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MAIN DRIVERS OF THE RECENT DECLINE IN ITALY'S NON-CONSTRUCTION INVESTMENT

by Fabio Busetti[1], Claire Giordano[1] and Giordano Zevi[1]

Abstract

This paper examines the causes of the exceptionally marked fall in non-construction investment in Italy since 2007. Non-financial private services were the main driver of the decline in the aggregate investment rate, but all sectors weighed in negatively; the reallocation of value added away from industry was a further drag on investment. In concordance with survey findings, an aggregate model of investment indicates that even during the recent double recession the most important driver of capital accumulation was demand conditions. The user cost of capital had a substantial negative impact in the acute phases of the sovereign debt crisis, but since 2013 its contribution has been positive, thanks to the ECB's expansionary monetary policy. The constraints on capital accumulation imposed by tight credit supply conditions were particularly severe in 2009 and 2012. Finally, uncertainty provided a sizeable drag on investment growth not only during the global financial crisis but also in the last two years. The significance of these determinants of investment is confirmed also by a disaggregated model for the thirteen manufacturing branches.

JEL Classification: E22, E27.
Keywords: non-construction investment, uncertainty, credit constraints.

Contents

[1] Banca d'Italia, Economics, Statistics and Research DG.

1. Introduction[2]

Total real gross fixed investment in Italy fell by around 30 per cent between the outbreak of the global financial crisis, in 2007, and 2014; currently it stands at absolute levels comparable to those of the mid-Nineties. A striking feature of the recent downturn in investment has been its unusual severity and duration. A comparison with past crises proves that the recent double recession has been exceptionally long and intense, both for gross domestic product (GDP), which cumulatively fell by nearly 10 per cent, and for gross fixed capital formation (GFCF; Table 1[3]).[4] While GDP declined more strongly in 2008-09 than in 2011-14, the downturn in investment was more severe in the latter recession.

The drop in GFCF in 2007-14 was also broad-based across investment products, with all types of expenditure at present below their pre-crisis level (including construction investment, here not reported; Fig. 1). This development is worrying in that non-construction expenditure is particularly relevant in boosting an economy's future productive capacity. In particular, GFCF in tangibles (i.e. machinery, equipment, weapons system and transport equipment, MET; information and communication technology, ICT), which represents one third of total investment expenditure (Table 2), declined by around 30 per cent in real terms. Investment in ICT and intellectual property products (IPP) performed better than the average; the former returned to growth in 2014; the latter (amounting to 15 per cent of the total) currently stands at a level that is only 4 per cent lower than that observed at its peak in 2009.

Table 1. The decline in GDP and investment during Italy's recent recessions

	1973-76 (1)			1992-93		
		GFCF			*GFCF*	
	GDP	*Non-construction*	*Total*	*GDP*	*Non-construction*	*Total*
Number of consecutive quarters of decline/increase	3	6	10	6	6	8
Cumulative percentage change	-3.8	-15.1	-8.5	-1.5	-20.4	-15.2
	2007-09 (2)			**2010-14 (3)**		
		GFCF			*GFCF*	
	GDP	*Non-construction*	*Total*	*GDP*	*Non-construction*	*Total*
Number of consecutive quarters of decline/increase	6	7	8	14	13	15
Cumulative percentage change	-7.0	-20.6	-14.2	-5.5	-22.8	-19.7
	2009-10 (4)			**2007-14 (5)**		
		GFCF			*GFCF*	
	GDP	*Non-construction*	*Total*	*GDP*	*Non-construction*	*Total*
Number of consecutive quarters of decline/increase	7	8	3	6+14	7+13	8+15
Cumulative percentage change	2.8	11.2	1.2	-9.6	-31.8	-30.3

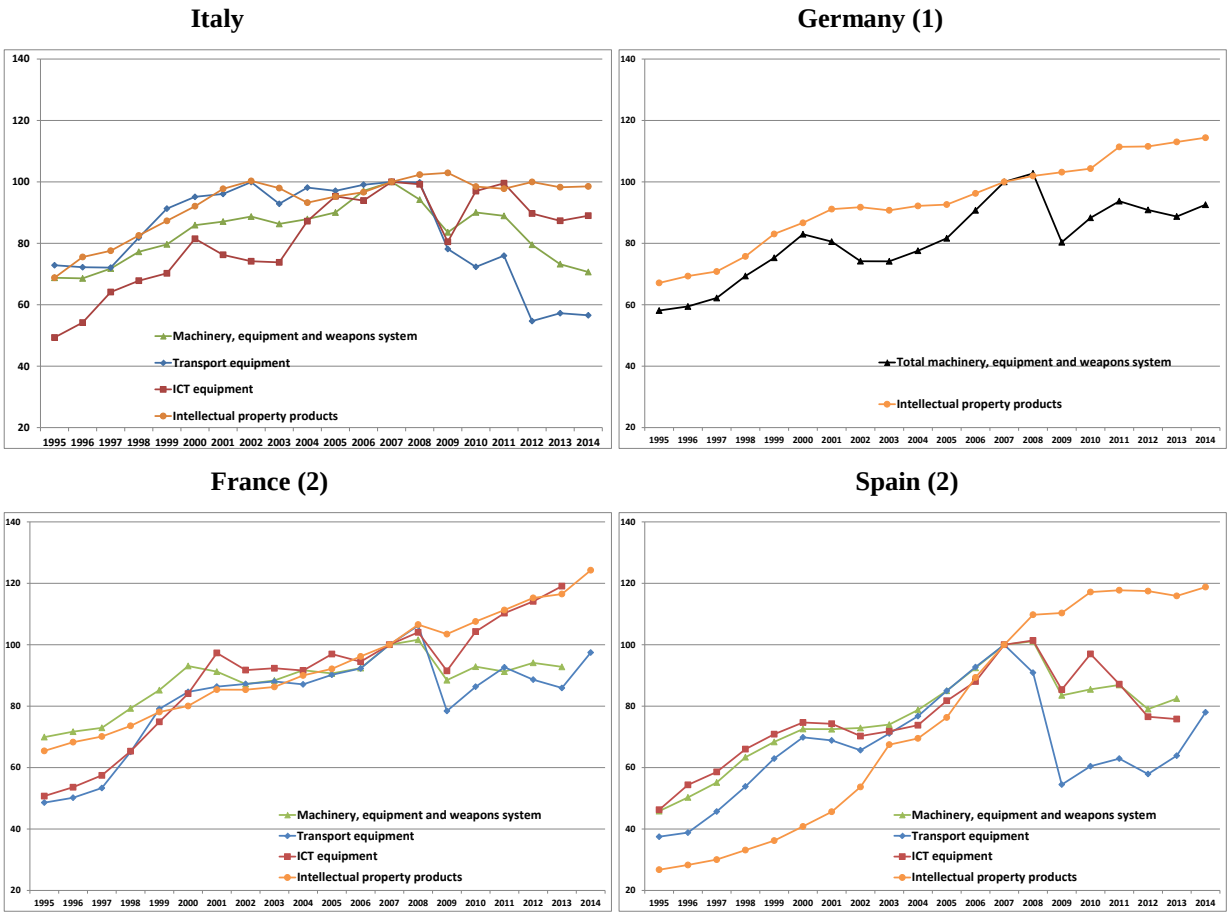
Source: Authors' calculations on Istat data.
Notes: (1) This period includes two quarters of slightly positive growth; (2) The period begins in 2007Q3 for non-construction GFCF and 2008Q1 for the other variables. It includes one quarter of positive growth for total GFCF; (3) The period includes one quarter of slightly positive growth for GDP and total GFCF and three quarters for non-construction GFCF; (4) The period includes one quarter of slightly decreasing total GFCF; (5) Overall decline since 2007-08.

[2] We are grateful to Alberto Locarno, Roberto Sabbatini, Stefano Siviero, Roberta Zizza and Francesco Zollino for useful comments on previous versions of this paper. Any error is however our own and the views here reported are those of the Authors and not of the Institution represented.
[3] We exclude investment in intellectual property products in Table 1 since the national account series prior to 1995 do not include Research and Development expenditure and are therefore not comparable.
[4] The apparent comovement between output and non-construction investment in the post-2007 downturns is however broadly similar to that observed during the historical recessions (i.e. with GFCF contracting about three to four times more than GDP), with the exception of the 1992-93 crisis, when the decline in overall economic activity was exceptionally contained in relative terms.

As well as in historical terms, Italy's investment slump was severe in an international comparison: total gross non-construction expenditure declined much more moderately in France and Germany, whereas the downturn in Spain was of a roughly comparable magnitude to Italy's (Fig. 1). Breaking down the components of tangible non-construction investment, developments in ICT investment were generally less unfavourable (in particular in France).[5] Differently to Italy, IPP investment in all three other main euro-area countries had no significant setback during the two recent crisis episodes.

Figure 1. Gross fixed non-construction investment by product in the four largest euro-area countries

(index 2007=100, chain-linked volumes)



Source: Istat and Eurostat.

(1) For Germany the breakdown for tangible non-construction investment is not available.

(2) For France and Spain the complete breakdown of investments series is available until 2013.

[5] The full breakdown of tangible non-construction expenditure for Germany is not available, although investment in ICT and "other machinery, equipment and weapons system" cumulatively recorded more favourable trends than those of the documented transport equipment expenditure (here not shown).

Table 2. Shares of gross fixed investment by product in the four largest euro-area countries in 2014

(percentage shares; computed on current values in 2014, unless otherwise indicated) (1)

	Italy	Germany	France	Spain
Construction	51	50	55	54
Total tangibles	33	32	22	31
Transport equipment	*5*		*6*	*8*
ICT equipment	*4*		*2*	*3*
Other machinery, equipment and weapons system	*24*		*14*	*20*
Intellectual property products	15	18	23	15

Source: Istat and Eurostat.

(1) The complete breakdown of investment series for France and Spain is available until 2013; shares were thus computed in 2013 for these two countries.

This paper delves into the causes of Italy's recent exceptional decline in non-construction expenditure. In particular, Section 2 measures the contribution of each economic sector in explaining the drop in Italy's gross tangible non-construction investment rate, relative to trends in France, Germany and Spain. Section 3 discusses the findings of the European Commission's Investment Survey for the four largest euro-area countries and exploits the Bank of Italy's most recent firm surveys to single out the key factors underlying investment developments in Italy, focusing mainly on weak demand, uncertainty and financial constraints. In Section 4, we quantify the role of each determinant in explaining the observed downturn in Italy, in particular exploring alternative measures of uncertainty. We first estimate a relatively standard investment model for the aggregate private sector at a quarterly frequency, that includes uncertainty and credit supply conditions. Given its relevance for non-construction investment in Italy, we next analyze a yearly 1986-2012 panel dataset of 13 manufacturing branches, which broadly confirms the results obtained at an aggregate level. Section 6 draws some conclusions. Appendix A provides some information on total investment developments. Appendix B derives the shift-share decomposition used in Section 2 and conducts an analysis on the gross intangible investment rate. Appendix C provides further survey-based evidence for the four largest euro-area countries and Appendix D includes details on the manufacturing branches considered in our panel estimates.

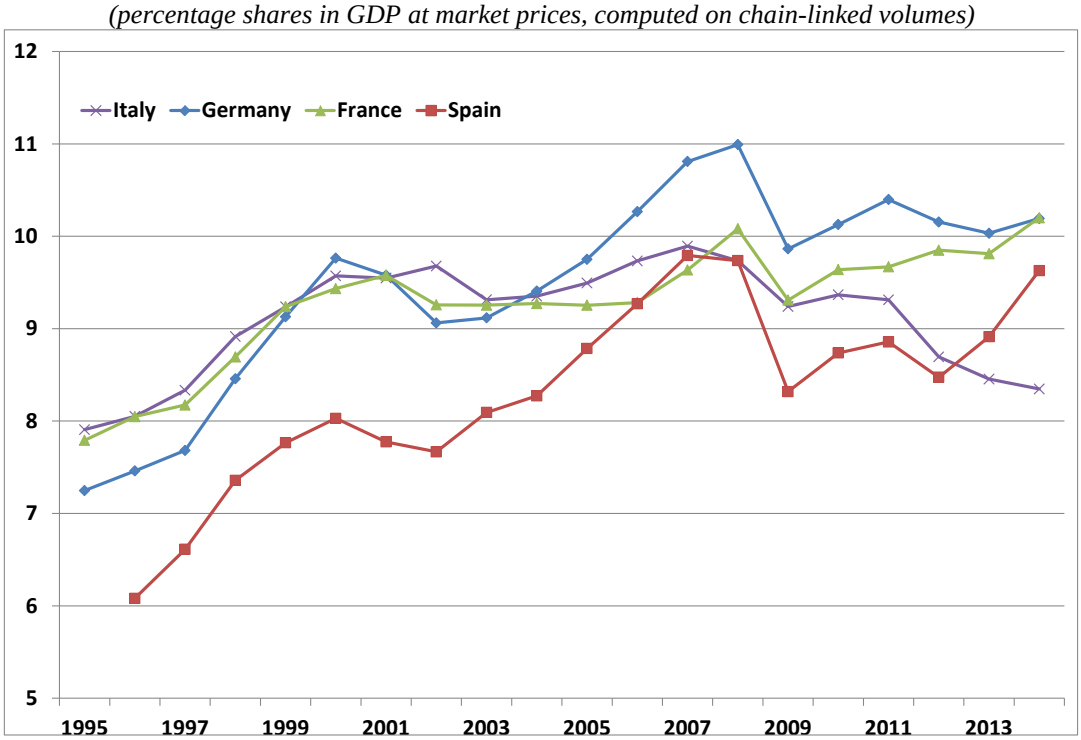
2. Sectorial drivers of the non-construction investment rate

Between the inception of the European Monetary Union and the outbreak of the global financial crisis in 2007 Italy's non-construction investment performance was not at all dismal in an international perspective[6]: its gross non-construction investment share in GDP was comparable to Germany and France's ratios (nearly 10 per cent), in turn about one percentage point higher than Spain's investment rates (Fig. 2; Table 3). However, in Italy the decline thereafter was the most long-lasting and pronounced across the four countries, leading to the lowest investment rate in 2014, at 8.3 per cent. Italy is currently the only large euro-area country recording an "investment gap" relative to its 2000-07 average, although in all four countries, with the exception of France, the investment rate is lower than the 2007-08 peak.

[6] This claim also holds for the total gross investment rate, shown in Appendix A, to which we refer.

Figure 2. Gross fixed non-construction investment rates in the four largest euro-area countries

(percentage shares in GDP at market prices, computed on chain-linked volumes)



Source: Istat and Eurostat.

Table 3. The current non-construction "investment gap" in the four largest euro-area countries

(percentage shares, when otherwise not indicated, computed on chain-linked volumes)

	A Medium-term average (1)	B Pre-crisis peak (2)	C 2014 investment rate	D Investment gap relative to medium-term average (3)	E Investment gap relative to pre-crisis peak (4)
Italy	9.6	9.9	8.3	-1.3	-1.6
Germany	9.7	11.0	10.2	0.5	-0.8
France	9.4	10.1	10.2	0.8	0.1
Spain	8.5	9.8	9.6	1.1	-0.2

Source: Our calculations on Istat and Eurostat.

(1) 2000-07 annual average.
(2) 2007 for Italy and Spain, 2008 for Germany and France.
(3) D= C-A. In percentage points.
(4) E=C-B. In percentage points.

A sectorial analysis helps shed light on the drivers of Italy's sharp investment decline in recent years. Growth in the total-economy investment rate stems from changes in investment intensity in each industry ("within effect") and varying shares of each sector in total output ("between effect"). Via shift-share analysis, it is therefore possible to ascertain to what extent aggregate investment rates reflect the investment behaviour in individual sectors and the changing sectorial composition of the economy.

By defining $X \equiv \frac{I}{Y}$, where I is nominal GFCF and Y is nominal value added, in Appendix B we show that:

$$(1)\ \frac{\hat{X}}{X} = \sum_{s=1}^{n} \frac{\hat{X_s}}{X_s} \frac{I_s}{I} + \sum_{s=1}^{n} \frac{I_s}{I} \left(\frac{\hat{Y_s}}{Y_s} - \frac{\hat{Y}}{Y} \right)$$

where ^ indicate differentials and *s* is one of the *n* sectors of the total economy. The first term on the right-hand side of the equation is the "within effect" and the second term is the "between effect".

We break the total economy down into six sectors: (i) agriculture, forestry and fishing; (ii) industry (except utilities); (iii) private regulated sector (utilities; transport and communication); (iv) finance, insurance and real estate (FIRE); (v) private unregulated services; (vi) public sector (public administration, health and education). Owing to their different dynamics, as seen in Figure 1, we here consider only tangible non-construction investment (i.e. MET and ICT investment, excluding IPP), whereas the same analysis is conducted for intangible expenditure in Appendix B.

Since 1995 the sectorial breakdown of gross fixed tangible non-construction capital formation has been surprisingly stable in Italy. By contrast, the share of industry has fallen significantly and that of private regulated services had increased moderately in the other three largest euro-area countries (Table 4). In Italy industry is the key sector in tangible non-construction investment, undertaking on average around 39 per cent of total expenditure, the largest share in an international comparison; Italy's industrial investment rate – equal to about 14 per cent – is also the highest across the four countries. Conversely, the weight of private (regulated and unregulated) services is relatively low. Public investment spending is also subdued in comparison with the other main euro-area countries, owing to fiscal consolidation that began in the mid-Nineties.

Table 4. Sectorial tangible non-construction investment rates (1)

(average annual percentage values; shares in total tangible non-construction investment in brackets; investment rates and shares computed on series at current prices)

	Agriculture, forestry and fishing	Industry net of utilities	Finance, insurance and real estate	Public administration, defence, education and health	Private regulated sector (transport and communication; utilities)	Private unregulated services
A. Italy						
1995-1999	13.3 (5.4)	12.0 (38.9)	1.1 (2.0)	4.6 (9.1)	14.3 (20.8)	6.5 (23.8)
2000-2007	17.0 (5.2)	14.0 (39.0)	1.0 (1.9)	4.8 (9.0)	14.1 (19.9)	7.5 (25.0)
2008-2012	17.2 (5.3)	13.6 (39.3)	0.8 (1.8)	4.6 (10.3)	12.8 (20.7)	6.1 (22.7)
B. Germany						
1995-1999	21.5 (2.7)	9.5 (31.7)	1.9 (3.6)	5.1 (10.2)	12.7 (16.4)	11.8 (35.5)
2000-2007	27.6 (2.8)	9.1 (27.5)	1.5 (2.6)	5.7 (11.1)	13.6 (18.0)	12.6 (38.0)
2008-2013	32.8 (3.3)	8.6 (27.4)	1.3 (2.4)	5.3 (11.4)	12.2 (18.5)	11.6 (37.0)
C. France						
1995-1999	16.5 (7.1)	7.8 (26.7)	1.5 (3.7)	3.9 (13.8)	11.6 (23.0)	5.8 (25.7)
2000-2007	18.7 (6.2)	7.8 (24.9)	1.6 (4.1)	3.2 (11.1)	12.5 (25.6)	5.9 (28.0)
2008-2013	24.5 (7.7)	6.4 (21.1)	1.5 (4.6)	3.0 (12.6)	12.7 (28.0)	4.9 (26.0)
D. Spain						
1995-1999	6.0 (3.5)	9.0 (32.5)	3.5 (4.8)	5.3 (11.6)	18.0 (28.6)	5.0 (19.0)
2000-2007	4.6 (1.9)	7.9 (27.1)	2.5 (3.7)	6.4 (12.6)	18.4 (26.2)	7.9 (28.5)
2008-2012	7.8 (2.9)	6.2 (21.0)	1.3 (2.9)	5.2 (14.2)	19.0 (35.1)	5.4 (23.9)

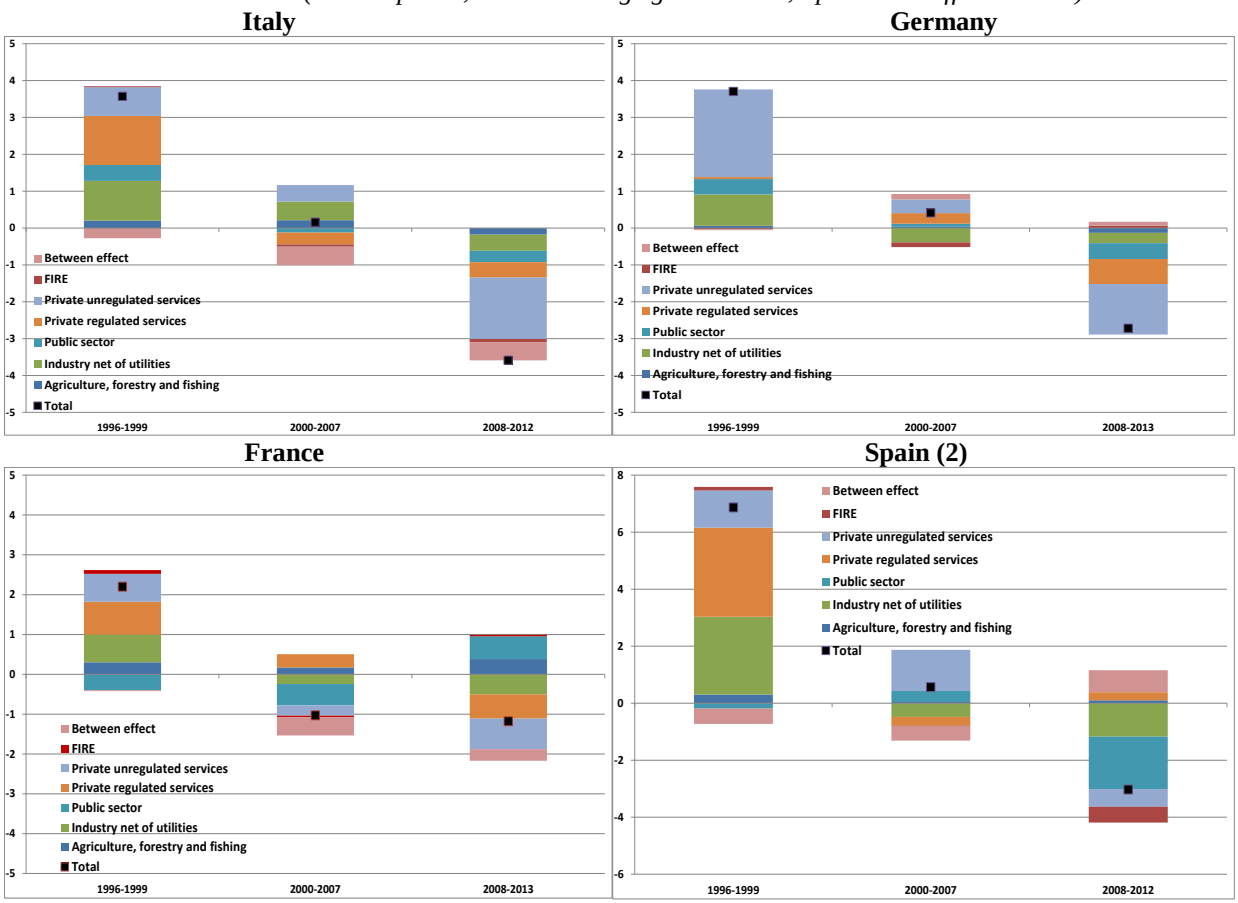
Source: Authors' calculations on Istat and Eurostat.

(1) Sectorial data for Italy and Spain are available until 2012.

Figure 3 presents the shift-share decomposition of aggregate tangible non-construction investment rates in the four countries under study for three sub-periods (1996-99; 2000-07; 2008-12).[7] The sum of the contributions of each sector is the total "within effect", here not shown.[8]

Figure 3. The decomposition of total-economy tangible non-construction investment rates in the four largest euro-area countries (1)

(current prices; annual average growth rates; Spain on a different scale)



Source: our calculations on Istat and Eurostat.

(1) Sectorial data for Italy and Spain are available until 2012.

(2) The scale for Spain is different to the other countries.

In Italy in 1995-2012 private services were the main driver of the total economy tangible non-construction investment rate dynamics, with a larger contribution coming from the unregulated *vis-à-vis* the regulated sector as of the 2000s; industry too was an important positive contributor until 2007, explaining on its own nearly one third of the total "within effect". Whereas in the years prior to the global financial crisis the aggregate "within effect" was positive (in particular, reflecting positive investment rate growth of all sectors before the inception of the Economic Monetary Union), in the recent recessionary period until 2012 sectorial investment rates declined across the board. Non-financial private services were the main driver of the recent aggregate downturn: in particular, this sector explains about two-thirds (i.e. over 2 percentage points) of the total-economy investment rate decline, against a negative contribution of industry of less than 0.5 percentage

[7] Only for France and Germany data are available for 2013. The shift-share analysis of this section is conducted on current price series, owing to non-additivity of constant price series. Annual average growth rates are taken for each sub-period; similar results are obtained when considering cumulative growth rates over each sub-period.

[8] Rounding up leads to small discrepancies between the aggregate investment rate and the sum of the "within" and "between" effects.

points, notwithstanding its roughly equivalent weight. The "between effect" – which reflects the tendency to a reallocation of value added away from industry, a high-investment intensity sector, to private services[9] – also contributed negatively to overall investment rate developments in the most recent years, as in the previous sub-periods.

Sectorial developments in Italy were similar to those in Germany, with the main difference being that in the latter country private unregulated services were by far the main driver of aggregate trends in tangible non-construction investment as of 1996, explaining nearly two thirds of the pre-EMU expansion and half of the downturn in recent years. In the 2008-13 period average annual sectorial investment rates were all negative or negligible, with total non-financial private services explaining two thirds of the total-economy slump and industry less than one sixth. Differently from Italy, since the early 2000's industrial value added in Germany grew at a faster rate than that of the total economy, to the detriment of private services especially in the recent recessionary years; the sectorial reallocation of value added to the advantage of industry observed in 2008-13 thus resulted in a small positive "between effect".

In France sectorial investment growth rates were more heterogeneous than in the other countries and no sector stands out as systematically driving aggregate developments over the 1995-2013 period. Trends in agriculture investment (whose share is relatively large in France; Table 4) had a non-negligible positive impact on aggregate investment over the entire period, including the recent recessionary years. In the most recent sub-period the positive contributions of agriculture and the public sector did not offset the negative contributions of the other sectors nor of the "between effect" (which was similar to Italy's).

Finally, in Spain whereas the exceptional growth prior to 1999 was explained mainly by the industrial and private service sectors, the sharp downturn in 2008-12 was largely determined by the industrial and public sectors. The "between effect", negative in the sub-periods before 2008, turned substantially positive during the recession years, owing to the non-negligible reallocation of value added away from industry to the advantage of the private regulated sector, which features an exceptionally high investment intensity in Spain.

This analysis suggests that in Italy in coming years, assuming the "between effect" will continue to be negative, the inversion of the declining trend in the total economy tangible non-construction investment rate crucially hinges on a recovery in private non-financial service expenditure.

3. Economic drivers of Italy's investment decline according to survey data

3A. Determinants of investment in the four largest euro-area countries

The European Commission (EC) Investment Survey, taken bi-annually in spring and autumn, allows us to analyse firms' perceptions on the economic determinants of the recent decline in Italy's manufacturing investment and to set them in an international perspective.[10] According to this survey, insufficient demand prospects and low capacity utilization rate were the most important factors constraining investment in manufacturing in Italy in 2014[11], in addition to policy uncertainty

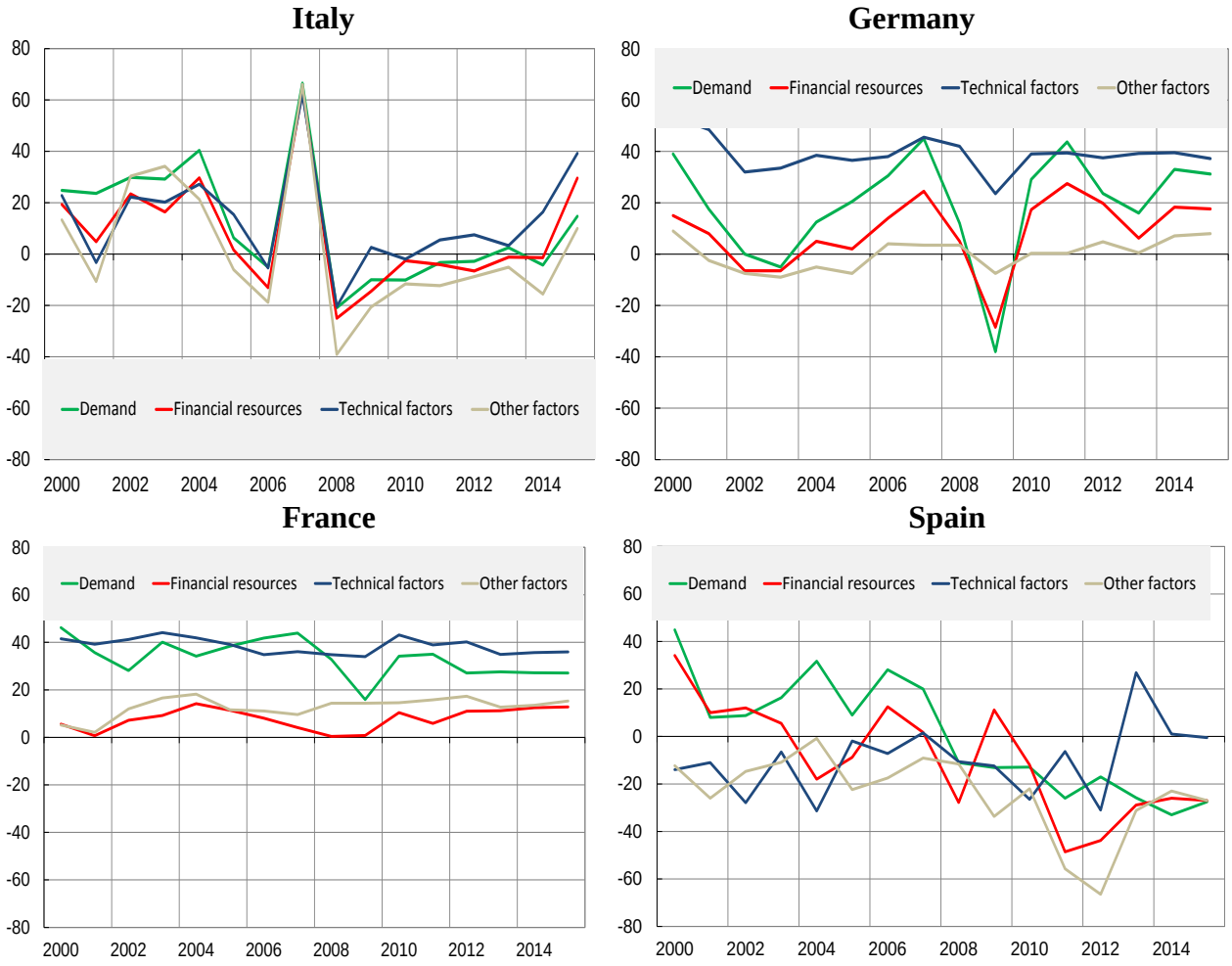
[9] Value added in industry net of utilities consistently grew less than the total economy as of 1995; in particular, in 2007-12 whereas the total economy output increased on average by 0.2 per cent each year, industrial value added actually declined by an annual rate of 2.4 per cent (figures here not shown).

[10] A comparison between the declarations of surveyed manufacturing firms on their realized investment and comparable national account data shows that the EC Investment Survey is particularly informative in the case of France and Germany, less telling for Italy – for which the Bank of Italy's yearly Survey of Industrial and Service Firms (Invind) conducted in spring is more indicative – and not very useful for Spain. See Appendix C for further details.

[11] See Appendix C for a comparison of capacity utilization rates in manufacturing.

(included in 'other factors'; Fig. 4); conversely, the drag on investment spending stemming from financial constraints waned and technological factors actually boosted GFCF. According to firms' expectations expressed in the latest survey taken in the Autumn of 2014,[12] in 2015 all factors were expected to boost investment expenditure, with an unchanged ranking relative to 2014.

Figure 4. The drivers of manufacturing firms' investment according to the EC Investment Survey (1)
(balances; percentage points)



Source: European Commission.
(1) "Demand" covers the capacity utilization rate and sales prospects; "financial resources" refers to the availability and cost of resources for investment, and the return on investment; "technical factors" include technological developments, the availability of labour, the labour-force's attitude towards new technologies and the technical conditions to be met to obtain investment permits; "other factors" include, for example, public policies, notably with regard to taxation, and whether or not production can be transferred abroad.

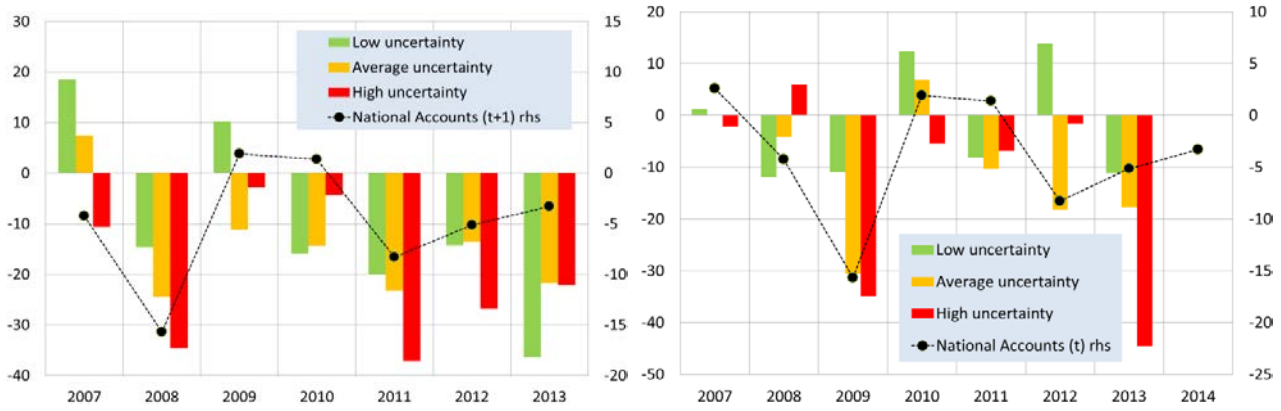
In the other three main euro-area countries, developments are somewhat different. German manufacturing firms registered a positive and increasing stimulus from all determinants in 2014, with the exception of technical factors, which remained stable on high levels; a stabilization of all sources of investment growth was expected for 2015. French firms' opinions are instead generally less sensitive to the business cycle, with financial factors perceived as being the least relevant. Finally, Spain is the only country for which weakness in demand and lack of financial resources should still exert a drag on investment also in 2015.

[12] The question on the determinants and aims of investment is indeed included only in the autumn Investment Survey.

The EC Investment Survey does not explicitly include economic uncertainty among the determinants of investment. Limited to Italy, the Bank of Italy's survey Invind, taken in spring, allows gauging the effects of a measure of this type of uncertainty on investment expenses at firm level.[13] We classify the firms for which the uncertainty (on expected turnover growth) is above the 75 percentile as "high uncertainty" units, those for which it is below the 25 percentile as "low uncertainty", and the remaining units as "average uncertainty". The left panel of Figure 5 shows the difference, according to these three groups of firms, between the share of firms that expect higher investment at year T for year T+1 and those that expect less investment; the black line indicates the change in investment recorded by national accounts, shifted backward by one year in the left panel. For most years in the period under study the plans previously formulated by high-uncertainty firms were especially pessimistic in comparison to the other groups. In the right panel of Figure 5 the percentages of firms increasing or decreasing realized investment in year T are separated into groups defined by *ex ante* uncertainty (measured in year T-1). Again for much of the 2007-13 period the most uncertain firms tend to confirm even *ex post* their lower investment.

Figure 5. Expected and realized investment for low and high uncertainty Italian firms

(difference in percent between the quota of firms that plan to increase investment in the following year and those that plan a decrease –left panel- and same difference for realized investment –right panel) (1)



Source: Authors' calculations on Bank of Italy (Invind) data; data weighted with the number of employees.
(1) The latest available Invind survey was taken in the Spring of 2014.

Finally, the EC autumn Investment Survey also provides information on the purposes of investment in the manufacturing sector. In addition to indicators signaling historically low capacity utilization rates (shown in Figure C3 in Appendix C), this survey indicates that there is still a large amount of slack, in particular in the Italian economy, pointing to a relatively low need for extension investment. Firms' replacement investment will in fact be greater in 2015 than in the previous year for all four main euro-area countries, in particular in Italy (see Figure C4 in Appendix C).

3B. A focus on investment developments and determinants in Italy in 2014 and in 2015

The Bank of Italy, in coordination with the daily *Il Sole 24 Ore*, conducts a quarterly survey on manufacturing and non-financial private service firms, which give their judgments on investment conditions with respect to the previous quarter and, starting from 2012, are questioned on their plans of increasing or decreasing fixed capital expenses with respect to the previous year and to the previous semester. In addition, every autumn the Bank of Italy conducts the Business Outlook Survey of Industrial and Service Firms (Sondtel).

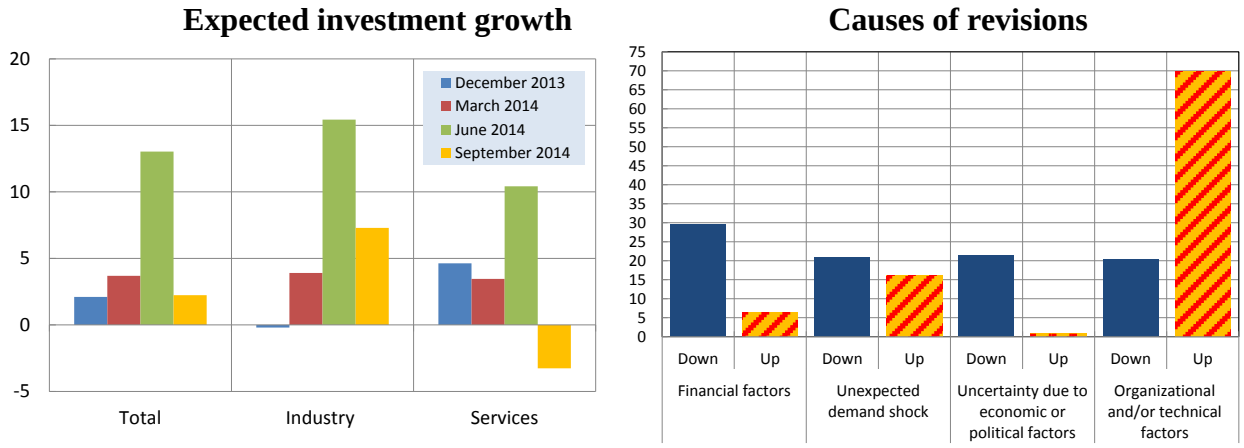
The Bank of Italy - *Il Sole 24 Ore* survey recorded generally dismal investment prospects for 2014, with the exception of the June survey (Fig. 6; left panel). In all four relevant editions of the

[13] Specifically, firms are requested the maximum and minimum expected growth rate in their turnover for the next year.

survey over half of the total interviewed firms expected unchanged investment in 2014 with respect to the previous year. According to Sondtel data, lower investment growth relative to investment plans was mostly attributed to a worsening of financial factors (29 per cent), followed by uncertainty (Fig. 6; right panel). Conversely, organizational and technical factors and, to a lesser extent, positive demand shocks resulted in upward revisions for a large share of firms.

Figure 6. Revisions of expected investment growth and their causes in Italy in 2014 according to Bank of Italy surveys

(balances in percentage points in left panel; percentage shares in right panel)



Source: Authors' calculations on Bank of Italy - *Il Sole 24 Ore* and Bank of Italy (Sondtel) data; Sondtel data weighted with the number of firms.

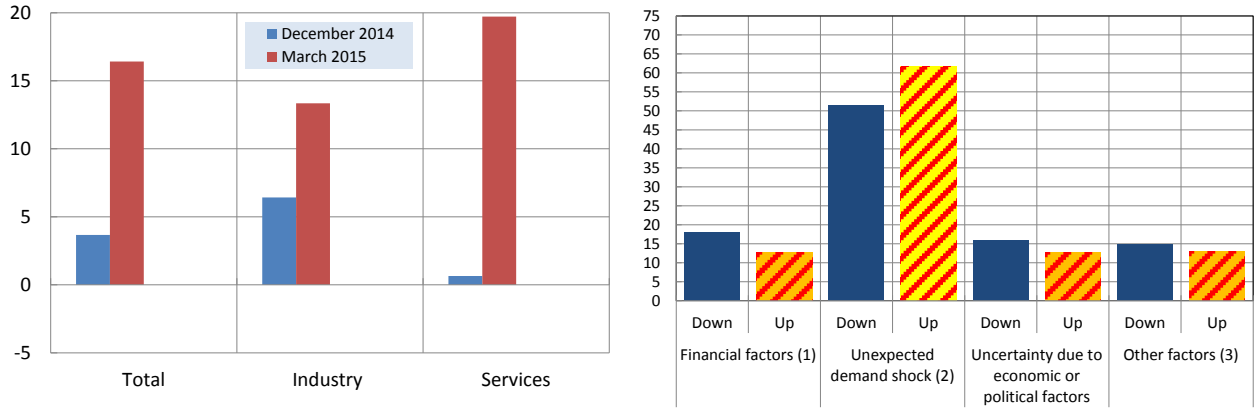
Concerning 2015, the December 2014 Bank of Italy - *Il Sole 24 Ore* survey was still very cautious (Fig. 7, left panel); in March 2015 the net balance increased to over 15 percentage points for the total economy, driven in particular by the tertiary sector; however, about half of the respondents still expected unchanged investment in 2015. Developments are likely to be more favourable in the second half of 2015 relative to the first (Banca d'Italia, 2015b). According to Sondtel data, greater investment growth in 2015 with respect to the previous year relies especially on stronger demand (more than 60 per cent of answers, cumulating domestic and foreign components; Fig. 7, right panel). The effects of the other factors appear, on the other hand, to be broadly balanced.

Finally, the investment conditions series of the Bank of Italy - *Il Sole 24 Ore* survey, dating back to 2004Q4, has consistently proved to anticipate the direction of changes in investment in the following year (Fig. 8; the investment conditions series is shifted forward by four quarters). Also according to this indicator, investment growth of the manufacturing and non-financial private service sector should be positive, yet modest, in 2015, with a more robust recovery expected for 2016.

Figure 7. Revisions of expected investment growth and their causes in Italy in 2015 according to Bank of Italy surveys

(balances in percentage points in left panel; percentage shares in right panel)

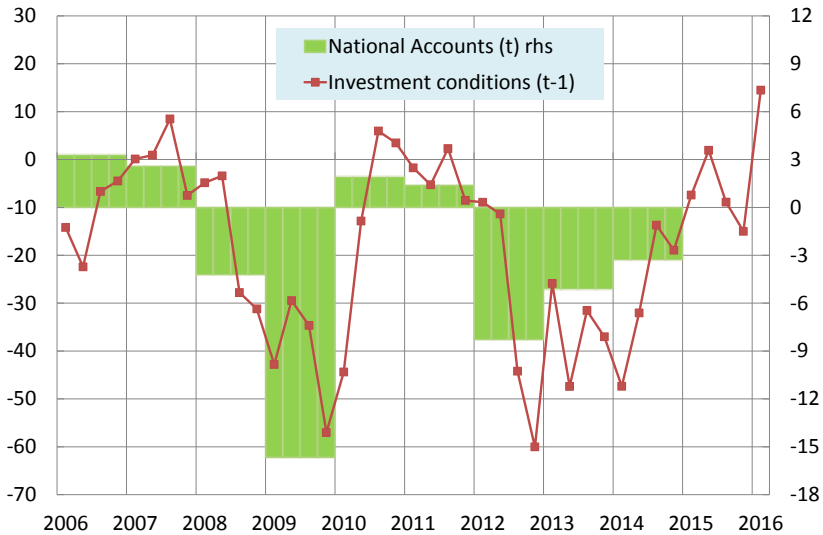
Expected investment growth **Causes of revisions**



Source: Authors' calculations on Bank of Italy - *Il Sole 24 Ore* and Bank of Italy (Sondtel) data; Sondtel data weighted with the number of firms.
(1) Financial factors include payment of Government arrears. (2) Demand factors refer to both domestic and foreign demand. (3) "Other factors" also include the cost of raw materials.

Figure 8. Judgments on conditions for investment and investment y-o-y-change in Italy according to the Bank of Italy - *Il Sole 24 Ore* survey

(balances in percentage points; percentage change on previous year)(1)



Source: Authors' calculations on Bank of Italy - *Il Sole 24 Ore* data; data weighted with the number of firms.
(1) National account data referring to tangible investment of industry, net of construction, and non-financial private services; our calculations for 2013; total investment for 2014.

4. Assessing the impact of uncertainty and credit frictions on investment dynamics in Italy

We now move on to substantiate the described survey evidence for Italy empirically.

The "accelerator model" suggests that output fluctuations have a key role in explaining investment behavior (Chirinko 1993). The cost and availability of financial resources, as well as the structure of corporate balance sheets, are also of relevance.

Uncertainty has been long recognized as a major factor in investment decisions, in that it may lead to a postponement of investment plans or an increase in the case of more desirable risk-return prospects. While economic theory provides contrasting explanations regarding the sign and relevance of the investment-uncertainty relationship (Leahy and Whited, 1996)[14], the empirical literature largely converges in pinning down negative effects of uncertainty on capital accumulation[15]. On a cross-section of Italian manufacturing firms, Guiso and Parigi (1999) find that firm-specific uncertainty weakens investment, the more when capital expenses are less reversible and the greater the firm's market power; by employing panel data for the period 1996-2004, Bontempi, Golinelli and Parigi (2010) confirm these results and also find that the negative effect of uncertainty on investment plans weakens for firms that can employ a more flexible labour input. Fuss and Vermeulen (2004) show that also for a panel of manufacturing Belgian firms subjective demand uncertainty depresses planned and realized investment, whereas price uncertainty is insignificant. Bloom, Bond and Van Reenen (2007), in an influential paper first released in the aftermath of the huge rise in uncertainty following the September 11 events, show that the responsiveness of investment to demand shocks decreases in periods of high uncertainty in a sample of U.K. manufacturing companies. Recently, among others, Gilchrist, Sim and Zakrajsek (2010; 2014) explore the connection between uncertainty and credit shocks and "point to financial distortions as the main mechanism through which fluctuations on uncertainty affects macroeconomic outcomes" (2014, p. 1). Bachmann, Elstner and Sims (2014) employ German IFO Survey microdata and U.S. data from the Philadelphia FED Business Outlook Survey to build survey-based uncertainty indexes and show that the negative impact on investment expenses of rises in uncertainty are stronger in Germany but more persistent in the U.S. (which could reflect stronger capital irreversibility in the former case, a larger impact of financial frictions in the latter). Banerjee, Kearns and Lombardi (2015) find that uncertainty lowers investment in a quarterly panel of G7 countries while Barkbu *et al.* (2015) point to a large effect of demand expectations, which is compounded by financial and uncertainty factors in the euro area.

Following this stream of literature, in this section we evaluate the impact of uncertainty and of the other drivers on capital spending in Italy. First, we provide aggregate evidence for private sector non-construction investment using an econometric relationship that follows the modeling approach in the Bank of Italy Quarterly Model (BIQM), augmented to take into account the effects of uncertainty and credit supply conditions. A decomposition of the recent fall in investment in terms of the contributions of each determinant is also presented. Next we provide panel estimates of the effects of uncertainty and liquidity conditions for 13 manufacturing branches; this evidence broadly confirms and corroborates the previous results based on aggregate data. Focusing on manufacturing is indeed particularly relevant for Italy, given the high non-construction investment rate of this sector in an international perspective, as seen in Section 2. In both the aggregate and disaggregate approaches, uncertainty is proxied with survey measures of the dispersion of agents' expectations on their own demand conditions and/or general economic environment.

4A. Aggregate estimates for private sector non-construction investment (quarterly data)

We assess the impact of the various determinants of the private sector non-construction investment using an econometric relationship that follows the modeling approach of the BIQM. In particular, the investment equation is obtained within a standard neoclassical model where firms derive investment and labour demand by a cost minimization problem, given factor prices and the

[14] The sign of the relationship depends on the technological features of firms' production functions and the structure of the product market, and in particular on the degree of reversibility of the investment expenses (the more reversible they are, the less relevant is uncertainty; Bernanke, 1983), firms' risk aversion and market power (for a risk-neutral competitive firm greater uncertainty increases investment; Abel, 1993), the interplay between irreversibility and monopolistic power (Caballero, 1991), the degree of flexibility of labour (which can compensate for the irreversibility of investment; Eberly and Van Mieghem, 1997).

[15] See Carruth, Dickerson and Henley (2000) for a review of the literature until 2000.

desired level of additional production capacity. Assuming a Cobb-Douglas production function and the non-malleability of capital, it is known that desired investment as a share of expected demand is equal to the optimal capital/output ratio K*, which in turn is a function of factor prices (see Busetti, Locarno and Monteforte, 2005, for further details on the BIQM specification).

The empirical counterpart is a dynamic model of investment with long-run homogeneity restrictions between investment and the capital/output ratio and investment and output; expectations and adjustment costs are taken into account by including several lags of the private sector value added and the capital/output ratio. The estimated model is thus specified as:

$$(2)\ i_t = \beta_0 + \beta_1\left(i_{t-1} - \left(k^*_{t-1}(uc_{t-1}) + y_{t-1}\right)\right) + \sum_{j=1}^{p}\beta_{2,j}\Delta y_{t-j} + \sum_{j=1}^{q}\beta_{3,j}\Delta k^*_{t-j}(uc_{t-j}) + \gamma' z_t,$$

where i_t, y_t, $k^*_t(uc_t)$ are (the logarithm of) the investment expenditure, the private sector value added and the optimal capital/output ratio, respectively, the latter being a known function of the user cost of capital uc_t. Compared with the standard neoclassical model, the model includes three additional determinants:

$$z_t = \left(confid_t,\ uncert_t,\ credit_t\right)',$$

that are aimed at capturing the effects of: (i) the entrepreneurs' level of confidence on the general and own economic outlook, (ii) the firms' uncertainty proxied by a measure of dispersion of their 'sentiments' (second moments), (iii) credit conditions.

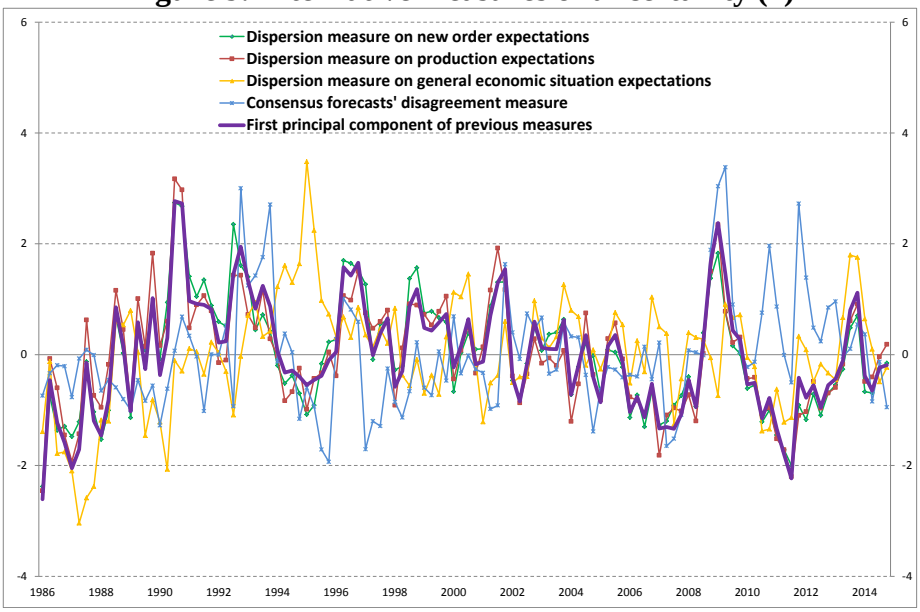
In more detail, the level of confidence is measured by the average sentiment indicator for manufacturing firms published by Istat[16]. For uncertainty several proxies are considered. From the Istat survey we derive a dispersion measure of replies regarding expectations for (1) orders, (2) production, and (3) general economic situation; these measures are defined as in Fuss and Vermeulen (2004) and Bachmann, Elstner and Sims (2014)[17]. In addition we look at (4) the dispersion (in terms of standard deviation) among the forecasts of Italian GDP provided by the analysts surveyed by Consensus Economics. These four different measures are shown in Figure 9 for the period 1986Q1-2014Q4, together with (5) an 'average measure' obtained by taking the first principal component of (1), (2), (3) and (4). Finally, credit frictions are captured by the synthetic indicator of credit supply conditions obtained by the Italian Bank Lending Survey.[18]

[16] This variable can be interpreted as a way of capturing the more forward-looking component of expected demand.

[17] In particular, the dispersion measure is computed as $uncert = \sqrt{frac_t^+ + frac_t^- - (frac_t^+ - frac_t^-)^2}$, where $frac_t^+$ and $frac_t^-$ are the fractions of firms in the cross section with "increase" and "decrease" responses at time t. This measure is the cross-sectional standard deviation of survey responses when the "increase" response is coded as 1, the neutral response as 0 and the "decrease" response as -1.

[18] We use the *index of supply tightening* for firms, that is a weighted average of the values assigned to the qualitative answers obtained from the banks involved in the survey as follows: 1 = tightened considerably, 0.5 = tightened somewhat, 0 = basically unchanged, - 0.5 = eased somewhat, - 1 = eased considerably. See http://www.bancaditalia.it/statistiche/tematiche/moneta-intermediari-finanza/intermediari-finanziari/indagine-credito-bancario/index.html for details.

Figure 9. Alternative measures of uncertainty (1)



Source: Authors' calculations on Istat and Consensus Economics.
(1) The measures have been standardized.

The model has been estimated by OLS with quarterly data over the period 1986-2013. Its properties are summarized in Figure 10, which reports the response of investment (with respect to the baseline level) to shocks to its determinants after 1,2,…,40 quarters, the so-called '*dynamic multipliers*'. Specifically, we consider: (1) a temporary (two years) shock to uncertainty, calibrated with what was observed at the time of the 'Great Recession' (we apply for 8 quarters the difference between the average values in the uncertainty indicator between 2008-09 and 2006-07); (2) a temporary (two years) shock to confidence, similarly calibrated; (3) a temporary (two years) shock to credit supply conditions, similarly calibrated; (4) a permanent increase by 1 per cent in output; (5) a permanent increase of 100 basis points in the real user cost of capital.

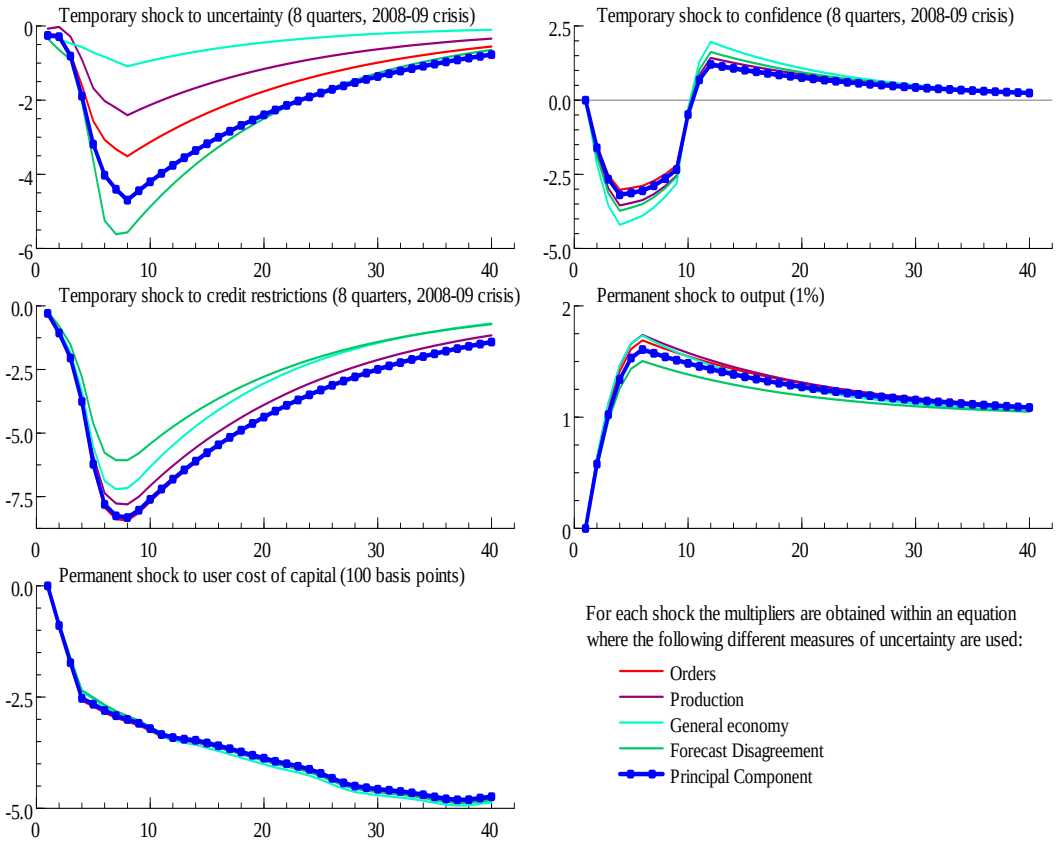
The effects of uncertainty shocks to investment are provided in the top left panel. A worsening of uncertainty of a similar magnitude as that observed during the 2008-09 recession curbs investment sizably, cumulatively by about 5 per cent after two years according to the first principal component of the four elementary indicators.

Following a temporary shock to the level of firms' confidence, calibrated looking at the average deterioration recorded during the 'Great Recession', the maximum impact on investment falls between 3 and 4 per cent, but vanishes rapidly as the shock disappears.[19]

Credit restrictions of a magnitude similar to what was on average observed in 2008-09 exert a sizable negative impact on investment, ranging between 6 and 8 per cent after two years. This result appears broadly in line with the estimates reported in Panetta and Signoretti (2010) and Caivano, Rodano and Siviero (2010), where several different ways of identifying the effects of the credit supply restrictions of 2008-09 were considered.[20]

[19] The shock to uncertainty is gradually and mostly absorbed after 8 quarters, as seen in the actual data. By contrast the negative shock to firms' confidence is still large after 8 quarters: this explains the sharp rebound of the dynamic multiplier when the shock is removed.
[20] Those papers reported a negative impact on GDP in a range between 0.5 and 1.5 per cent, which seems consistent with our figures for non-construction private investment (that in 2008-09 accounted by about one tenth of GDP).

Figure 10. Dynamic multipliers of the investment equation with respect to shocks to uncertainty, confidence, credit supply conditions, output, user cost of capital



The 'accelerator' reaches a peak in the second year when the elasticity of investment to output is between 1.5 and 1.8; the elasticity then gradually returns to 1 following the long term constraint imposed, and tested, in the model.

Finally, a permanent rise of 100 basis points in the real user cost of capital has a gradual and prolonged negative impact on investment, peaking at about -5 per cent after 10 years (-4 after 5 years). It is noteworthy that the multipliers with respect to output and the cost of capital are similar (albeit somewhat smaller) to those that were estimated using the data before the crisis, as reported in Busetti, Locarno and Monteforte (2005, table 1).

The estimated model of investment can shed light on the factors behind the large decline in capital accumulation observed during the double recession. Figure 11 shows the contributions of each of the determinants included in the model to the year-on-year growth rate of the private-sector non-residential investment.[21] In most periods the main driver is the demand component (sum of the output and confidence contributions). The real user cost of capital provided a large negative impact during the most acute phases of the sovereign debt crises, but contributed positively since 2013 (overall by nearly 4 percentage points), mainly reflecting the effects of the expansionary monetary policy measures adopted by the European Central Bank. The constraints to capital accumulation imposed by tight credit supply conditions accounted about one third of the fall in investment occurred during the periods 2008-09 and 2012-13. Finally, uncertainty provided a sizeable negative

[21] The quarterly series of private-sector non-construction investment has been obtained by a standard temporal disaggregation methodology that uses the quarterly series available for the whole economy. For 2013 and 2014 the data for non-construction investment for the public sector (from which private sector's expenditure is obtained) are not yet available; they are thus proxied by employing the dynamics of total public investment.

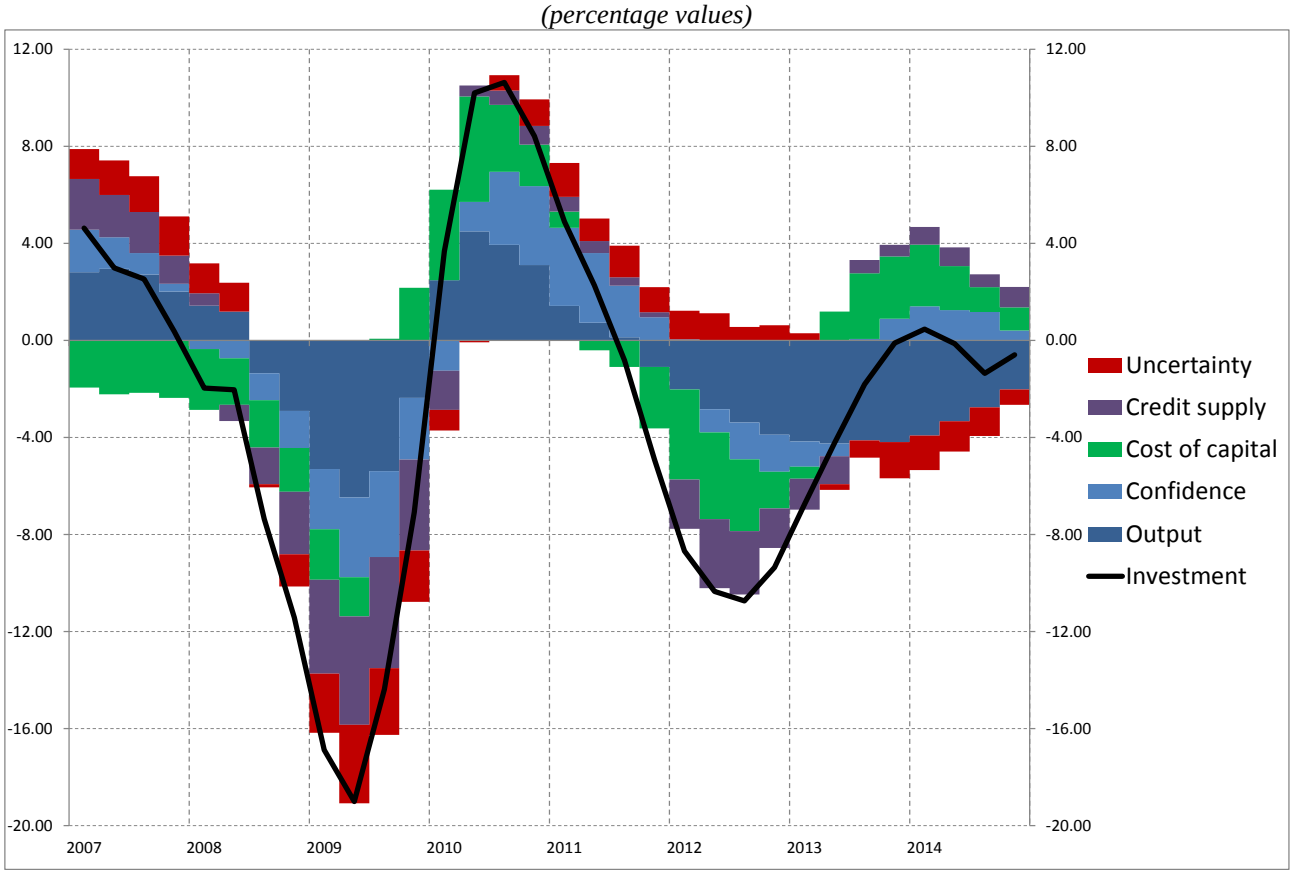
impact not only during the 'Great Recession' but also since mid-2013, and stands out as one of the factors explaining the delayed recovery of the Italian economy.

The econometric decomposition in Figure 11 is consistent with the qualitative results coming from the surveys and described in Section 3. An analysis by the IMF provides a similar assessment (IMF, 2015; Chapter 4). The results presented here are also coherent with the counterfactual exercise of Busetti and Cova (2013) where simulations of the BIQM were used to identify the contributions of the main factors related to the sovereign debt crisis.

In perspective – absent large external shocks – the dynamics of all determinants should turn positive in 2015 and in 2016: confidence has increased further at the beginning of this year and uncertainty has declined; the ECB's asset purchase program and the targeted longer term refinancing operations (TLTROs) are expected to lower firms' financing costs and further improve credit supply conditions; the lagged effects of past output declines would vanish and be replaced by increases according to most forecasters' predictions. The firms' replies in the most recent March 2015 Bank of Italy – *Il Sole 24 Ore* survey point in the same direction.[22]

Figure 11. Factors driving the dynamics of the private sector's non-construction investment since the 'Great Recession'

(percentage values)



[22] The March survey moreover signals a diminished drag on firms' activity stemming from economic uncertainty relative to three months earlier (when this question was first introduced) and a positive contribution originating from financial factors for the first time since March 2008 when this question was included in the survey questionnaire (Banca d'Italia, 2015a).

4B. Annual panel estimates on manufacturing non-construction investment

Moving to the disaggregated analysis, the empirical investment model applied to annual 13-sector manufacturing data for 1986-2012 has the following baseline specification[23]:

(3)

$$\Delta i_{i,t} = \alpha_0 + \alpha_{1i,t} + \alpha_{2i,t}\,\Delta i_{i,t-1} + \alpha_{3i,t}\,\Delta va_{i,t} + \alpha_{4i,t}\,\Delta interest_{i,t-1} + \alpha_{5i,t}\,liquidity_{i,t-1} + \alpha_{6i,t}\,uncertainty_{i,t-1} + \alpha_{7i,t}\,cycle_{i,t-1} + \varepsilon_{i,t}$$

All variables, except the interest rate and the dummy cycle variable, are expressed in logarithms, with Δ denoting first differences; coefficients may therefore be interpreted as elasticities. Branch-specific non-construction investment and value added are taken from Istat national accounts; data were winsorised to eliminate possible outliers. The interest rate is the average bank lending rate to firms, the only series for which a sectorial breakdown is unavailable. Sectorial corporate liquidity conditions are proxied by the annual average of the percentage balances computed on the liquidity expectations of the manufacturing firms surveyed monthly by Istat. Uncertainty is proxied by a (branch-specific) dispersion measure of replies from the same survey regarding total order expectations, as defined in the previous subsection, following Fuss and Vermeulen (2004) and Bachmann, Elstner and Sims (2014). The cycle variable is a dummy variable taking value 1 in expansionary years, capturing the general state of the Italian economy[24]. The equation is estimated via a standard panel fixed-effects procedure.

Our results for the manufacturing sector are presented in Table 5, which offers four alternative specifications (with column *b* as our baseline and preferred specification). Changes in lagged non-construction investment are negatively correlated with current changes in the same variable, suggesting irreversible investment decisions. Contemporary changes in output, which capture sector-specific demand conditions, positively affect non-construction investment expenditure, as expected[25]. An increasing cost of lending dampens investment, as does decreasing corporate liquidity. Uncertainty is found to have a significant negative impact on capital accumulation. Finally, positive phases in the general economic cycle exert a positive, yet small and lagged, effect on sectorial capital spending.

Limiting our estimation period to 1986-2007 leads to similar results, suggesting no significant break in the recent recessionary years[26]. Moreover, there is no evidence of a difference in the documented correlations between export-oriented and domestic market-oriented branches (as defined in Appendix D).

[23] The 13 manufacturing branches we consider are those shown in Table D1 in Appendix D.

[24] In particular, the dummy variable takes value 1 in all years within 1986-2012 except for 1992-93, 1996, 2001-02, 2008-12. Time dummies introduced for each year were instead found to be insignificant.

[25] Lagged changes of over one year are instead not found to be significant. A similar result is obtained when replacing sectorial value added with industrial production.

[26] It must be said, however, that investment data disaggregated by asset type and by manufacturing branch are only available until 2012, thereby losing out on another two recessionary years.

Table 5. Sectorial estimation results

(dependent variable: non-construction investment change (t))

	a	*b*	*c*	*d*
Investment (t-1)	-0.255***	-0.237***	-0.263***	-0.262***
	0.001	*0.001*	*0.000*	*0.000*
Value added (t)	0.271***	0.137*	0.175**	0.175**
	0.006	*0.060*	*0.024*	*0.023*
Value added (t-1)				-0.003
				0.978
Lending rate (t-1)	-0.038***	-0.026***	-0.031***	-0.031***
	0.001	*0.002*	*0.003*	*0.005*
Liquidity (level, t)		0.335***	0.217**	0.217**
		0.001	*0.023*	*0.021*
Liquidity (level, t-1)	0.458***		0.003*	0.003*
	0.000		*0.056*	*0.079*
Economic cycle (t-1)		0.040**	0.022	0.022
		0.024	*0.247*	*0.258*
Uncertainty (t-1)	-0.167**	-0.181***	-0.169***	-0.170***
	0.014	*0.003*	*0.008*	*0.006*
R^2	*.25*	*.25*	*.27*	*.27*

Note: Estimates are obtained via a fixed-effects model on 351 observations; constant not shown; (***) significant at 1% level, (**) significant at 5% level, (*) significant at 10% level.

5. Conclusions

The decline in Italy's non-construction investment since 2007 has been of unprecedented severity, in both a historical and an international perspective. All investment goods were affected. In 2014 a large non-construction "investment gap" was registered in Italy, both relative to its pre-crisis peak and to its 2000-07 average.

While sectorial investment rates fell across the board in 2008-12, private non-financial services stand out as the main "culprit" of Italy's downturn, explaining two thirds of the decline in the aggregate propensity to invest. This negative contribution was compounded by that originating from the reallocation of value added from high investment intensity sectors (industry) to low investment intensity sectors (private non-financial services). Assuming this "between effect" will continue to be negative over the next years, significant positive investment growth should be undertaken in particular by private services in order to guarantee a sustained recovery and a closure of the afore-mentioned "investment gap".

Amongst the factors behind the recent non-construction investment slump, various results may be drawn out from our econometric analyses, broadly confirming indications arising from survey data. In addition to traditional determinants (demand conditions and the user cost of capital), uncertainty and credit supply conditions are found to have statistically and economically significant effects on firms' capital spending. According to our estimates, demand was the main driver of the investment slump in the recent double recession. The user cost of capital provided a large negative impact during the most acute phases of the sovereign debt crises but since 2013 its contribution has reversed, owing to the expansionary monetary policy measures enacted. The constraints imposed by

tight credit supply conditions were particularly large during 2009 and 2012. Uncertainty also provided a sizeable negative impact during the double recession; it appears as one of the main factors explaining the delay in the recovery of the Italian economy. The significance of these determinants and their negative impact on non-construction investment growth is also confirmed by a panel analysis on 13 manufacturing branches, which cumulatively explain over a third of total non-construction investment.

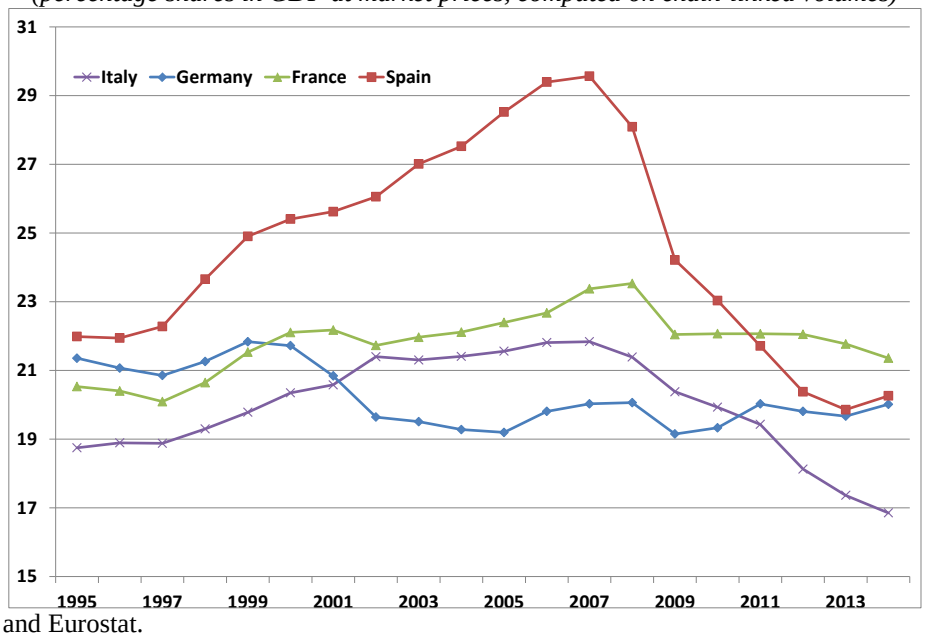
The most recent surveys point to positive, yet modest, non-construction investment growth in Italy in 2015, for the first time in five years, favoured by the recovery in demand, the loosening of credit restrictions and the waning of uncertainty; a marked improvement in expectations in the private non-financial service sector has also been registered. Replacement investment should however continue to be more significant than expenditure aimed at expanding machinery and plants, owing to the fact that the degree of capacity utilization is still low in both a historical and an international comparison. A more substantial expansion is instead expected for 2016.

Appendix A
Recent developments in the total investment rate in the four largest euro-area countries

Since the inception of the European Monetary Union and until the outbreak of the global financial crisis in 2007 the total gross investment share in GDP averaged 21.3 per cent against roughly comparable rates in France and Germany (Fig. A1; Table A1). Spain's investment to GDP ratio was much higher, peaking at nearly 30 per cent in 2007, owing to the country's residential boom. The fall thereafter was the sharpest in Spain (nearly 10 percentage points), followed by Italy (5 points). In the latter country, the propensity to invest decreased to 16.9 per cent in 2014, currently the smallest share across the four countries, as well as a historical low for Italy. All four countries under study now present a significant shortfall in capital accumulation relative to their 2000-07 average, as well as to their pre-crisis peak, with the exception of Germany.

Figure A1. Gross fixed investment rates in the four largest euro-area countries

(percentage shares in GDP at market prices, computed on chain-linked volumes)



Source: Istat and Eurostat.

Table A1. The current total "investment gap" in the four largest euro-area countries

(percentage shares, when otherwise not indicated, computed on chain-linked volumes)

	A Medium-term average (1)	B Pre-crisis peak (2)	C 2014 investment rate	D Investment gap relative to medium-term average (3)	E Investment gap relative to pre-crisis peak (4)
Italy	21.3	21.8	16.9	-4.4	-4.9
Germany	20.0	20.1	20.0	0.0	-0.1
France	22.3	23.5	21.4	-0.9	-2.1
Spain	27.4	29.6	20.3	-7.1	-9.3

Source: Authors' calculations on Istat and Eurostat data.

(1) 2000-07 annual average.
(2) 2007 for Italy and Spain, 2008 for Germany and France.
(3) D= C-A. In percentage points.
(4) E=C-B. In percentage points.

Appendix B
A focus on the shift-share analysis

A. Deriving the shift-share formula

By defining $X \equiv \frac{I}{Y}$, where I is nominal GFC and Y is nominal value added, the investment rate can be expressed as:

$$X = \sum_{s=1}^{n} X_s \frac{Y_s}{Y}$$

Where *s* is one of the *n* sectors of the economy.
Taking time differentials (where ^ indicates differentials):

$$\hat{X} = \sum_{s=1}^{n} \widehat{X_s} \frac{Y_s}{Y} + \sum_{s=1}^{n} X_s \frac{\hat{Y}_s}{Y}$$

By dividing both terms by X and via simple algebra we obtain:

$$\frac{\hat{X}}{X} = \sum_{s=1}^{n} \frac{\widehat{X_s}}{X_s} \frac{Y_s}{Y} \frac{X_s}{X} + \sum_{s=1}^{n} \frac{X_s}{X} \frac{\hat{Y}_s}{Y} = \sum_{s=1}^{n} \frac{\widehat{X_s}}{X_s} \frac{Y_s}{Y} \frac{I_s/Y}{I/Y} + \sum_{s=1}^{n} \frac{I_s/Y_s}{I/Y} \left(\frac{Y \hat{Y}_s}{Y^2} - \frac{\hat{Y} Y_s}{Y^2} \right)$$

By simplifying terms, we get the decomposition presented in Section 2:

$$\frac{\hat{X}}{X} = \sum_{s=1}^{n} \frac{\widehat{X_s}}{X_s} \frac{I_s}{I} + \sum_{i=1}^{n} \frac{I_s}{I} \left(\frac{\hat{Y}_s}{Y_s} - \frac{\hat{Y}}{Y} \right)$$

B. A shift-share analysis of intangible investment rates

Relative to intellectual property product (IPP) investment, which in Italy and Spain accounts for 15 per cent of total expenditure (against higher shares of 18 and 23 per cent in Germany and France, respectively; see Table 2), its sectorial composition is quite heterogeneous across the four countries considered (Table B1). In Italy nearly half of investment in intangibles is undertaken by the public and regulated sectors, similarly only to Spain, with no significant change recorded during the recent recessionary phase; conversely, the share of IPP investment accruing to industry is low relative to France and, in particular, Germany.

Table B1. Sectorial intangible investment rates (1)

(shares in total intangible investment in brackets; average annual percentage shares; current prices)

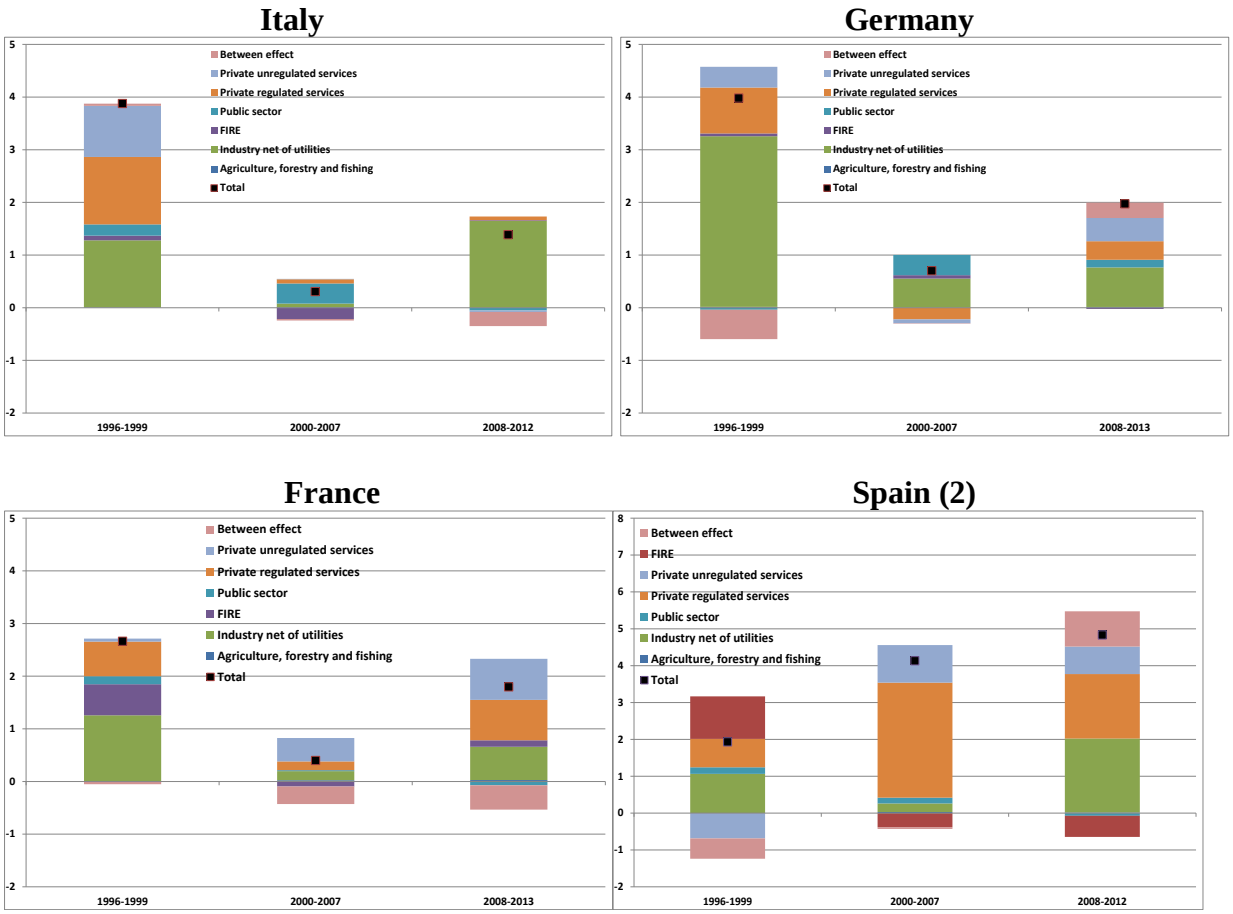
	Agriculture, forestry and fishing	Industry net of utilities	Finance, insurance and real estate	Public administration, defence, education and health	Private regulated sector (transport and communication; utilities)	Private unregulated services
A. Italy						
1995-1999	0.1 (0.1)	3.1 (30.7)	1.0 (5.2)	3.6 (21.9)	5.6 (24.8)	1.5 (17.3)
2000-2007	0.1 (0.1)	3.3 (28.4)	0.9 (5.2)	4.2 (24.3)	5.7 (24.4)	1.7 (17.6)
2008-2012	0.1 (0.1)	4.1 (30.9)	0.7 (4.1)	4.3 (24.9)	5.8 (24.2)	1.6 (15.8)
B. Germany						
1995-1999	0.6 (0.2)	5.7 (52.9)	0.4 (2.2)	2.7 (15.1)	3.6 (12.7)	2.0 (16.9)
2000-2007	0.8 (0.2)	7.2 (54.3)	0.5 (2.2)	2.9 (14.1)	3.9 (12.9)	2.1 (16.2)
2008-2013	1.1 (0.2)	7.4 (51.6)	0.5 (2.1)	3.4 (16.1)	4.1 (13.7)	2.3 (16.2)
C. France						
1995-1999	0.5 (0.3)	8.8 (40.1)	1.3 (4.2)	1.9 (9.1)	8.0 (21.2)	4.3 (25.1)
2000-2007	0.7 (0.3)	9.4 (37.1)	1.6 (5.0)	2.1 (9.0)	8.7 (21.9)	4.6 (26.7)
2008-2013	1.1 (0.4)	10.3 (34.2)	1.6 (5.1)	2.0 (8.3)	10.1 (22.5)	5.4 (29.4)
D. Spain						
1995-1999	0.1 (0.3)	1.7 (26.8)	1.9 (10.8)	2.0 (18.8)	2.2 (15.1)	1.7 (28.3)
2000-2007	0.2 (0.3)	1.6 (20.1)	1.8 (10.0)	2.7 (19.2)	4.8 (25.2)	2.0 (25.2)
2008-2012	0.3 (0.3)	2.4 (19.7)	1.3 (6.9)	3.0 (19.3)	6.4 (27.8)	2.4 (26.0)

Source: Authors' calculations on Istat and Eurostat data.

According to a shift-share analysis (Fig. B1), in Italy since 2008 and in Germany since 1995 the main driver of the aggregate intangible investment rate has been industry. In particular, in the former country in the recent crisis years the exceptionally large contribution of industry, due to high sectorial investment rate growth, more than offset the negative "between effect" reflecting the shift of value added away from industry; all other sectors' "within" contributions were negligible. In the same period in Germany both the total "within effect" and the reallocation of value added across sectors boosted IPP investment growth. France, again, provides a different picture relative to the other countries: similarly to its tangible non-construction expenditure, its total-economy IPP investment rate reflected diverse sectorial dynamics over time; in 2007-13 the public sector was the sole negative contributor to overall growth, together with the "between effect". In Spain, although industry and private services were the main drivers of aggregate intangible investment rate growth, FIRE also provided a significant contribution, negative as of 2000, owing to the non-negligible share in IPP investment of this sector.

Figure B1. The decomposition of total-economy IPP investment rates in the four largest euro-area economies (1)

(current prices; annual average growth rates; Spain on a different scale)



Source: Authors' calculations on Istat and Eurostat data.

(1) Sectorial data for Italy and Spain are available until 2012.

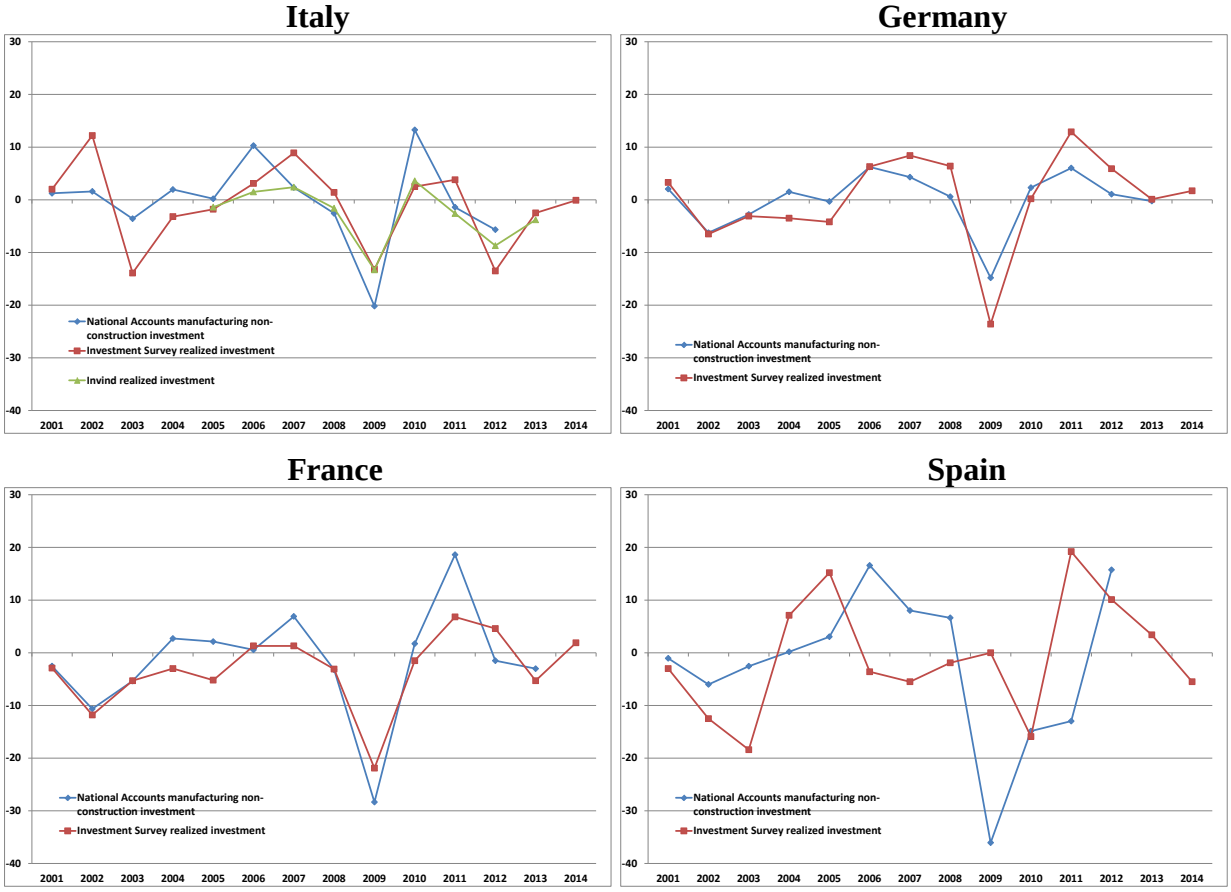
(2) The scale for Spain is different to the other countries.

Appendix C
Additional survey-based evidence on investment

A. The European Commission Investment Survey and the Bank of Italy's Invind Survey

A comparison between the declarations of surveyed manufacturing firms on their realized investment and comparable national account data shows that the EC Investment Survey is particularly informative in the case of France and Germany, for which positive correlations between the two series are over 0.9, less telling for Italy (correlation of 0.6) – for which the Bank of Italy's yearly Survey of Industrial and Service Firms (Invind) conducted in spring is more indicative (correlation of nearly 1) – and not very useful for Spain (correlation of 0.2).[27]

Figure C1. Manufacturing non-construction investment according to national accounts, the EC Investment Survey and Invind
(annual growth rates; chain-linked volumes)



Source: European Commission, Istat, Eurostat, Bank of Italy (Invind).

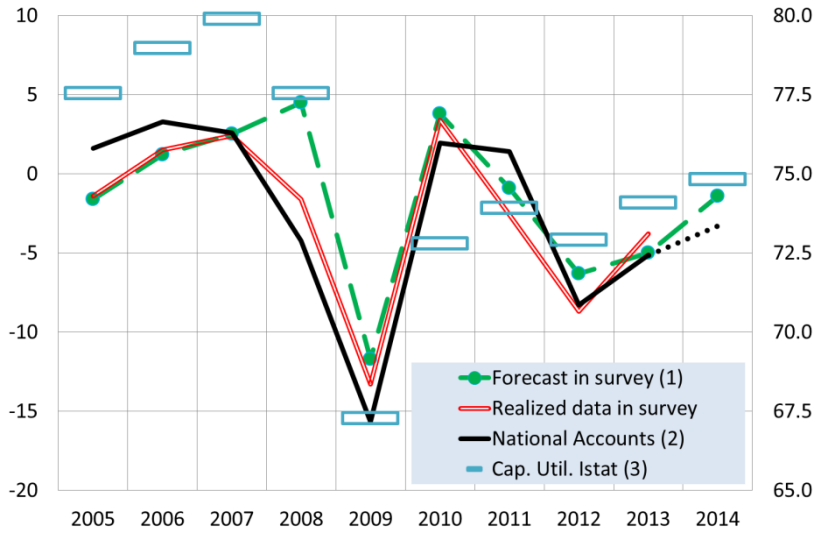
In particular, focusing on Italy, in the Invind survey firms in industry net of construction and private non-financial services with over 20 employees are questioned about their realized and planned investment expenses in the previous and current year. On average firms declare plans that result about 1 percentage point higher than realized investment in the 2005-13 period (the average difference decreases to 0.5 points if 2008 is omitted, when a sudden and unexpected inversion of the economic cycle took place; Fig. C2); this consistent over-optimism is in line with some other micro datasets (see, for example Bachman and Elstner, 2013, for German IFO data). Realized total

[27] The most recent EC Investment Survey was taken in Spring 2015.

investment recorded in the survey is broadly in line with national accounts' fixed capital expenses in the same sectors, net of Research and Development items, which have been included in investment only after the adoption of the ESA 2010 framework.

Figure C2. Investment y-o-y Growth and Capacity Utilization

(y-o-y growth rates on left hand side scale; chain linked volumes; industry net of construction and non-financial private services; percentage values on right hand side scale)

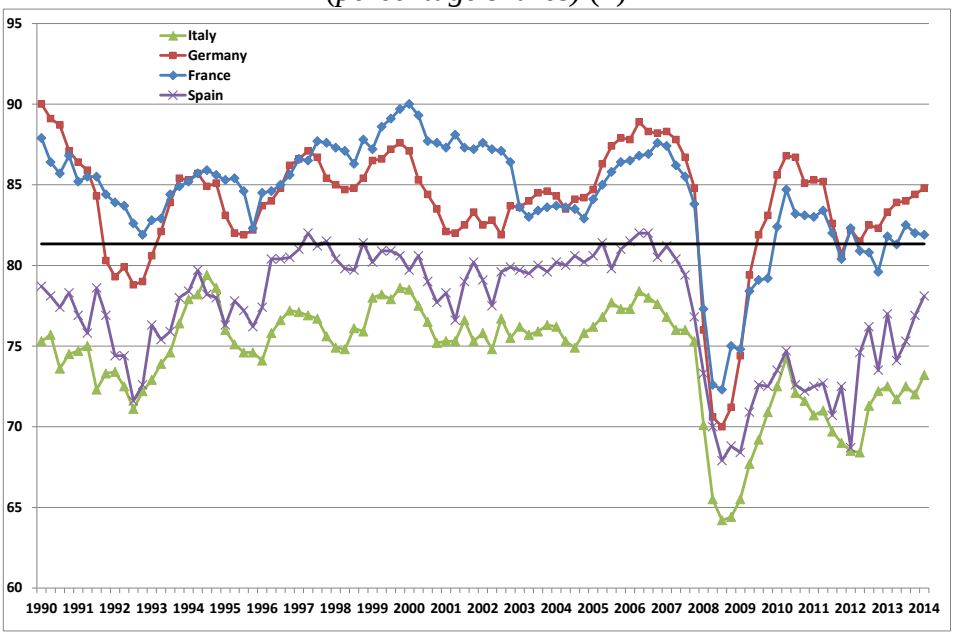


Source: Authors' calculation on Istat and Bank of Italy (Invind) data.
Notes: (1) Declared in the Spring of year T for the whole of year T; (2) tangible non-construction investment by industry, net of construction, and non-financial private services; Authors' calculations for 2013; total economy investment expenses for 2014; (3) calculated for manufacturing firms with at least 50 employees.

B. Manufacturing capacity utilization rates and the aims of investment in the four largest euro-area countries

Manufacturing capacity utilization remains below the long-term average of the four largest euro-area countries in Italy and, to a lesser extent, in Spain, taking a heavy toll on investment, whereas it has exceeded the historical mean in Germany as of 2013 and in France as of 2014 (Fig. C3). According to the most recent EC Investment Survey including this specific question (Autumn 2014), replacement investment turns out to be the main aim of investment in 2014-15 for Italian firms, as opposed to extension measures taken or expected in Germany and in Spain (Fig. C4).

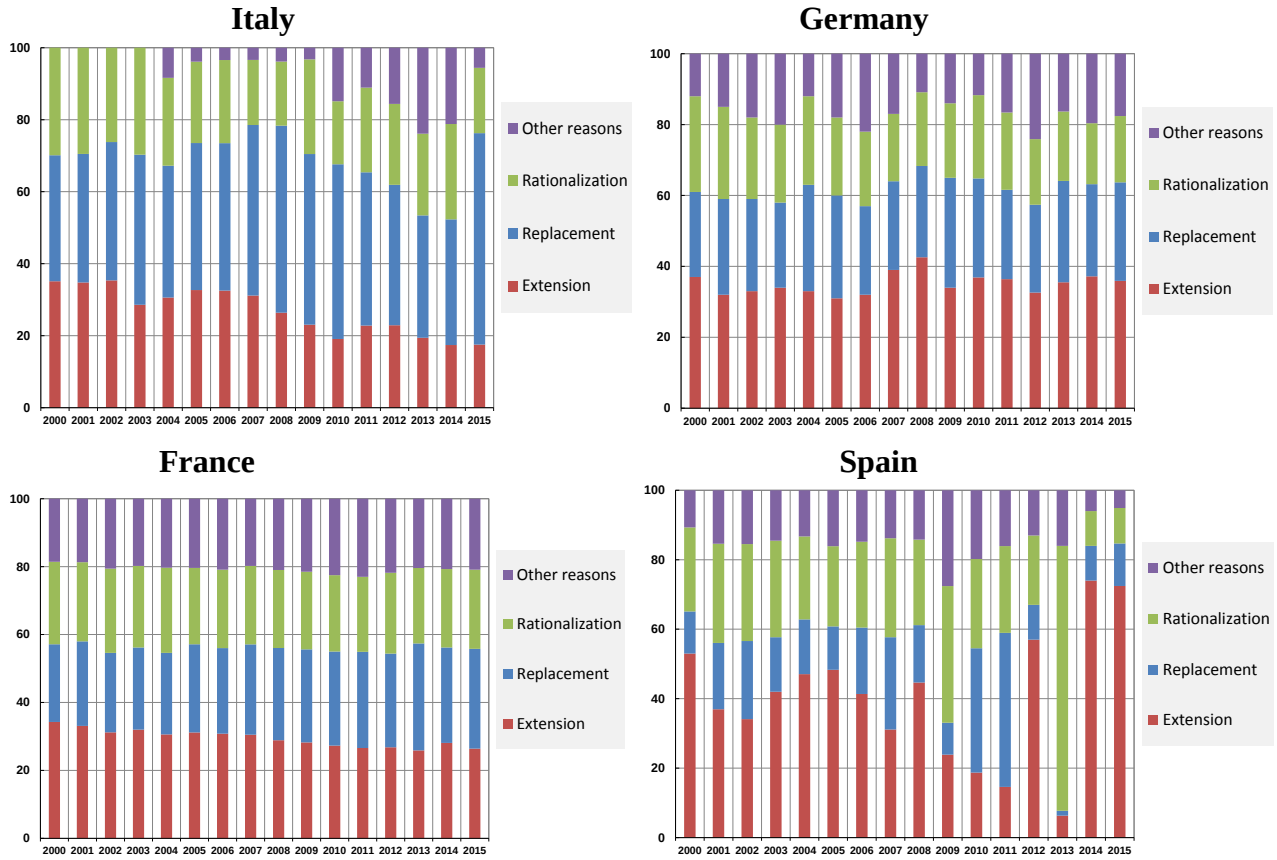
Figure C3. Capacity utilization in manufacturing
(percentage shares) (1)



Source: European Commission.

(1) The long-term average is the mean of the 1991-2007 averages of the four countries.

Figure C4. The aims of manufacturing firms' investment according to the EC Investment Survey
(percentage shares) (1)



Source: European Commission.

(1) Percentage shares are normalized to 100

Appendix D
The sectorial breakdown of manufacturing employed in our panel estimates

Given the high share of tangible non-construction investment made by the industrial, in particular manufacturing, sector in Italy, it is also interesting to investigate investment dynamics within manufacturing. Due to data availability this was possible only for the period 1995-2012. The manufacturing branches employed in our panel estimates are those shown in Table D1. We also divided the sub-sectors into export-oriented and domestic market-oriented ones, on the basis of Istat foreign trade data. In particular, we defined sectors as export-oriented (domestic market-oriented) when their propensity to export, computed as the ratio of exports to value added at current prices, is higher (lower) than the sectorial average[28].

Table D1. The classification of Italy's manufacturing branches

1	Food products; beverages and tobacco products	DO
2	Textiles, wearing apparel, leather and related products	EO
3	Wood, paper, printing and reproduction	DO
4	Coke and refined petroleum products	EO
5	Chemicals and chemical products	EO
6	Basic pharmaceutical products and pharmaceutical preparations	DO
7	Rubber and plastic products and other non-metallic mineral products	DO
8	Basic metals and fabricated metal products, except machinery and equipment	DO
9	Computer, electronic and optical products	EO
10	Electrical equipment	EO
11	Machinery and equipment n.e.c.	EO
12	Motor vehicles, trailers, semi-trailers and of other transport equipment	EO
13	Furniture; jewellery, musical instruments, toys; repair and installation of machinery and equipment	EO

Legend: DO = domestic market-oriented; EO= export-oriented.

[28] The average propensity to export is computed in three different points of time (1995; 2000; 2007). Each sector is classified according to its export orientation in these three years. In cases of changes of status over time (in particular, in the case of coke and refined petroleum products; pharmaceutical products; computer, electronic and optical products), a sector is classified as "export-oriented" ("domestic-oriented") if this feature is confirmed for at least two out of the three years considered.

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