



## Construction crises and business cycle: consequences for GDP forecasts

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*How do we take into account the specificities of the construction sector to forecast GDP growth? Construction activity is usually highly correlated with the economic cycle, both upswings and downswings. However, during construction-specific crises, its developments differ markedly from those of the other sectors as in the early 1990s and from 2011 to 2015. The risk of making a construction-related error when forecasting GDP then increases for forecasting models that are mainly or exclusively based on manufacturing surveys - as is the case with the current quarter forecasting model (ISMA) at the Banque de France. A "safeguard" model, which isolates the value added of each sector, has been constructed to overcome this type of limitation and thus improve the results.*

Since January 2000, the Banque de France has published a monthly forecast of the French GDP growth rate for the current quarter, known as ISMA (Indice Synthétique Mensuel d'Activité). The approach used for short-term forecasting (Mogliani et al., 2014) is based on the data from the manufacturing industry survey of the Banque de France.<sup>1</sup> It thus differs from the more structural models used to draw up medium- and long-term growth forecasts.<sup>2</sup>

Such a choice is justified by the fact-based observation that the cycle of the whole economy is very closely correlated with the cycle in manufacturing (Chart 1). The manufacturing sector accounts for 67% of the variance in the growth rate of total value added. This correlation is explained by the high proportion of inputs of manufactured goods in the inputs of other sectors,<sup>3</sup> but also by the lower variability of activity in the other sectors, in particular services.

Another reason for focusing on manufacturing industry surveys is the difficulty of forecasting the activity of market

services, which are the main sector of the economy. The market services sector shows a strong heterogeneity which is not entirely captured by the scope of the surveys.<sup>4</sup> Models based exclusively on manufacturing surveys may thus be paradoxically more efficient in forecasting GDP growth than those using surveys in several sectors (Mogliani et al., 2014, Thubin et al., 2016).

1 See also Bec and Mogliani (2015) for a more detailed methodological analysis.

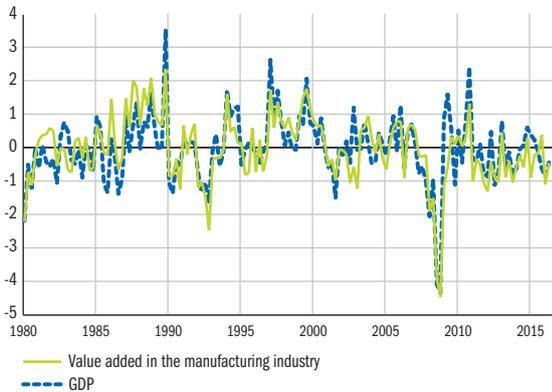
2 See for example the forecast of the Banque de France on France published every half-year, which currently covers 2016-2018 ([https://www.banque-france.fr/uploads/tx\\_bdfgrandesdates/previsions-economiques-juin-2016.pdf](https://www.banque-france.fr/uploads/tx_bdfgrandesdates/previsions-economiques-juin-2016.pdf)).

3 In 2014, inputs of manufactured goods accounted for 7.9% of market services output and 27.3% of construction sector output.

4 Furthermore, the Banque de France survey in services is only available since October 2002, while the periodicity of the INSEE survey in services has been monthly only since June 2000. The history of these surveys is too short to precisely forecast in the very short term the growth of activity in services.

**C1 GDP and value added in the manufacturing industry**

(quarterly changes in percentages, standardised mean)



Source: Insee.

**Construction sometimes has atypical cycles compared to the rest of the economy**

While the hypothesis of a strong correlation between the cycles of the manufacturing industry and the economy as a whole is verified most of the time, certain periods show a decoupling between the different sectors of activity. In particular, the construction sector may experience sharply divergent developments from the rest of the economy, which persist over time, owing to the specificities of residential and non-residential real estate cycles and investment in public works.

First, real estate investments are subject to bubble phenomena and also depend on medium-term demographic cycles that do not affect consumption and other GDP components equally (Monnet and Wolf, 2016). In the shorter term, real estate investment is also impacted

by tax incentive schemes (rental investment subsidies, zero-rate loans, etc.). Real estate investment is thus the most volatile component of GDP. As for investments in public works, they show – more than the other components of public expenditure – a specific cycle affected by fiscal policy decisions.

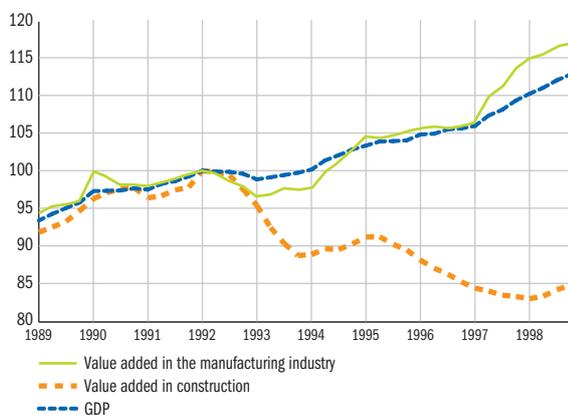
In France, over the past four decades, there have been two periods marked by a sustained decline in value added in construction, which was not correlated with developments in other sectors of activity. The first decoupling period is between 1993 and 1998 (Chart 2). The second period is between 2011 and 2015 (Chart 3). The latest quarterly accounts available<sup>5</sup> indicate that this construction crisis could have ended in 2016.

However, the economic agents behind these two crises are different (Charts 4 and 5). Between 1991 and 1995, these were mainly businesses with the crisis of commercial real estate and public works.<sup>6</sup> As of 2011, households are at the root of the residential real estate crisis.

The prolonged decrease in business investment in construction during the 1990s was explained by the bursting of the commercial real estate bubble observed between 1988 and 1991 (Taffin 1993, Jaillet and Sicsic 1998). In addition to commercial property, the decline in business investment in construction was also due to the impressive decline in public works activity in the 1990s.

**C2 Contraction in the construction sector between 1993 and 1998**

(100=Q1 1992)



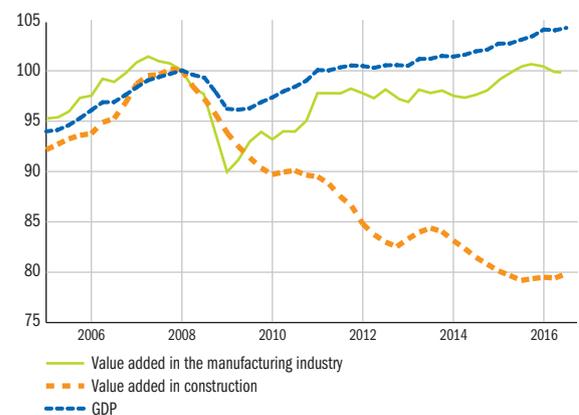
Source: Insee.

5 1<sup>st</sup> estimate of the quarterly accounts of the 3<sup>rd</sup> quarter 2016 (28/10/2016) at the time of the finalisation of this document.

6 Investments in public works are made not only by general government but also by companies.

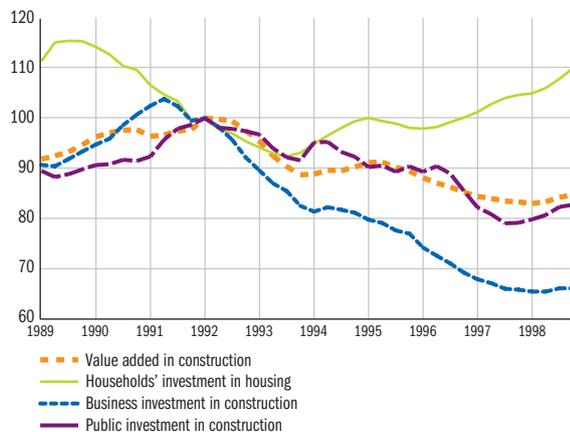
**C3 Contraction in the construction sector between 2008 and 2015**

(100=Q1 2008)



Source: Insee.

**C4 Value added and investment in construction**  
(100=Q1 1992)



Source: Insee.

**C5 Value added and investment in construction**  
(100=Q1 2008)



Source: Insee.

Conversely, the construction crisis between 2011 and 2015 is essentially the result of the fall in household investment (Chart 5), which is in turn explained by a variety of factors: lower growth of the population of purchasing age, slowing salaried employment and purchasing power, interest rate fluctuations (Faubert, Monnet, Sutter 2015). It is only since 2014 that the decline in activity in public works has worsened the construction crisis.<sup>7,8</sup>

During both crisis periods, the deterioration in construction activity had a limited impact on manufacturing activity, resulting in a dissociation between the value added growth of these two sectors. The decrease in demand addressed to the manufacturing industry by the construction sector was offset by an increase in final demand for manufactured goods, as well as a rise in inputs in the non-construction sectors (including the manufacturing industry itself).<sup>9</sup>

**The equation of the PRISME model for the construction sector**

In the specific case of construction, the difficulty in forecasting the changes in activity is due to the composition of the sector, which is made up of different activities which different cycles: housing, non-residential building and public works. Monthly surveys carried out by the Banque de France and INSEE have a weak predictive power mainly as a result of the exclusion of small firms (less than 11 employees) from the scope of the survey. These firms contribute to a significant share of value added, in particular in the building renovation sub sector.

Consequently, the PRISME model uses a quarterly survey carried out by INSEE among small enterprises (the "artisanat du bâtiment" survey), which provides a better proxy of activity in housing construction than any other survey available. It also covers all building sectors (residential and non-residential, investments made by households, businesses or social housing companies).

As regards public works, the importance of which we have seen in the construction crises of the 1990s and since 2014, only two quarterly surveys are available, those of the Banque de France and INSEE. The choice was made to use the Banque de France survey, which has a slightly higher predictive power. Lastly, the equation of the PRISME model in construction also includes the past variation in value added in this sector, in order to take into account the persistent nature of the business cycle in this sector.

**Forecasting models must take account of sectoral differences**

From end-2013 to end-2014, the forecasts of the Banque de France's ISMA model, which is solely based on manufacturing industry surveys, overestimates GDP growth, mainly due to a disconnection between the industrial and construction sectors.

7 The end of the tax exemption plan (Scellier scheme) and first time home buyer plan (interest-free loan scheme) from 2012 has also had a negative short-term impact on housing investment.

8 It should also be noted that between 2010 and 2012, a counter cyclical social housing construction policy increased the investment of companies (as the landlords of social housing are non-financial corporations), contrary to what had happened in the early 1990s.

9 The share of intermediate inputs from manufacturing in the construction sector output is relatively high (about 27%) and higher than in the market services sector (8%). Nevertheless, it is much lower than the self-consumption of the manufacturing sector (43%).

Mogliani et al. (2014) show that the ISMA model residuals have satisfactory properties (normality, absence of autocorrelation). These properties make highly unlikely the hypothesis of a prolonged period where the forecasting errors of the model would be systematically positive or negative. However, if one or two sectors of the economy diverge from the manufacturing industry over several quarters, the ISMA model may display a series of errors that always go in the same direction over a short period of time.

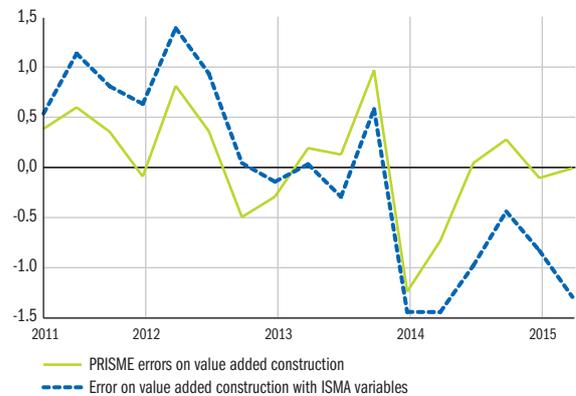
This observation led to the development of the PRISME<sup>10</sup> (PRévision Intégrée Sectorielle Mensuelle) model, providing a growth forecast obtained from the aggregation of sectoral forecasts for the six main sectors of the economy (market services, manufacturing, construction, energy, non-market services, agriculture).

A real-time "out-of-sample" analysis of the PRISME model equation in construction shows that this equation significantly reduces forecasting errors between 2011 and the second quarter of 2015 in construction compared to a calibration using only variables of the ISMA model (except for a short period from Q4 2012 to Q4 2013, see Chart 6). However, over a long period, PRISME is no better than ISMA in forecasting GDP growth, which in fine confirms the superiority of surveys in the manufacturing industry for short-term forecasting models.

**Conclusion**

For short-term forecasting models as well as for economic analysis and assessments, the indicators that usually

**C6 Errors of models regarding construction**



Source: Insee, authors' computations.

receive the most attention are those of the manufacturing industry. Although this particular attention is perfectly justified, it is useful to be aware of the limitations of the manufacturing indicators when the developments in the construction cycle are very different to those of other sectors. We have shown, in the case of the Banque de France, how a forecasting model (PRISME) that isolates value added in construction can overcome this limitation and thus improve the GDP forecast for the current quarter during certain periods, as during the French construction crisis between 2011 and 2015.

<sup>10</sup> See Thubin et al. 2016 for the description of the PRISME model.

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