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Does the Exposure to the Business Cycle Improve Consumer Perceptions for Forecasting? Microdata Evidence from Chile *

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Abstract

Given the lag with which the official consumption series are released and the anticipation with which consumption confidence indicators are published, there is latent attention in assessing the predictive power of consumer confidence over consumer spending. In this article, we make use of a rich and unique individual-level dataset obtained by merging a consumer sentiment survey with an unemployment survey of the Greater Metropolitan area of Chile's capital city. This is aiming to: (i) analyse how forecasts of private consumption and components are improved by consumer sentiment indexes constructed using the labour market characteristics of respondents and re-focusing aggregate answers according to timing and subject, and (ii) analyse to what extent a greater exposure of consumers/workers to the business cycle comes out as a better capability to nowcast and short-term forecast consumption. Considering that consumers work in sectors where decisions are taken based to a greater or lesser extent on the current and future economic situation, we assume a learning mechanism permeable to the sentiment of workers that is present when they are surveyed as consumers, referred to as "exposure". Since the exposure is extensible to investment decisions, we include total investment and its components in the analysis. By means of auto-regressions, our results suggest that the in-sample adjustment of a simple model improves in most cases when any of the newly built factors are included. Although there is no silver-bullet definition of the factor helping all aggregates across all horizons simultaneously, future-oriented factors as well as information coming from consumers working together in Commerce, Industry, Construction, and Personal Services sectors provide material predictive gains, ranging from 4.5% to 40.2% at one-year compared to the non-augmented auto-regression. Although surveys of consumers' perceptions provide rich information, these results are important since it is necessary to disentangle ideally from the most disaggregate level to have a better revealing economic behaviour.

Resumen

Dado el rezago con el cual se publican las series oficiales de consumo y la anticipación con la que se publican los indicadores de confianza de los consumidores, existe una latente atención en evaluar el poder predictivo de la confianza de los consumidores sobre el gasto en consumo. En este artículo, utilizamos una rica y única base de datos a nivel individual obtenida al fusionar una encuesta de sentimiento de los consumidores con una encuesta de desempleo de la Gran Área Metropolitana de la capital de Chile. Esto tiene como objetivo: (i) analizar cómo mejoran las proyecciones de consumo privado y sus componentes mediante índices de sentimiento de los consumidores construidos

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utilizando las características del mercado laboral de los encuestados, y reenfocando las respuestas agregadas según su temporalidad y sujeto, y (ii) analizar en qué medida una mayor exposición de los consumidores/trabajadores al ciclo económico se manifiesta como una mejor capacidad para pronosticar el consumo a corto plazo actual y a futuro. Considerando que los consumidores trabajan en sectores donde se toman decisiones, en mayor o menor medida, basándose en la situación económica actual y futura, asumimos un mecanismo de aprendizaje permeable al sentimiento de los trabajadores que se presenta cuando se les encuesta como consumidores, denominado “exposición”. Dado que la exposición es extensible a las decisiones de inversión, incluimos la inversión total y sus componentes en el análisis. Mediante autoregresiones, nuestros resultados sugieren que el ajuste dentro muestra de un modelo simple mejora en la mayoría de los casos cuando se incluye alguno de los factores construidos. Aunque no existe una un factor tipo bala de plata que ayude a todos los agregados en todos los horizontes simultáneamente, los factores reorientados hacia el futuro, así como la información que proviene de los consumidores que trabajan juntos en los sectores de Comercio, Industria, Construcción y Servicios Personales, entregan ganancias predictivas importantes, que van desde 4.5% a 40.2% a un año en comparación con la misma autoregresión sin aumentar. Si bien las encuestas sobre las percepciones de los consumidores entregan una rica información, estos resultados son importantes ya que sugieren que necesario indagar, idealmente, al nivel más desagregado para obtener un comportamiento económico más revelador.

1 Motivation, objectives, and main results

The confidence of consumers has played a key role in the development of modern theoretical economics. Moreover, plenty of empirical literature has advocated analysing the relationship between consumer confidence and consumer spending across world economies. This is relevant for different economic agents having to take important and irreversible decisions, and policymakers interested in future movements that shape the typically biggest component of domestic demand. Given the lag with which the official consumption series are released, and the anticipation with which consumption confidence is published, there is latent attention in assessing the predictive power of consumer confidence numeric indicators over consumer spending at the aggregate level.

This paper goes one step further by using microdata evidence of consumer sentiment predictability over aggregate consumption and investment, taking advantage of a specific survey on consumers' perceptions which, at the same time, is linked to a survey of employment/unemployment of the Greater Santiago, Chile's capital city. These are the Survey of Employment and Unemployment in Greater Santiago (*Encuesta de Ocupación y Desocupación en el Gran Santiago*, henceforth labelled as "EOD") and the Survey of Perception and Expectations on the Economic Situation in Greater Santiago (*Encuesta de Percepción y Expectativas sobre la Situación Económica en el Gran Santiago*, "IEE"), both produced by the *Centro de Microdatos* of Universidad de Chile. The key advantage is that it is possible to link, with no error, the perception of a consumer with her/his characteristics as a participant of the labour market, *e.g.* labour situation, economic activity, gender, income, and location. Thus, it is possible to exploit database's richness by re-grouping consumer perceptions indexes based on labour-market characteristics, aiming to improve their forecasting ability over macro aggregates and hypothesis testing. This treatment also aims to disentangle labour market characteristics more akin to the forecasting task.

By using the mentioned dataset, the aim of this article is two-fold: (i) to analyse the extent to which consumer sentiment indexes better forecast aggregate consumption and its components, by constructing new indexes using the labour market characteristics of respondents and re-focusing aggregate answers according to timing and subject, and (ii) analyse to what extent a greater *exposure* of consumers/workers to the business cycle comes out with a better capability to nowcast and short-term forecast consumption, compared to consumers/workers that participate in economic sectors less exposed to the business cycle. This latter exercise seeks to find the most accurate information of the survey when tracking the economy. Our claim assumes that consumers work in sectors where decisions are taken based to a greater or lesser extent on the current and future economic scenario. The consumers can take these decisions themselves, be aware of them, or be affected by their consequences. Thus, we assume the existence of a learning mechanism permeable to the sentiment of workers that is present when they are surveyed as consumers. We call this mechanism as "exposure" and we operationalize it by means of the correlation of workers' economic sector with the output gap. Since this argument is extensible to investment decisions, we include total investment and its components in the analysis.

After checking the in-sample consumer-survey-based statistical inference within the simplest (and more transparent) econometric setup, we test our two proposals by means of out-of-sample comparisons exercises.[1] Thus, the first hypothesis comes out as a multi-horizon forecast comparison between an atheoretical predictive autoregressive model for a given macro aggregate and its corresponding survey-based factor-augmentation version, using different computations of consumer indexes. The second hypothesis consists of an out-of-sample comparison between two survey-based factors, one grouping indicators from consumers currently working in sectors more sensitive to the business cycle, and the other conformed with consumers working in the remaining sectors surveyed. We proxy the business cycle by means of an output gap estimation.

Note that these hypotheses are tested for Private consumption, Non-durable consumption, and Durable consumption, plus Gross fixed capital formation (GFCF), Construction & works, and Machinery & equipment. We also make use of the same re-classification of answers used in Chanut, Marcel, and Medel (2019) in terms of timing and subject, but now we are able to distinguish the economic sector where the consumer is currently working, adding new dimensions to exploit.

[1] These exercises consider a fixed vintage of the macroeconomic aggregates, which are subject to a revision policy. Thus, exercises are not conducted with real-time data.

Our in-sample results suggest that the adjusted goodness-of-fit coefficient of the first-best auto-regression improves in the majority of cases when including any of the considered consumer-perception-based factors. Our baseline results show that using specifically the re-classification by subject and timing, the *Personal Future Expectation Index* as well as the *Overall Future Expectation Index* improve for almost all macro aggregates considering any sectorial definition of the factor. In contrast, the *Personal Current Situation Index* is less helpful to explain the dynamics of any macro aggregate built with any sector. Most of these improved adjustments are found for GFCF and its components, and for Durable consumption to a lesser extent. Consumers working in *Commerce* and *Industry* provide more useful information than remaining sectors, as well as when adding consumers in *Construction* and *Personal Services* sectors without manufacturing. When accounting for the statistical significance of the consumer-perceptions factor, there is a concentration of significant cases using future-based indexes for the same macro aggregates, which exhibits better adjustments. Also, the evidence is mostly favourable for sectors more closely related to the business cycle rather than those that are less so or plainly insensitive to it.

Our out-of-sample results show, with a baseline added to alternative setups, predictive gains at all horizons for all variables, in some cases of a sizable magnitude whereas in others non-statistically significant. The most fruitful results are obtained for Non-durable consumption and GFCF, which are statistically superior to the predictive benchmark model when made up by sectors more akin to the business cycle. There is no silver-bullet definition of the factor helping at the same time all aggregates across all horizons. However, in more consumption series than not, the *Personal Country Situation Index* and the *Country Current Situation Index* lead to the best results. In turn, the *Overall Future Expectation Index* does so for investment series. Regarding the economic sectors in which consumers participate and provide more useful predictive information, unquestionably the best forecasting results are concentrated in *Commerce*, *Industry*, *Construction*, and *Personal Services* (thus, out of 3,060 individuals surveyed per quarter, this factor is composed of 1,735 answers per quarter on average) and in *Commerce*, *Construction*, and *Personal Services* (comprising 1,313 answers per quarter on average). When comparing between factors, the results are largely favourable to the factors based on consumers more *exposed* to the business cycle. In this line, the most fruitful results are obtained with *Commerce*, *Industry*, and *Transportation* sectors and *Commerce*, *Construction*, and *Personal Services* that outperform the remaining sectors less exposed to the business cycle. Although surveys of consumers perceptions provide rich information, these results are important as it is necessary to disentangle ideally from the most disaggregate level to have a better revealing economic behaviour.

The remainder of the article proceeds as follows: in section II, we review the related literature on this topic. In section III, we describe our econometric setup in terms of the individual and macro aggregates data, detailing the information contained in the two surveys and the construction of all consumer-based factors. It also describes the statistical inference carried out to both in- and out-of-sample analyses. In section IV we display our results of the chosen baseline autoregressive model, and the in-sample and predictive evidence. Finally, section V provides the conclusions drawn from the study.

2 Literature review

Several articles set up the baseline stylised facts and common findings on this matter, specially analysing the case of advanced economies such as the Euro Area and the United States; for the latter, specially using the *Survey of Consumers* (SoC) produced by the University of Michigan.[2] For instance, Fuhrer (1993) studied whether the SoC can explain different economic phenomena with simple predictive models and a vector auto-regression (VAR). Their results suggest that a good part of the variation in the sentiment index is explained by macro aggregates, and that the SoC explains and improves a little on the actual consumption series and its forecasts. Carroll, Fuhrer, and Wilcox (1994) analyse if the information of the SoC predicts changes in private consumption, finding that within a reduced-form model, the SoC anticipates consumption growth. Howrey (2001) makes use of part of the SoC to analyse the ability to anticipate recessions and recovery episodes using a VAR, finding that the SoC is barely superior to a benchmark model when forecasting GDP one step ahead. Doms and Morin (2004) mimics SoC answers using newspapers-based indexes, finding three transmission channels to consumers perceptions through actual economic data, tone, and volume. The newly-built indexes come out as playing a role when consumers update their perceptions, which is directly dependent on the volume of economic news. Ludvigson

[2]For more details on the full content of the SoC, see Survey of Consumers, University of Michigan (2020).

(2004) shows that the SoC contains valuable information on the future path of aggregate consumption but yielding modest predictive gains, whereas the same SoC information could be found in economic/financial indicators. By exploiting the microdata of SoC, Souleles (2004) finds that aggregate shocks do not impact all households equally, and demographics explain this heterogeneity to a large extent. Particularly, people's forecast errors are systematically correlated with their demographics, and sentiment helps forecast consumption growth.

Geiger and Scharler (2019) use the SoC to show how consumers assess gasoline price shocks using a sign-restricted VAR, finding that oil prices and unemployment guide consumer perceptions, and these perceptions are consistent with economic developments. Lahiri, Monokroussos, and Zhao (2015) analyse the SoCs' predictive ability over consumption using a dynamic factor model and a large, real-time, jagged-edge dataset, finding a robust role for perceptions in improving consumption-forecast accuracy particularly through the services component. All these results are promising and call to analyse its potential extension to other countries with their corresponding surveys. Moreover, valuing the predictive content of surveys for macro aggregates, and the way how it could be better handled, Bürgi and Sinclair (2015) suggests a nonparametric approach to refine the pool of respondents participating in the *Survey of Professional Forecasters* conducted by the Federal Reserve of Philadelphia. Their approach leads to significant short-term predictive gains, which could certainly be interesting to further analyse in the context of this article.

This list is not intended to be comprehensive; rather, it aims to show the evolution of the type of questions and results that a rich consumer sentiment survey could provide for economic analysis. Outside the United States, the evidence is also substantial. Similar exercises to that conducted with SoC has been produced with specific consumer sentiment and perceptions indexes for the Euro Area (Gayer, 2005; Girardi, Golinelli, and Pappalardo, 2017; Basselier, Liedo, and Langenus, 2018), Germany (Schröeder amd Hüfner, 2002; Abberger, 2007), Italy (Bruno and Malgarani, 2002), Sweden (Hansson, Jansson, and Löf, 2003; Österholm, 2014), China (Li, 2011), South Korea (Moon and Lee, 2012), and Garnitz, Lehmann, and Wohlrabe (2017) for 44 countries. De Mello and Figuereido (2014) provide evidence for the Brazilian sentiment indicators acting as covariant when forecasting economic activity in an econometric setup similar to this article's.

In emerging market economies, as is the case of Chile, the evidence is scarce. Nonetheless, recent research suggests that aggregate consumer sentiment indicators do not perform well when trying to predict private consumption and investment within a simple, statistical ensemble. However, when re-classifying survey answers according to timing (current/future) and subject (personal/country) dimensions, the evidence turns favourable to the use of forward-looking factors to predict specific components of the aforementioned macro aggregates (Chanut, Marcel, and Medel, 2019). By making use of an instrumental definition of consumer sentiment based on a different consumer confidence survey, Acuña, Echeverría, and Pinto-Gutiérrez (2020) find that consumer sentiment improves in-sample modelling of private consumption as well as its out-of-sample forecast in a fundamental-based environment. Their results are robust to nonlinearities and, to some extent, they contradict theoretical predictions of consumer spending theories based on, for instance, the *Precautionary Saving Hypothesis* (Blanchard and Mankiw, 1988).

Furthermore, using a subset of questions from a consumer perceptions survey, Albagli *et al*. (2019) find that confidence shocks impact consumption negatively up to eight quarters after returning to its previous growth rate, providing some support to consumer sentiment indicators acting as predictors. Also, Figueroa and Pedersen (2019), by picking specific questions of the same consumer confidence survey used in Chanut, Marcel, and Medel (2019) and Albagli *et al*. (2019), analyse its forecast ability on Chilean economic activity. Authors' findings are favourable to the use of consumer answers for horizons different from nowcast, suggesting that consumers indeed provide good-quality frontward information.[3] Interestingly, all these results have in common at least two limiting characteristics: (i) the need for a re-classification or refinement of quantitative indexes in search of actual *hard* data predictability, and (ii) the use of indexes in an aggregate way, in the sense that the mentioned re-shaping of indicators makes use of all individuals' data whatever the driver of the re-classification is, classified by either timing or subject.

[3]Some other applications of consumer sentiment indicators in Chile rely on its use as an aggregate covariate in a data-rich ensemble to forecast activity and inflation. See, for instance, Calvo and Ricaurte (2012) making use of one particular survey question, and Riquelme and Riveros (2018) using disaggregated survey indicators to build a coincident indicator of total monthly economic activity.

3 Econometric setup

Firstly, it is relevant to distinguish between *consumer expectations* and *consumer sentiment*. In this article, we make use of consumer *sentiment*, which means the economic agents' opinion on future relevant economic developments that may be influenced by today's actions (*e.g.* "Do you think the state of the economy has improved, stayed the same, or deteriorated over the last year?"), in contrast to economic *expectations* in which agents state their perceived most likely value on a particular targeted variable (*e.g.* "What do you think will be the year-on-year rate of CPI inflation in the next quarter?"). It is generally believed that qualitative questions to report agents' sentiment, while less accurate, are better understood by a non-expert audience and, thus, better reflect their true sentiment, as opposed to a random guess. This is precisely a feature exploited in this article, testing whether consumers diverge in their opinions depending on the economic sector in which they participate. Naturally, there is no wrong answer to a sentiment survey, whereas expectations allow us to even characterise a numeric error term fully.

A review of the econometric exercise conducted in this article is the following. First, we search the best stationary autoregressive AR(p) forecasting model for each of the six macroeconomic variables considered. We search across p lags, p={1,...,4}, as actual macroeconomic data is released in quarterly frequency. Instead of using the traditional in-sample information criteria to select the model with the best fit, we use a more demanding strategy by choosing the best out-of-sample model when forecasting from 1 up to 4 quarters ahead. This is also the reason why we search among the simplest family of AR(p) models, *i.e.* to avoid the issue of overfitting by including regressors that exaggerate the dynamics of the series at the cost of spoiling out the predictive power of the model. We also choose this strategy to stress out the out-of-sample benefits of the exogenous factor without including any additional covariate.[4]

Secondly, we compare the multi-horizon forecast of the chosen AR(p) model extended with the exogenous consumer-survey-based factor. By performing this exercise, we can determine if this extension is fruitful from an out-of-sample perspective–and checking for our first hypothesis. We compare these forecasts by means of the root mean forecast error (RMSFE) and using the Clark and West (2007) test for statistical inference.

Thirdly, we build the exogenous consumer-survey-based factor by grouping consumers' answers. These consumers are currently working in sectors that are more sensitive to the business cycle. This makes us consider a share of total answers that compound the factor, and the complementary share compounding another factor with consumers working in other sectors less sensitive to the business cycle. Hence, we compare the influence of both factors on the predictive ability of the chosen AR model, expecting that the consumers possibly more aware of the business cycle would provide more accurate information on their economic situation–and checking for our second hypothesis. This comparison is made by means of the RMSFE and the Harvey, Leybourne, and Newbold (1997) test. On top of this, we also re-classify some answers according to timing and subject. Thus, factors contain three dimensions: timing, subject, and economic sector, *e.g.* "*Personal Current Situation Index of consumers working in Commerce and Industry*". An important drawback of this exercise is that it is not conducted in real time because of data vintages availability.

Fourthly, we try four different specifications of the economic sectors when building consumer-survey-based exogenous factors. This is because the sensitivity to the output gap of the economic sectors of the surveyed consumers is evolving with the time difference (lags) with which the correlation coefficient is calculated.

Finally, we conduct a robustness exercise using the whole range of AR(p) models available combined with different setups of the exogenous factor, namely, first differences or levels, and the number of terms included in the forecasting equation. These exercises are relevant because in some cases the best forecasting model is evolving with the forecast horizon for a given macro aggregate, and comparisons must be made with the best benchmarks. Also, there is no single manner to include the factor in the forecasting equation, and so, we try different specifications.

[4] In Acuña, Echeverría, and Pinto-Gutiérrez (2019), the authors use another consumer-survey aggregate factor to predict private consumption with a fundamentals-based consumption model. The authors, however, do not check if the non-augmented model is better than an atheoretical simple benchmark. In this sense, the exercise conducted in this article is more motivated by the forecasting results.

3.1 Consumer perceptions, labour market microdata, and the business cycle

As mentioned above, we make use of the microdata freely available (after submitting an online registry) by the Universidad de Chile's *Centro de Microdatos* (http://documentos.microdatos.cl/). This database is the result of merging the datasets of two surveys: the *Survey of Employment and Unemployment in Greater Santiago* (the EOD) and the *Survey of Perceptions and Expectations on the Economic Situation in Greater Santiago* (the IEE). A unique feature is that both databases are available (anonymously) at the individual level and are already merged since respondents are asked about both their labour situation as a worker and her/his economic perception as a consumer. The independence in answering both surveys, especially that of sentiment, is ensured by the wording of the questions. Thus, the sentiment is not conditioned to her/his labour situation by survey design.

Naturally, the universe of the IEE is the same of that of EOD:[5] inhabitants over 14 years old living in the Santiago Metropolitan Region and in Puente Alto and San Bernardo counties. These add up to about 40% of the Chilean population in 2017. The sample is composed of 3,060 individuals per quarter, consisting in a stratified random sampling with a panel data component–a rotating panel. In this method part of the whole panel is kept permanently, and another part is a completely new cross-section sample. The sample of 3,060 individuals in each quarter is divided into four subsamples of 765 individuals, where each subsample is independent and represents the Greater Santiago. The rotation design is of the 2-2-2 type, where two selected individuals are interviewed twice in a row, then they are not contacted in the following two rounds, and then they are interviewed again in the following two rounds, covering a period of 18 months in total. The collection technique is face-to-face interview and the reported answer rate reaches 77.4% (informed on March 2014). The representativeness with respect to the universe could be considered adequate, but this is not the case when considering the whole country, as it focuses in Santiago only.[6] The IEE is released quarterly and fully available since March 2001 (75 observations available up until September 2019).

Note that across all questions asked in IEE there is a time dimension and a subject dimension, allowing us to re-classify them in these terms and the economic sector reported by each individual. These questions are the following, responded in a qualitative manner (with two exceptions):

- Q1: *How was the economic situation of the country a year ago?* (better, same, worse)
- Q2: *What are the three main problems of the country?* (free answer)
- Q3: *How did the income of your household vary in the last 12 months?* (increased, same, decreased)
- Q4: *How is the situation of your household in terms of indebtedness?* (complicated, average, no problem)
- Q5a: *Did a member of your household buy a durable good in the past three months?* (yes/no)
- Q5b: *If so, how have you financed it?* (credit/cash)
- Q6: *In one year, how will be the economic situation of the country compared to today?* (better, same, worse)
- Q7: *How will the income of your household vary within the next 12 months?* (increase, same, decrease)
- Q8: *What will be the CPI inflation rate in 12 months?* (numeric answer)
- Q9a: *Will a member of your household buy a durable good in the next three months?* (yes/no)
- Q9b: *If so, how will it be financed?* (credit/cash)
- Q10: *Are you or is a member of your household thinking of buying a house in the next 12 months?* (yes/no).

[5] Specific details can be found in Centro de Microdatos (2016).

[6] Santiago is Chile's capital city with a population of 7.037 million, *i.e.*, 37.57% of the country's total of 18.730 million as of 2017.

It is important to look at the way in which qualitative answers are transformed into quantitative indicators. There are two steps. The first consists of aggregating the individual answers to the same question to get a number called "balance statistic," while the second step is to aggregate the balance statistic of each question to form a synthetic indicator. Intuitively, the balance statistic is the difference between the percentage of positive answers and the percentage of negative answers.[7] Any synthetic indicator (step 2) is constructed by taking the equally weighted average of the balance statistic of the questions composing the indicator.

Similarly to what Chanut, Marcel, and Medel (2019) sugget, we overcome the limitations of an aggregate indicator that blends all questions without a specific focus by re-grouping subsets of questions distinguishing between timing (current sentiment/future expectations) and subject (personal and country-wide). Crossing these two dimensions originates four different indicators, in which the questions are mapped as:

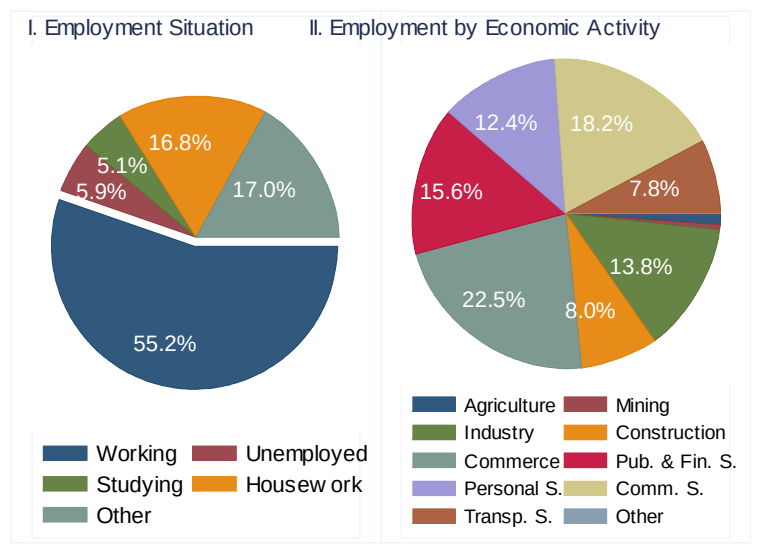
1. Country Current Situation Index (*CCSI*): Q1,
2. Country Future Expectation Index (*CFEI*): Q6,
3. Personal Current Situation Index (*PCSI*): $\frac{1}{3}$Q3 + $\frac{1}{3}$Q4 + $\frac{1}{3}$Q5a,
4. Personal Future Expectation Index (*PFEI*): $\frac{1}{3}$Q7 + $\frac{1}{3}$Q9a + $\frac{1}{3}$Q10,
5. Overall Future Expectation Index (*OFEI*): $\frac{1}{4}$Q6 + $\frac{1}{4}$Q7 + $\frac{1}{4}$Q9a + $\frac{1}{4}$Q10.

Note that we add a fifth indicator (OFEI) overriding the "subject" dimension (mixing country and personal) in order to have an appraisal on the overall predictive ability of those answers. In turn, EOD asks for traditional personal, demographic, and economic information: county, gender, age, marital status, educational level, employment situation, reason of unemployment, availability, occupational position, number of workers hired under your responsibility, economic activity, type of institution or establishment, total hours worked during the week of reference, total days worked during the week of reference, duration of inactivity, willingness to work extra hours, effort in job search, reason for no job searching, type of contract, salary, income from independent activities, pension, and total household income. Breaking over the "Employment Situation" answers (whose answers could be *Working*, *Unemployed*, *Studying*, *Housework*, and *Other*), and particularly mapping the "*Working*" answer with the "Economic Activity", we found that 55.2% of the sample that reports working (average 2001.I-2019.III), 22.5% do that in the *Commerce* sector, 18.2% in *Commonality and Social Services*, 15.6% in *Public and Financial Services*, 13.8% in *Industry*, 8.0% in *Construction*, 7.8% in *Transportation*, and the rest in four remaining smaller sectors (see Figure 1).

Thus, our hypothesis propose that consumers in economic sectors that are *more exposed* to the business cycle could be able to forecast better overall consumption and investment than (i) a reasonable simple benchmark, and (ii) consumers in sectors less sensitive to the business cycle. But which is the group of consumers more exposed to the business cycle? In our setup, this is equivalent to asking which economic sectors are more correlated to (a measure of) the output gap. There is no single way on how to determine the sensitivity or exposure of specific economic sectors to the business cycle. For instance, it is possible that those sectors with a higher GDP weight could be the most exposed, but it ignores the dynamic relationship with the output gap. Thus, it could be the case that a sector, while having a heavy weight on GDP, fluctuates less than other sectors with lighter weight throughout the business cycle. This is actually the case of *Financial Services* (14.9%) and *Mining* (9.4%) with a weight greater than, for instance, *Transportation* (5.0%), but this latter with a greater correlation with the (lagged) output gap. Also, the correlation is calculated using the output gap instead of GDP to differentiate between, for instance, episodes of "GDP growth" from "GDP growth above the potential GDP".

[7] Formally, it is defined as balance statistic=$100(\sum_{i=1}^{N} \omega_i x_i)$, where N is the total number of individual surveyed, ω_i is the weight of the i-th sample unit, and x_i is the response of the i-th sample unit, taking value one when the answer is "yes" or "increase", minus one when the answer is "no" or "decrease", and zero when the answer is "stable" or "same". The weight of the i-th sample unit is chosen in such a way that the sample is representative: the weight is inversely proportional to the probability of unit i to be drawn; hence, if the sample is random, the weight is simply ω_i=1/N.

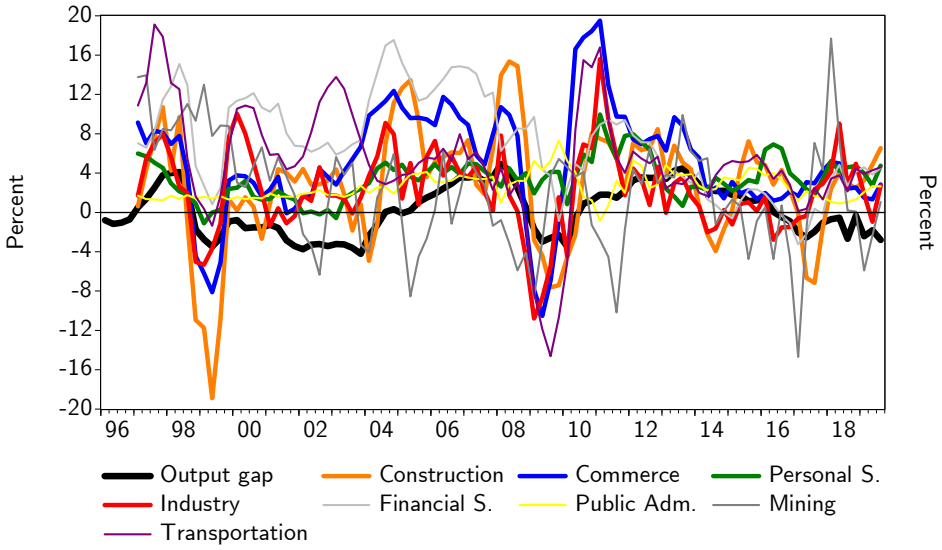
Figure 1. Composition of the *Centro de Microdatos*' employment situation answers by situation and economic activity, 2001-2019 average (*)



(*) Source: Authors' calculations based on *Centro de Microdatos* database.

The approximation used in this article for the output gap is obtained as the difference between the logarithmic level of actual GDP and potential GDP.[8] The latter is defined as the logarithmic level of the seasonally-adjusted and filtered version of the GDP including up to five years of forecast observations coming from an *ad-hoc* ARIMA model. This last step is performed to avoid the "end-of-sample" identification problem when using the Hodrick-Prescott (λ=1,600) method to filter the series. The seasonal adjustment program used is the X-13ARIMA-SEATS, whereas the ARIMA forecasting model is the so-called *airline model* (Box and Jenkins, 1970; Ghysels, Osborn, and Rodrigues, 2006).

Figure 2. Output gap and selected activity sectors (annual variation) (*)



(*) Source: Authors' calculations based on Central Bank of Chile's database.

[8]The source of the GDP series is the Central Bank of Chile's *Quarterly National Accounts* database (https://si3.bcentral.cl/Siete/secure/cuadros/home.aspx). We use the vintage available up to 2019.III.

We identify the economic sectors most sensitive to the output gap by means of cross correlation calculated with the current and up to 4-quarter lagged output gap. Particularly, the correlation in period t of the activity sectors *Construction*, *Commerce*, *Personal Services*, *Industry*, *Financial Services*, *Public Administration*, *Mining*, and *Transportation*, obtained from the Central Bank of Chile's *Quarterly National Accounts* database, with the correlation in t, t-1, t-2, and t-3 quarters of the output gap. The time series plot of involved variables is presented in Figure 2, and the estimated correlations are presented in Table 1.

Table 1: Correlation coefficient between (lagged) output gap and economic activity sectors (*)

	Output gap$_t$	Output gap$_{t-1}$	Output gap$_{t-2}$	Output gap$_{t-3}$	Output gap$_{t-4}$
Output gap$_t$	1.000	0.918	0.791	0.634	0.495
Output gap$_{t-1}$	0.918	1.000	0.918	0.789	0.636
Output gap$_{t-2}$	0.791	0.918	1.000	0.917	0.790
Output gap$_{t-3}$	0.634	0.789	0.917	1.000	0.921
Output gap$_{t-4}$	0.495	0.636	0.790	0.921	1.000
Mining$_t$	0.105	0.031	-0.013	-0.036	-0.040
Industry$_t$	0.330	0.108	-0.151	-0.362	-0.533
Construction$_t$	0.541	0.477	0.302	0.068	-0.137
Commerce$_t$	0.507	0.303	0.057	-0.190	-0.378
Transportation$_t$	0.213	0.072	-0.111	-0.315	-0.486
Financial Serv.$_t$	0.262	0.183	0.052	-0.126	-0.301
Personal Serv.$_t$	0.438	0.347	0.198	0.072	-0.058
Public Adm.$_t$	0.187	0.213	0.257	0.327	0.430

(*) Shaded cells=bigger correlation coefficient ($\geq |30\%|$) for a comparable time difference.
Sample: 2001.I-2019.III (75 observations). Source: Authors' calculations.

Note that, as the sectors with an acceptably high correlation with the output gap are evolving with the lag with which the correlation is calculated, we make use of four different definitions of the factor combining more informative sectors, thus:

1. CI: Commerce + Industry
2. CIT: Commerce + Industry + Transportation
3. CICS: Commerce + Industry + Construction + Personal Services
4. CCS: Commerce + Construction + Personal Services.

Notice that we consider for factor building all those sectors having more than twice a correlation coefficient above $|30\%|$ between t and t-4 output gap lags. Also, we opt to exclude *Public Administration* because it is merged with *Financial Services* in the EOD/IEE that, in turn, exhibit a low correlation with the output gap for considered time differences. Recall that for our second hypothesis, we compare the predictive ability of each of these four factors separately in our AR(p) setup with those composed with the remaining activity sectors surveyed by IEE (see Figure 1).

3.2 Macroeconomic aggregate data

We perform the same econometric exercise when predicting the six macroeconomic variables with the four consumer perception factors. Mentioned variables are Private consumption (PC) plus two out of three of its components separately—Durable consumption (DC) and Non-durable consumption (NDC)–, and Gross fixed capital formation (GFCF) plus its two components–Construction & works (CWK) and Machinery & equipment (MEQ).

The source of all these variables is the Central Bank of Chile's *Quarterly National Accounts* database; specifically, the vintage available until 2019.III. The transformation used to achieve stationarity is the annual percentage change. The series achieve stationarity with the full sample (2001.I-2019.III, 75 quarterly observations) according to the Augmented Dickey-Fuller (null hypothesis: the series has a unit root) using a trend, a constant, and 4 lags for PC (p-value: 0.193), a trend, a constant, and 4 lags for NDC (p-value: 0.147), a constant and 4 lags for DC (p-value:

0.145), a trend, a constant, and 4 lags for GFCF (p-value: 0.192), a constant and 4 lags for CWK (p-value: 0.127), and a trend, a constant, and 8 lags for MEQ (p-value: 0.381). No structural change is found in any of the series.

These macroeconomic aggregates are depicted in Figure 3, panels I and II, along with the indexes depicted by timing/subject (CCSI, CFEI, PCSI, PFEI, and OFEI) in panels III to VII. Note that all these factors achieve stationarity with a trend, a constant, and 5 lags (but excluding the trend with PCSI and PFEI indexes) according to the Augmented Dickey-Fuller test at the 10% confidence level. This is important because although the factors are developed in levels, they already refer to temporal comparisons according to their wording (see subsection 3.1). So, it could be unusual for one of these indicators to persistently grow over an extended time span. Thus, there is not an econometric issue when including them in the AR model in levels.

3.3 In-sample and forecast evaluation framework

We use the *estimation sample* covering from 2001.I to 2014.IV (56 observations) to estimate the AR(1) to AR(4) models for the six macroeconomic variables to determine which of them is the best forecasting model making use of the remaining *evaluation sample* covering from 2015.I to 2019.III (19 observations). After finding the best model, we then include four terms of the consumer-based factor and compare the resulting forecast with that of the non-augmented model. In our robustness exercises, we perform different setups on factor specification (level or first differences) combined with different number of terms included in the auto-regression (from one to four), under different AR(p) models. There is not a clear way on how to include the factor. However, as mentioned above, consumer data is evolving according to a 2-2-2 rotating panel scheme, and thus, include at least more than one term imply consider different and ultimately more consumers in the forecasting task. We opt to set the 4-term first differences of the factor as a baseline setup, which will be naturally challenged by robustness exercises. The baseline specification thus is:

$$y_t = \overline{y} + \sum_{i=1}^{P} \rho_i y_{t-i} + \phi_1 \Delta f_t + \phi_2 \Delta f_{t-1} + \phi_3 \Delta f_{t-2} + \phi_4 \Delta f_{t-3} + \varepsilon_t, \tag{1}$$

where y_t is any of the macro aggregates, $\Delta\ f_t$ corresponds to first difference of the consumer-based factor and its complementary versions, $\{\overline{y},\rho_i,\phi_i\}$ are to-be-estimated parameters once $P \in \{1,...,4\}$ is determined according to its out-of-sample performance without including a factor, and ε_t is a white noise. Note that the factor enters the equation with four terms, including a contemporaneous term. This is so because the survey data becomes available four to five months prior to macroeconomic aggregates.

For the same *estimation sample*, we compute the incremental adjusted goodness-of-fit coefficient with and without including the factor, and the joint statistical significance of the ϕ_i-coefficients in equation (1). We choose the P coefficient of equation (1) and also conduct the whole forecasting exercise making use of the *evaluation sample* in a rolling window scheme. This is also required for the statistical inference framework.

The forecast evaluation statistic used is the root mean squared forecast error (RMSFE) defined as:

$$RMSFE_h = \left[\frac{1}{P(h)} \sum_{t=R}^{T+1-h} \left(y_{t+h} - y_{t+h|t} \right)^2 \right]^{\frac{1}{2}}, \tag{2}$$

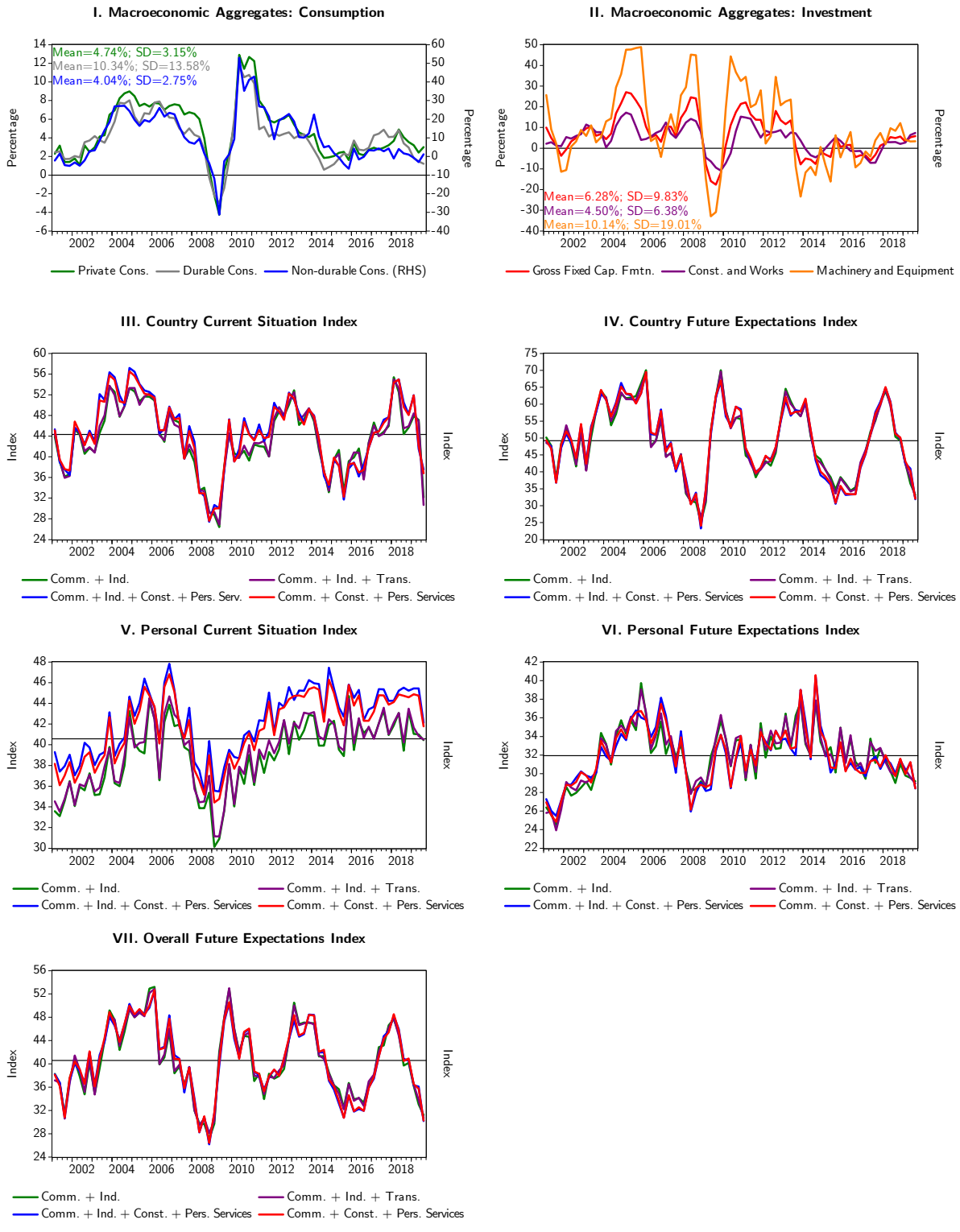
where $y_{t+h|t}$ represents the forecast of y_{t+h} made with information known up until time t. We generate a total of $P(h)$ forecasts, satisfying $P(h)=T+2-h+R$, where h is the forecast horizon, h={1,2,3,4}, and R is the number of observations in the *estimation sample* (56 observations).

For simplicity, the results are reported using a relative measure of the RMSFE, easing a comparison across the alternative forecasts. Two comparisons are made:

$$(i) \quad : \quad \text{Relative RMSFE}_h^1 = \text{RMSFE}_h^{\text{Factor augmented}} / \text{RMSFE}_h^{\text{No factor}}, \tag{3}$$

$$(ii) \quad : \quad \text{Relative RMSFE}_h^2 = \text{RMSFE}_h^{\text{Factor augmented (more exposed)}} / \text{RMSFE}_h^{\text{Factor augmented (less exposed)}},$$

Figure 3. Macroeconomic aggregates and consumer-perceptions-based indexes (*)



(*) Horizontal line in III-VII=mean of the mean of each depicted series. Source: Authors' calculations based on Central Bank of Chile and *Centro de Microdatos* database.

where "more/less exposed" refers to the relationship with the output gap. Thus, values below unity imply a better performance in favour of our two proposed hypotheses.

For the first case, *i.e.* the forecast including the factor compared to the AR version with no augmentation, the Clark and West (2007; CW) test is used because it consists of an adjusted RMSFE comparison due to model encompassing. Hence, the CW test evaluates *model adequacy* instead of *forecast accuracy*, as opposed to the Harvey, Leybourne, and Newbold (1997) test used to compare forecast accuracy between factors. Note that the CW is not the most appropriate for small sample environments due to a reduction of its power. However, there is no small-sample correction available and results are presented for reference. Thus, we use it for want of a better alternative.

The CW test can be considered as both an encompassing test and an adjusted comparison of the MSFE. The adjustment is made to ensure a fair comparison between nested models. Intuitively, the CW test removes a term that introduces noise when a parameter, that should be zero under the null hypothesis of equal MSFE, is estimated.

The core statistic of the CW test is constructed as follow:

$$\widehat{z}_{t+h} = (\widehat{\varepsilon}_{1,t+h})^2 - \left[(\widehat{\varepsilon}_{2,t+h})^2 - \left(y_{1,t+h|t} - y_{2,t+h|t}\right)^2\right], \tag{4}$$

where

$$\begin{aligned} \widehat{\varepsilon}_{1,t+h} &= y_{t+h} - y_{1,t+h|t}, \\ \widehat{\varepsilon}_{2,t+h} &= y_{t+h} - y_{2,t+h|t}, \end{aligned} \tag{5}$$

represent the corresponding forecast errors. Note that $y_{1,t+h|t}$ and $y_{2,t+h|t}$ denote the h-step-ahead forecasts generated from the two models under consideration. "Model 1" is the parsimonious or *small* model without factor-augmentation that is nested in the *larger* "Model 2". In other words, Model 2 would become Model 1 of some of its parameters were set to zero.

With a little algebra, it is straightforward to show that it could also be expressed as follows:

$$\text{Sample MSFE-Adjusted} = \frac{2}{P(h)} \sum_{t=R}^{T+1-h} \widehat{\varepsilon}_{1,t+h} \left(\widehat{\varepsilon}_{1,t+h} - \widehat{\varepsilon}_{2,t+h}\right). \tag{6}$$

This statistic is used to test the following null hypothesis, against the alternative:

$$\begin{aligned} H_0 &: \mathbb{E}\left[\text{Sample MSFE-Adjusted}\right] = 0, \\ H_1 &: \mathbb{E}\left[\text{Sample MSFE-Adjusted}\right] > 0. \end{aligned} \tag{7}$$

The CW test suggests a one-sided test for a t-type statistic based upon the core statistic in equation (4), *i.e.* asymptotically normal critical values. In most of the analysis, it follows Clark and McCracken (2001, 2005). Theoretical results in those papers require models to be estimated with non-linear least squares (which we use in this article) and multi-step forecasts to be made with the direct method. As we make use of the iterated forecast method, we show the results at more than one-step-ahead horizon just for reference.

For the second hypothesis considered in equation (3), *i.e.* comparing between the two factor-augmented forecasts, the equal predictive ability of Harvey, Leybourne, and Newbold (1997, HLN) test is used. This consists in a small-sample-corrected version of the Diebold and Mariano (1995) test, and plainly tests forecast accuracy. According to the Diebold-Mariano original test, we focus on testing the following null hypothesis against the alternative:

$$\begin{aligned} H_0 &: \mathbb{E}\left[\widehat{d}_{t(h)}\right] = 0, \\ H_1 &: \mathbb{E}\left[\widehat{d}_{t(h)}\right] \neq 0, \end{aligned} \tag{8}$$

where

$$\widehat{d}_{t(h)} = \left(y_{t+h} - y_{1,t+h|t}\right)^2 - \left(y_{t+h} - y_{2,t+h|t}\right)^2. \tag{9}$$

Our null hypothesis posits that forecast generated from the nested model performs equally to those generated from the larger model. As noted by HLN, using an approximately unbiased estimator of the mean's variance leads to a modified Diebold-Mariano test statistic:

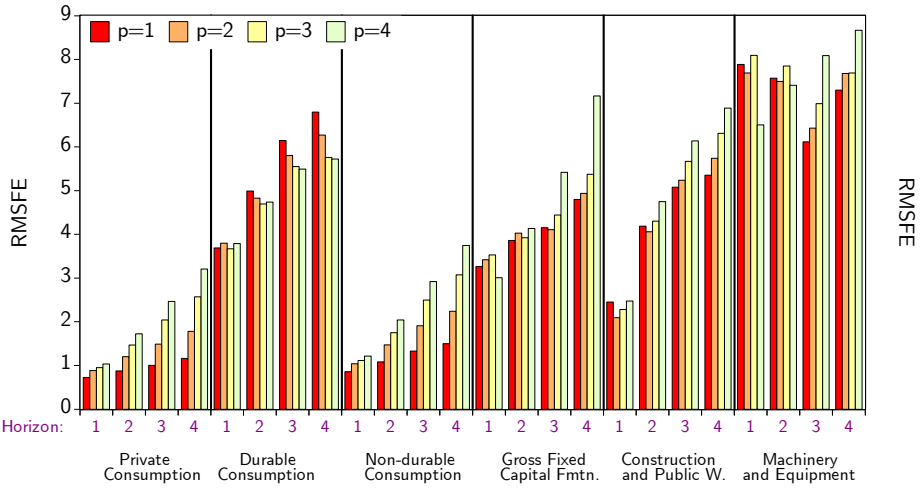
$$HLN_h = \left[\frac{n+1-2h+n^{-1}h(h-1)}{n}\right]^{\frac{1}{2}} \left(\overline{d}_{t(h)}/\widehat{\sigma}_{dt(h)}\right), \tag{10}$$

which must be contrasted with critical values from a Student's t distribution with (n-1) degrees of freedom, and $\overline{d}_{t(h)}$ corresponds to the sample mean and $\widehat{\sigma}_{dt(h)}$ to the standard deviation of the term in equation (9). Notice that this test requires that the estimates be made with a rolling window scheme. Thus, we perform our estimations with rolling windows of a fixed size of 50 observations. It is important to emphasize that the two tests differ in a number of aspects, the most important difference being that they are designed for different purposes. Consequently, we expect these two tests to deliver different results.

4 Results

As mentioned above, we choose the best AR(p) model following its predictive performance. In Figure 4, we show the (absolute) RMSFE of the AR(1) to AR(4) models for each horizon and macro aggregate. Two observations are worth mentioning: (i) there are heterogeneous results across horizons for a given variable, and in some cases the best model is evolving with the horizon, leading to further analyse other setups in an extensive robustness exercise (subsection 4.3), and (ii) there are some variables that are more difficult to predict as they exhibit more volatility than others, shedding some light on where is more likely to have room for improvement. Except for DC at h>1 and MEQ for h={2,3}, the best forecasting model is the AR(1). These two cases also motivate our robustness exercises, where we analyse the same results but using an AR(4) model. Thus, we make use of this simple—but demanding in terms of predictability—model to conduct our baseline forecasting exercise, but subject to further analysis.

Figure 4: Multi-horizon RMSFE of the AR(p) models by macroeconomic aggregate (*)



(*) Each bar displays the out-of-sample RMSFE by horizon and macroeconomic aggregate, for a given p-lag, p={1,...,4}, of the AR(p) model. Source: Authors' calculations.

4.1 In-sample diagnostics

Our first in-sample results comprise the incremental adjusted goodness-of-fit coefficient[9] when comparing the AR(1) with and without including the consumer-based factor. The results are presented in Table 2, showing the ratio between the adjusted goodness-of-fit coefficient of the AR(1) model including the factor upon the native AR(1). Hence, figures above unity are favourable for the factor. Note that we display two sets of columns: the first with the factors built with the sectors most associated to the output gap and the second with the complimentary factors.

Table 2. Adjusted R-squared ratio between AR(1) factor-augmented and native AR(1) model (*)

	Factor: More sensitive sectors					Factor: Less sensitive sectors				
	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
Factor: *Commerce + Industry*										
PC	0.977	1.013	0.984	0.996	1.009	0.977	0.992	1.004	0.991	0.995
DC	0.981	1.026	0.985	1.003	1.020	0.974	0.993	0.993	0.985	0.992
NDC	0.950	1.030	0.956	0.990	1.019	0.956	0.989	0.980	0.979	0.992
GFCF	0.981	1.026	1.008	1.022	1.034	0.998	1.007	1.014	1.031	1.037
CWK	0.983	1.025	1.013	1.060	1.058	0.982	1.015	0.997	1.034	1.039
MEQ	0.986	1.021	1.029	1.023	1.033	.018	0.999	1.078	1.054	1.060
Factor: *Commerce + Industry + Transportation*										
PC	0.980	1.010	0.991	0.995	1.005	0.976	0.995	1.000	0.991	0.996
DC	0.986	1.025	0.986	0.998	1.013	0.972	0.993	0.993	0.987	0.994
NDC	0.951	1.024	0.959	0.984	1.009	0.955	0.992	0.980	0.983	0.998
GFCF	0.985	1.019	1.010	1.023	1.033	0.990	1.011	1.015	1.032	1.038
CWK	0.981	1.028	1.006	1.058	1.059	0.982	1.014	1.001	1.034	1.038
MEQ	0.997	1.010	1.032	1.020	1.030	1.001	1.006	1.087	1.059	1.066
Factor: *Commerce + Industry + Construction + Personal Services*										
PC	0.980	0.990	1.002	0.990	0.992	0.980	1.017	0.987	0.997	1.010
DC	0.971	0.995	0.991	0.987	0.994	0.988	1.018	0.988	0.998	1.012
NDC	0.959	0.978	0.975	0.981	0.989	0.958	1.052	0.956	0.986	1.021
GFCF	0.994	1.007	1.016	1.033	1.038	0.981	1.023	1.003	1.022	1.033
CWK	0.986	1.020	0.997	1.034	1.039	0.981	1.015	1.009	1.058	1.056
MEQ	1.010	1.000	1.078	1.061	1.066	0.986	1.017	1.035	1.020	1.032
Factor: *Commerce + Construction + Personal Services*										
PC	0.978	0.997	1.001	0.993	0.999	0.983	1.015	0.992	0.991	1.002
DC	0.972	1.003	0.988	0.992	1.002	0.990	1.017	0.997	0.989	1.002
NDC	0.953	0.991	0.969	0.989	1.004	0.965	1.046	0.972	0.971	0.998
GFCF	0.990	1.014	1.017	1.035	1.042	0.985	1.015	0.995	1.013	1.020
CWK	0.985	1.022	1.001	1.042	1.046	0.979	1.015	1.006	1.051	1.051
MEQ	1.004	1.012	1.075	1.062	1.070	0.994	0.995	1.028	1.001	1.008

(*) Adjusted R-squared ratio=Adjusted R-squared with the factor/Adjusted R-squared without the factor. Orange-shaded cells=Adjusted R-squared ratio greater than 1. Green-shaded cells=Adjusted R-squared ratio greater than 1.05 (5% of adjustment gain). Sample: 2001.I-2014.IV (56 observations). Source: Authors' calculations.

Three salient features are worth mentioning. First, whatever the sectors included in the factor either more correlated to the output gap or not, the PCSI classification virtually in none of the cases provides material improvements. Consequently, the reading of this survey when including personal current situation questions (Q3, Q4, and Q5a) does not come out with relevant information for neither prospective consumption nor investment. Second, a comparison between a given factor with its complementary version is always favourable for the sectors more akin to the output gap. However, an exception is made with the CICS sectors (Commerce + Industry + Construction

[9]Recall that the adjusted goodness-of-fit coefficient corresponds to Adjusted-R^2=$1-[(1-R^2)(T-1)/(T-P-1)]$, where R^2 is the ratio between the sum of regression squared residuals and total squared residuals, T is the sample size, and P the number of estimated coefficients in the regression. Thus, the measure already considers the adjustment controlling for the number of regressors. This is particularly relevant to avoid the issue of overfitting.

+ Personal Services) in which 13 (out of 30) cases compared to 18 cases improves the model's adjustment. This is important because this is the factor containing more information than the others and, despite this advantage, is unable to track better, specifically, DC and NDC. Third, there are two factors providing a satisfactory performance independently of the sectors considered and working well with all variables: PFEI and OFEI. As will be shown later, these two specifications come out as the best for forecasting.

Our second in-sample result is regarding the statistical significance of the null hypothesis NH: ϕ_1=...=ϕ_4=0 of equation (3). In this case, note that we test for this specific hypothesis being a number of different ways to consider it in terms of factor specification (level or differences), number of terms included in the regression, and the native model by itself. Recall that we set this exercise obeying to a predictive criterion which has led to the best results with 4-term factor in levels with an AR(1) native model. Naturally, testing a particular economic theory will require a richer environment, such as that of Acuña, Echeverría, and Pinto-Gutiérrez (2020) to control for other possible effects occurring simultaneously. Having reported that there are numerous ways to carry out this type of test, the issue of short sample is also latent. As the *estimation sample* comprises 56 observations (2001.I-2014.IV) and the *evaluation sample* 19 observations (2015.I-2019.III), we consider the full sample (2001.I-2019.III). Although 75 observations could still be moderate to estimate six highly-correlated regression coefficients, we opt to conduct this exercise to disentangle and discriminate better between the proposed factors.

The results are presented in Table 3. First, in this exercise there are overall, fewer cases in which the factor comes out statistically significant compared to the previous case in which it may enhance the adjustment of the model. In this sense, this exercise could be considered as a refinement of the previous one and, thus, helping to focus in the most promising cases. Second, within those promising cases there is now a marked difference between PFEI and OFEI specifications, plainly favouring the OFEI index with sectors more related to the business cycle, and particularly for investment series. Third, following this exercise, the information from CITS sectors turns specifically useful to explain the dynamic of the investment series only (particularly MEQ), which is added to the previous results of adjustment improvements.

In sum, PFEI and OFEI are the most fruitful re-classifications to explain the dynamic of the series considered, whereas in terms of the economic sectors in which the consumers participate, there is not a single specification that comes out as systematically superior—which will be determined predictively. Finally, there is supporting evidence for sectors more related to the business cycle than the remaining ones when explaining considered macro aggregates.

4.2 Out-of-sample results

Our first out-of-sample result concerns our first hypothesis, *i.e.* the extent to which consumer sentiment factors better forecast macro aggregates and their components compared to the native un-extended chosen AR(p) model. The results are presented in Table 1A in Annex A.

Three facts are worth mentioning. First, although showing some important predictive gains (=1-RMSFE ratio%) specially at longer horizons, both PC and CWK do not deliver statistically significant results. For PC the best factor specification is the PCSI compounded by the CICS sectors with the largest gain surrounding 18% at h=4. In turn, for CWK, there is not a single specification actually showing a predictive gain at the nowcast horizon, whereas for the remaining horizons the CFEI specification with CI economic sectors comes out as the best forecasting strategy, with gains ranging from 4.1% to 11.3% at h=2 and 4, respectively.

Second, for DC and MEQ, there are noticeable predictive gains for all horizons, but statistically significant only at h=1 for DC, and at h=4 for MEQ. For DC, two cases provide significant results, using CFEI and OFEI both using information from CIT sectors. Note that predictive gains coming from including the *Transportation* sector as the comparison with CI sectors show a non-statistically significant, poorer performance. Also, the maximum gain with CFEI achieves a material figure close to 14% (being 9.5% with the second-best alternative, OFEI). For MEQ, there are four statistically significant cases, all of them at h=4. Remarkably, all these results are obtained with the CFEI specification with each of the four economic sectors groups. Furthermore, there is virtually a tie between CI and CIT sectors (with gains of 7.8% and 7.7%), then a better performance is noticed with CICS sectors (8.5%),

and the best result is obtained with CCS (10.3%). Thus, it is important to note that the only factor that excludes consumers working in *Industry* comes out as the best and, at the same time, by making pairwise comparisons, *Construction* seems to contribute more to the factor's forecast ability.

Table 3. *F*-test results (*p*-value) of the consumer-based factor statistical significance (*)

	Factor: More sensitive sectors					Factor: Less sensitive sectors				
	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
Factor: *Commerce + Industry*										
PC	0.965	0.084	0.766	0.239	0.071	0.935	0.477	0.203	0.500	0.313
DC	0.635	0.038	0.674	0.226	0.070	0.931	0.571	0.558	0.556	0.413
NDC	0.976	0.042	0.875	0.209	0.048	0.872	0.430	0.592	0.429	0.273
GFCF	0.971	0.105	0.380	0.127	0.028	0.756	0.334	0.161	0.103	0.076
CWK	0.961	0.163	0.362	0.014	0.020	0.951	0.190	0.630	0.103	0.034
MEQ	0.836	0.125	0.197	0.204	0.059	0.318	0.475	0.020	0.097	0.060
Factor: *Commerce + Industry + Transportation*										
PC	0.923	0.091	0.525	0.293	0.102	0.971	0.411	0.317	0.480	0.268
DC	0.504	0.028	0.612	0.345	0.148	0.981	0.561	0.564	0.488	0.348
NDC	0.969	0.126	0.845	0.340	0.111	0.851	0.345	0.600	0.332	0.191
GFCF	0.916	0.177	0.333	0.144	0.049	0.859	0.268	0.146	0.094	0.055
CWK	0.986	0.124	0.513	0.023	0.014	0.962	0.239	0.508	0.090	0.035
MEQ	0.697	0.230	0.170	0.213	0.083	0.446	0.418	0.010	0.095	0.048
Factor: *Commerce + Industry + Construction + Personal Services*										
PC	0.802	0.529	0.164	0.515	0.364	0.900	0.063	0.750	0.242	0.065
DC	0.981	0.545	0.581	0.521	0.343	0.431	0.032	0.553	0.307	0.157
NDC	0.766	0.584	0.602	0.397	0.351	0.918	0.030	0.927	0.262	0.034
GFCF	0.761	0.311	0.160	0.076	0.048	0.971	0.146	0.406	0.170	0.070
CWK	0.847	0.099	0.637	0.086	0.023	0.986	0.331	0.439	0.027	0.030
MEQ	0.408	0.481	0.026	0.066	0.037	0.794	0.176	0.128	0.251	0.104
Factor: *Commerce + Construction + Personal Services*										
PC	0.932	0.269	0.144	0.365	0.180	0.882	0.071	0.563	0.400	0.165
DC	0.965	0.308	0.647	0.382	0.209	0.364	0.047	0.224	0.499	0.373
NDC	0.904	0.347	0.660	0.282	0.176	0.858	0.081	0.562	0.511	0.162
GFCF	0.886	0.244	0.150	0.070	0.034	0.947	0.270	0.624	0.263	0.147
CWK	0.899	0.069	0.553	0.049	0.013	0.992	0.395	0.465	0.056	0.060
MEQ	0.573	0.346	0.028	0.058	0.026	0.720	0.467	0.141	0.426	0.254

(*) *p*-value of the null hypothesis: NH: ϕ_1=...=ϕ_4=0 (see equation 1) against the alternative of at least one term is equal to zero. Green-shaded cells=p<10%. Orange-shaded cells=p<15%. Sample: 2001.I-2019.III (75 observations). Source: Authors' calculations.

Finally, the most fruitful results are obtained for NDC and GFCF. A common result between them is that no single factor is significant at the nowcast horizon, and this also is extended to NDC at h=2. However, for NDC, notably the predictive gains at h=3 occurred all with the same PCSI factor using the four different groups of economic sectors. Moreover, the best results are obtained with CICS (20.9%) and CCS (19.1%) sectors. Consequently, the key feature leading to these results is the inclusion of the answers of consumers working in *Personal Services*, which is corroborated with the results at h=4, where aforementioned two factors—PCSI-CICS and PCSI-CCS—comes out as the best forecasting alternatives with predictive gains of 24% and 20.9%, respectively.

Regarding GFCF, despite some important gains with CI and CIT sectors, none of them comes out as statistically significant. In contrast, using CICS and CCS sectors the results with OFEI are always significant for h>1. It is important to remark that only in this case the best results in terms of the lowest RMSFE ratio are not statistically significant, but the second-best alternative actually is so at conventional levels of significance. These are the cases of CFEI and OFEI indexes generated with CICS information comparing 0.862 versus 0.941 at h=2, 0.829 versus 0.958 at h=3, and 0.810 versus 0.951 at h=4, where OFEI results are always statistically significant. The same is obtained with CCS when comparing CFEI with OFEI at h=2: 0.855 versus 0.923, h=3: 0.809 versus 0.935, and h=4:

0.787 versus 0.928; all cases statistically significant with OFEI. Overall, however, for each considered case, the best results are always favourable to CCS sectors. In consequence, when considering the path of best results according to the lowest RMSFE ratio, this is composed by CFEI with CICS sectors at h=1, and CFEI with CCS sectors for h={2,3,4} despite the results of the CW test, but with a slightly different RMSFE ratio.

Regarding our second hypothesis, *i.e.* the extent to which consumers working in economic sectors more exposed to the business cycle provides better forecasting ability than those consumers working in the remaining sectors. The results are presented in Table 2A in Annex A.

The first salient feature is that a number of predictive gains are noticed favouring our hypothesis, but only a few are statistically significant. There is an overwhelming difference favouring the use of country-wide information in the construction of the factor using either current sentiment or future expectation questions, plus the overall future expectation built jointly with the personal future expectation. On nine occasions, the OFEI indicator comes out as significant, and eight for CCSI, seven for CFEI, and two for PCSI. In terms of the economic sectors, the results are spread across the four specifications, but the statistically significant cases are concentrated in CICS sectors (12), then CIT (8), and CI and CCS (3 cases each). Thus, our second hypothesis is mostly supported for DC, NDC, and GFCF using CFEI and OFEI factors with information coming from CICS sectors. These results, added to the results of Table 1A, suggest a superior forecast ability of the CICS sectors over remaining ones when using OFEI factor for GFCF, and reinforce the use of PCSI factor with the same sectors for NDC.

Given the number of specifications and results, in Table 4 we provide a summary of the best forecasting path according to the smaller RMSFE ratio for each variable. Note that in some cases, the smallest RMSFE ratio is achieved with a non-statistically-significant setup, despite having available a second-best alternative with a slightly higher RMSFE ratio but rejecting the null hypothesis proposed by the CW test. This table highlights the importance of the PCSI specification for consumption, and the CFEI for investment series. It also makes clear that the most fruitful results in terms of predictive accuracy are found for NDC and GFCF, showing smaller RMSFE ratios. Finally, CICS and CCS sectors boldly provide the most valuable information for forecasting any of the considered macro aggregates.

4.3 Robustness results

In this subsection, we report the results of an extensive robustness exercise consisting in different twists to the baseline setup. In particular, we assume different native best AR forecasting models, which is particularly relevant for both DC and MEQ, as well as a different number of factor terms included in the regression. Notice that for DC and MEQ, according to Figure 4, the AR(4) model comes out as the best for some specific horizons (for all cases except MEQ at h=3 and 4). Unlike the baseline setup, we also consider the factor in levels. All these exercises are conducted to find the most fruitful way to consider the factor with an out-of-sample objective. Thus, the aim is to challenge the results of Table 4.

All detailed results are presented in the Online Appendix, mimicking the results of Table 2 (Adjusted R-squared ratio), Table 3 (F-test results), Table 1A (RMSFE ratio between the native AR(1) and the factor-augmented AR model), and Table 1B (RMSFE ratio between the AR model augmented with the more sensitive factor and the AR model augmented with the less sensitive factor to the business cycle), but we provide a summary to ease comparisons. Also, as we try the AR(2), AR(3), and AR(4) as native models, there is a new type of results when comparing to the native AR(1). However, these results are shown for reference only, as they are not fully comparable to the AR(1) because the factor-augmented AR(p) with p={2,3,4} could exhibit a better performance not exclusively to the information contained in the factor but to a "larger p" (a model more suitable for the variable at hand).

Hence, the Online Appendix is organised according to the following scheme:

- A1: Native model: AR(2), factor specification: Δx, number of factor terms: 4
- A2: Native model: AR(3), factor specification: Δx, number of factor terms: 4
- A3: Native model: AR(4), factor specification: Δx, number of factor terms: 4

Table 4: Summary of the best forecasting baseline setup

by macro aggregate (*)					
	Setup	h=1	h=2	h=3	h=4
PC	RMSFE:	0.983	0.958	0.874	0.818
	Sectors:	CICS	CICS/CCS	CCS	CICS
	Index:	PCSI	PCSI	PCSI	PCSI
DC	RMSFE:	0.863*	0.937	0.886	0.856
	Sectors:	CIT	CIT	CCS	CCS
	Index:	CFEI	CFEI	CCSI	CCSI
NDC	RMSFE:	0.958	0.872	0.791*	0.760**
	Sectors:	CICS	CICS	CICS	CICS
	Index:	PCSI	PCSI	PCSI	PCSI
GFCF	RMSFE:	0.945	0.855†	0.809†	0.787†
	Sectors:	CICS	CCS	CCS	CCS
	Index:	CFEI	CFEI	CFEI	CFEI
CWK	RMSFE:	1.002	0.959	0.983	0.887
	Sectors:	CCS	CI	CCS	CI
	Index:	CFEI	CFEI	OFEI	CFEI
MEQ	RMSFE:	0.992	0.980	0.976	0.897*
	Sectors:	CICS	CICS	CCS	CCS
	Index:	PFEI	CFEI	CFEI	CFEI

(*) "RMSFE" stands for Relative RMSFE$_h^1$ (see equation 3). "Sectors" stands for the economic sectors considered in the consumer-perception-based factor (see subsection 3.1). "Index" stands for the timing (current/ future) and subject (personal/country-wide) feature of the factor. (†) For this case there is available a statistically significant result but with a slightly higher RMSFE ratio. Clark and West (2007) test's p-value: (***) p<1%, (**) p<5%, and (*) p<10%. Sample: 2015.I-2019.III (19 observations). Source: Authors' calculations.

- A4: Native model: AR(1), factor specification: Δx, number of factor terms: 1
- A5: Native model: AR(1), factor specification: Δx, number of factor terms: 2
- A6: Native model: AR(1), factor specification: Δx, number of factor terms: 3
- A7: Native model: AR(1), factor specification: x, number of factor terms: 1
- A8: Native model: AR(1), factor specification: x, number of factor terms: 2
- A9: Native model: AR(1), factor specification: x, number of factor terms: 3
- A10: Native model: AR(1), factor specification: x, number of factor terms: 4.

Consequently, tabulated results are shown according to:

- Baseline Tables 2 and 3 (Adjusted R-squared ratio and F-test results) = merged to Tables 1.A1 to 1.A10,
- Baseline Table 1A (RMSFE ratio between the native AR(1) and the factor-augmented AR model) = Tables 2.A1 to 2.A10,
- New tables comparing AR(p), p={2,3,4} models with the AR(1) = Tables 3.A1 to 3.A3,
- Baseline Table 2A (RMSFE ratio between factor-augmented AR models according to its relationship with the business cycle) = Tables 4.A1 to 4.A10.

Thus, for instance, for all series in which Figure 4 show that the best model is the AR(1), the comparisons should be made across Table 2.A4 to Table 2.A10. In turn, for those series where the best model is the AR(4), the strength of the factor should be looked up in Table 3.A3. In this sense, and recalling that the primary interest is in forecasting and the comparison between sector, the primary conducting results are obtained from Tables 2.A4-2.A10 (or 3.A3) and Tables 4.A4-4.A10, with the in-sample results (Tables 1.A1 to 1.A10) analysed at the end.

The summary of robustness exercises is presented in Table 5. Notice that unlike Table 4, we consider two types of results, those statistically significant according to the CW test, and those not statistically significant. The latter are included to have an appraisal on the predictive gains on a small sample environment, where the CW test may not be the most suitable but we use it as we have no better alternative, as well as to make it comparable to Table 4.

For PC, there are noticeable predictive gains for all horizons when comparing to baseline results, except at h=3 in the non-statistically significant case. At h=1, there is a significant gain in neither the baseline nor alternative estimations. However, the 2-term factor in levels with CIT sectors and OFEI index deliver better results as well as showing better in-sample diagnostics. At h=2, there is a superior result in both RMSFE precision and significance. The results with the consumer-factor in levels including one and three terms, significant and non-statistically significant, respectively, outperform the baseline results. More remarkably, the significant predictive gain of 4.9% with CIT sectors and CCSI index comes out as a better alternative than the remaining sectors less exposed to the business cycle, and with better diagnostics. At h=3, the newly found statistically significant result does not provide a greater predictive gain than the non-significant case, and its diagnostics are also non-supportive. For h=4, the best results are obtained with the 4-term factor in levels, and its precision only improves for the non-significant case. However, it is important to remark that robustness exercises find a superior statistically significant role for the consumer-factor at any horizon (unlike the baseline results), except the nowcasting one, in which only one variable exhibits a significant gain.

For DC, we present the results assuming that the best forecasting model is, first, the AR(1) and second the AR(4), which is in line with Figure 4. When assuming the AR(1) as the best model, the baseline results are still the best performers across all horizons, despite that for $h>1$ there are now statistically significant cases but with a smaller predictive gain. The competing setup always includes a 2-term factor in levels. However, all these results for DC are due to the room opened by the use of the second-best forecasting model, the AR(1), and thus, it is relevant to delve in the results obtained with the AR(4). In this case, despite not finding statistically significant results, all predictive gains are smaller than the AR(1) case, which is expected, but predictive *gains* nonetheless. Remarkably, all these results are obtained with the same sectors (CIT) and with two indexes: CFEI and CCSI. The best results are always obtained with the factor in first differences.

For NDC, robustness results provide enhanced predictive gains for h=1 and h=4. The case of NDC is the only one in the entire exercise showing a statistically significant predictive gain at the nowcasting horizon, which is also of a material size (25.9%), and compounded by sectors (CCS) which are statistically superior to the remaining ones less exposed to the business cycle; and the PFEI index. For intermediate horizons, the results are mixed. In 8 out of 9 cases the best setup is obtained with the factor in levels, and with a relatively high number of terms. For h=2, the statistically significant result is obtained with CCS sectors and the PCSI index, which along with PFEI, are the two most competitive indexes for this macro variable. Unlike the baseline case, for h=2 a statistically significant gain is found, completing all horizons with significant results. However, for these significant cases, the diagnostics are not supportive, despite being superior at forecasting than the remaining sectors less exposed to the business cycle. Also, no clear pattern of sectors across horizons is found. At h=3 the baseline result remains the best, whereas h=4 yields slightly better results (0.698 versus 0.760) with the factor in levels and replacing CICS by CI sectors.

For GFCF, none of the robustness results provides improvements. Thus, despite that the path of best results across horizons does not provide statistically significant results, the significant ones show smaller gains also with the 4-term factor in first differences. From an in-sample point of view, all these results are very promising and favouring our hypotheses. Also, the out-of-sample comparison with sectors less exposed to the business cycle favours our second hypothesis, but being non-significant according to the HLN test.

For CWK, the situation with robustness exercises improves just a bit. At h=1, the baseline result with CICS sectors and CFEI index show inexistent predictive gains, but using the factor in levels delivers a predictive gain of 4.9%

(statistically non-significant) with same sectors but PCSI index. A similar situation is found at h=2 and 3, where mild, statistically non-significant gains are obtained with different sectors, indexes, and consumer-factor setups. At h=4, the baseline result persists as the best with CI sectors and CFEI index, and with in-sample diagnostics favouring our hypotheses.

Finally, for MEQ we analyse the results assuming that the best model according to Figure 4 is the AR(4), which clearly applies for h={1,2}, but is not the case at h={3,4}—where the AR(1) comes out as the best. When assuming that the best model is the AR(1), the results tend to favour our first hypothesis, in the sense that using the factor in levels improves the predictive gains for h={1,2,3}. However, they do not support our second hypothesis, and sectors less exposed to the business cycle could be as good as those more exposed to it. At h=4, in turn, the baseline result remains as the best option, corresponding to a statistically significant predictive gain of 10.3% with CCS sectors and CFEI index that, and at the same time, is better than the remaining sector less exposed to the business cycle. Also, in-sample diagnostics give support to our out-of-sample results. When assuming the AR(4) as the best model, we find statistical gains for all horizons, despite not statistically significant. The results for h={1,2} are more relevant in the light of Figure 4, and in both cases the RMSFE with CICS sectors and PFEI index gives support to our hypotheses–first, showing predictive gains of 5.2% and 6% for h={1,2} and, second, predicting better than do sectors less exposed to the business cycle.

In sum, from our baseline setup we conclude that PCSI along with CCSI indexes provide the most fruitful results for consumption series, and CFEI doing so for investment series. In turn, NDC and GFCF are the variables showing the greatest predictive gains of the whole exercise. Lastly, CICS and CCS sectors undoubtedly lead to the best forecasting results as well as better forecasts compared to remaining sectors less exposed to the business cycle. From the robustness exercises, we confirm that NDC and GFCG are the most benefited series when using the consumer-based factor for forecasting as well as the pre-eminence of CCS and CICS sectors. However, a major shift in favour of the OFEI index is found, which in our baseline setup leads to the best result in just one case, whereas in the alternative setups comes out as the best alternative for investment series. This shift is due to the different way in which the factor is included in the forecasting regression. In this sense, the factor in levels comes out as the best alternative at shorter horizons, *i.e.* h={1,2}, whereas the first differences are superior for the remaining horizons.

5 Concluding remarks

The aim of this article is two-fold: (i) to analyse the extent to which consumer sentiment indexes better forecast aggregate consumption and its components, by constructing new indexes using labour market characteristics of respondents using a unique dataset, and re-focusing aggregate answers according to timing and subject, and (ii) to analyse to what extent a greater *exposure* of consumers/workers to the business cycle comes out with a better ability to nowcast and short-term forecast consumption, compared to consumers/workers that participate in economic sectors less exposed to the business cycle. Our claim assumes that consumers work in sectors where decisions are taken depending to a greater or lesser degree on the current and future economic situation. The consumers can take the decisions themselves, be aware of them, or be affected by their consequences. Thus, we assume the existence of a learning mechanism permeable to the sentiment of workers that is present when they are surveyed as consumers. We call this mechanism "exposure" and we operationalize it by means of the correlation of worker's economic sector with the output gap. Since this argument is extensible to investment decisions, we include total investment and its components in the analysis.

Despite the considerable amount of related literature, this article goes one step further by using microdata evidence of consumer sentiment predictability over aggregate consumption and investment, taking advantage of a specific survey on consumers' perceptions which, at the same time, is linked to a survey of employment/ unemployment of the Greater Metropolitan area of Chile's capital city. These are the Survey of Employment and Unemployment in Greater Santiago and the Survey of Perception and Expectations on the Economic Situation in Greater Santiago, both elaborated by the Universidad de Chile's *Centro de Microdatos*.

Table 5: Summary of the best forecasting path by macro aggregate under different setups (*)

	h=1		h=2		h=3		h=4	
	Stat. s.[1]	Not stat. s.[1]	Stat. s.[1]	Not stat. s.[1]	Stat. s.[1]	Not stat. s.[1]	Stat. s.[1]	Not stat. s.[1]
Private Consumption (best native model[2]: AR(1))								
RMSFE[3]	-	0.837	0.951*	0.890	0.974*	0.874	0.914*	0.754
Sectors[4]	-	CIT	CIT	CICS	CICS	CCS	CCS	CI
Index[5]	-	OFEI	CCSI	PFEI	PCSI	PCSI	PCSI	PCSI
HLN test[6]	-	1.034	0.935	0.997	0.983	1.021	0.925	0.770
Factor[7]	-	x	x	x	Δx	Δx	x	x
No. of terms[8]	-	2	1	3	2	4	4	4
Adj. R-sq. (more sens.)[9]	-	1.011	1.012	1.005	0.994	0.978	0.997	1.014
Adj. R-sq. (less sens.)[9]	-	1.014	1.007	1.043	0.995	0.983	1.002	0.990
F-Test (more sens.)[10]	-	0.122	0.075	0.618	0.813	0.932	0.645	0.215
F-Test (less sens.)[10]	-	0.106	0.144	0.072	0.798	0.882	0.568	0.846
Durable Consumption (best native model[2]: AR(1))								
RMSFE[3]	0.863*	0.912	0.941**	0.937	0.957*	0.886	0.955*	0.856
Sectors[4]	CIT	CI	CI	CIT	CIT	CCS	CI	CCS
Index[5]	CFEI	CCSI	OFEI	CFEI	OFEI	CCSI	OFEI	CCSI
HLN test[6]	0.922	0.961	0.976	0.952*	0.975	0.985	0.969	0.980
Factor[7]	Δx	x	x	Δx	x	Δx	x	Δx
No. of terms[8]	4	2	2	4	2	4	2	4
Adj. R-sq. (more sens.)[9]	0.998	1.012	1.027	0.998	1.023	0.988	1.027	0.988
Adj. R-sq. (less sens.)[9]	0.987	1.006	1.017	0.987	1.018	0.997	1.017	0.997
F-Test (more sens.)[10]	0.345	0.162	0.022	0.345	0.031	0.647	0.022	0.647
F-Test (less sens.)[10]	0.488	0.142	0.083	0.488	0.079	0.224	0.083	0.224
Durable Consumption (best native model[2]: AR(4))								
RMSFE[3]	-	0.885	-	0.978	-	0.928	-	0.919
Sectors[4]	-	CIT	-	CIT	-	CIT	-	CIT
Index[5]	-	CFEI	-	CFEI	-	CCSI	-	CCSI
HLN test[6]	-	0.903*	-	0.936*	-	0.947	-	0.964
Factor[7]	-	Δx	-	Δx	-	Δx	-	Δx
No. of terms[8]	-	4	-	4	-	4	-	4
Adj. R-sq. (more sens.)[9]	-	0.997	-	0.997	-	0.990	-	0.990
Adj. R-sq. (less sens.)[9]	-	0.990	-	0.998	-	0.999	-	0.999
F-Test (more sens.)[10]	-	0.411	-	0.411	-	0.476	-	0.476
F-Test (less sens.)[10]	-	0.550	-	0.550	-	0.134	-	0.134
Non-durable Consumption (best native model[2]: AR(1))								
RMSFE[3]	0.741**	0.769	0.896**	0.653	0.791*	0.742	0.698*	0.700
Sectors[4]	CCS	CICS	CCS	CCS	CICS	CCS	CI	CIT
Index[5]	PFEI	PFEI	PCSI	PFEI	PCSI	PFEI	PCSI	PCSI
HLN test[6]	0.831**	0.809	0.870**	0.932	0.866	0.964	0.697**	0.694**
Factor[7]	x	x	x	x	Δx	x	x	x
No. of terms[8]	3	4	2	4	4	4	4	4
Adj. R-sq. (more sens.)[9]	1.025	1.016	0.993	1.016	0.959	1.016	0.979	0.974
Adj. R-sq. (less sens.)[9]	1.077	1.062	0.996	1.062	0.958	1.062	0.966	0.969
F-Test (more sens.)[10]	0.352	0.450	0.555	0.450	0.766	0.450	0.710	0.784
F-Test (less sens.)[10]	0.122	0.220	0.470	0.220	0.918	0.220	0.806	0.733

Table 5 (cont.): Summary of the best forecasting path by macro aggregate under different setups (*)

	h=1		h=2		h=3		h=4	
	Stat. s.[1]	Not stat. s.[1]	Stat. s.[1]	Not stat. s.[1]	Stat. s.[1]	Not stat. s.[1]	Stat. s.[1]	Not stat. s.[1]
Gross Fixed Capital Formation (best native model[2]: AR(1))								
RMSFE[3]	-	0.945	0.923**	0.855	0.935*	0.809	0.928**	0.787
Sectors[4]	-	CICS	CCS	CCS	CCS	CCS	CCS	CCS
Index[5]	-	CFEI	OFEI	CFEI	OFEI	CFEI	OFEI	CFEI
HLN test[6]	-	0.938	0.873	0.879	0.867	0.878	0.876	0.876
Factor[7]	-	Δx	Δx	Δx	Δx	Δx	Δx	Δx
No. of terms[8]	-	4	4	4	4	4	4	4
Adj. R-sq. (more sens.)[9]	-	1.033	1.042	1.035	1.042	1.035	1.042	1.035
Adj. R-sq. (less sens.)[9]	-	1.022	1.020	1.013	1.020	1.013	1.020	1.013
F-Test (more sens.)[10]	-	0.076	0.034	0.070	0.034	0.070	0.034	0.070
F-Test (less sens.)[10]	-	0.170	0.147	0.263	0.147	0.263	0.147	0.263
Construction and Works (best native model[2]: AR(1))								
RMSFE[3]	-	0.951	-	0.950	-	0.944	-	0.887
Sectors[4]	-	CICS	-	CICS	-	CCS	-	CI
Index[5]	-	PCSI	-	PCSI	-	CFEI	-	CFEI
HLN test[6]	-	0.984	-	0.992	-	0.996	-	0.980
Factor[7]	-	x	-	x	-	Δx	-	Δx
No. of terms[8]	-	4	-	4	-	3	-	4
Adj. R-sq. (more sens.)[9]	-	0.978	-	0.978	-	0.993	-	1.060
Adj. R-sq. (less sens.)[9]	-	0.982	-	0.982	-	0.998	-	1.034
F-Test (more sens.)[10]	-	0.848	-	0.848	-	0.433	-	0.014
F-Test (less sens.)[10]	-	0.817	-	0.817	-	0.768	-	0.103
Machinery and Equipment (best native model[2]: AR(1))								
RMSFE[3]	-	0.976	0.937**	0.933	0.928**	0.922	0.897*	0.941
Sectors[4]	-	CICS	CCS	CICS	CICS	CICS	CCS	CIT
Index[5]	-	OFEI	OFEI	OFEI	OFEI	OFEI	CFEI	PFEI
HLN test[6]	-	1.047	1.017	0.998	1.025	1.015	0.934	0.960
Factor[7]	-	x	x	x	x	x	Δx	x
No. of terms[8]	-	2	2	3	2	3	4	2
Adj. R-sq. (more sens.)[9]	-	1.002	1.003	1.092	1.002	1.092	1.062	0.998
Adj. R-sq. (less sens.)[9]	-	0.998	0.996	1.056	0.998	1.056	1.001	1.002
F-Test (more sens.)[10]	-	0.491	0.480	0.006	0.491	0.006	0.058	0.708
F-Test (less sens.)[10]	-	0.639	0.691	0.025	0.639	0.025	0.426	0.641
Machinery and Equipment (best native model[2]: AR(4))								
RMSFE[3]	-	0.948	-	0.940	-	0.956	-	0.987
Sectors[4]	-	CICS	-	CICS	-	CICS	-	CIT
Index[5]	-	PFEI	-	PFEI	-	PFEI	-	PCSI
HLN test[6]	-	0.869	-	0.916	-	0.959	-	0.993
Factor[7]	-	Δx	-	Δx	-	Δx	-	Δx
No. of terms[8]	-	4	-	4	-	4	-	4
Adj. R-sq. (more sens.)[9]	-	0.987	-	0.987	-	0.987	-	0.997
Adj. R-sq. (less sens.)[9]	-	0.980	-	0.980	-	0.980	-	1.012
F-Test (more sens.)[10]	-	0.483	-	0.483	-	0.483	-	0.674
F-Test (less sens.)[10]	-	0.652	-	0.652	-	0.652	-	0.159

(*) Notes to Table 5. (1) "Stat. s." stands for statistically significant; "Not stat. s." denotes non-statistically significant result according to the Clark and West (2007) test. p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. (2) "Best native model" reports the best forecasting AR(p) model according to Figure 4. For PC, NDC, GFCF, and CWK the best model is the AR(1) for all horizons whereas for DC and MEQ it is the AR(4) for some specific horizons. (3) "RMSFE" stands for Relative RMSFE$_1^h$ (see equation 3). (4) "Sectors" stands for the economic sectors considered in the consumer-based factor (see subsection 3.1): CI, CIT, CICS, and

CCS. (5) "Index" stands for the timing (current/future) and subject (personal/country-wide) feature of the factor: CCSI, CFEI, PCSI, PFEI, and OFEI. (6) "HLN test" stands for Relative RMSFE_2^h (see equation 3) and the results of the Harvey, Leybourne, and Newbold (1997) test between factor-augmented AR models according to its relationship with the business cycle. p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Orange-shaded cells=Figures below 1. Green-shaded cells= Figures below 1 and statistically significant. (7) "Factor" stands for the way in which the consumer-based factor enters the forecasting equation (see equation 1) either in levels (x) or first differences (Δx). (8) "No. of terms" refers to the number of factor terms included in the forecasting equation (see equation 1). 1=$x/\Delta x$, 2=x x(-1)/$\Delta(x)$ $\Delta(x(t\text{-}1))$, 3=x x(-1) $x(t\text{-}2)/\Delta(x)$ $\Delta(x(t\text{-}1))$ $\Delta(x(t\text{-}2))$, and 4=x $x(t\text{-}1)$ $x(t\text{-}2)$ $x(t\text{-}3)/\Delta(x)$ $\Delta(x(t\text{-}1))$ $\Delta(x(t\text{-}2))$ $\Delta(x(t\text{-}3))$. (9) "Adj. R-sq. (more sens.)" and "Adj. R-sq. (less sens.)" stands for the Adjusted R-squared ratio between factor-augmented and native AR models, for the factors built with sectors more and less sensitive to the business cycle. Orange-shaded cells=Adjusted R-squared ratio greater than 1. Green-shaded cells=Adjusted R-squared ratio greater than 1.05 (5% of adjustment gain). (10) "F-Test (more sens.)" and "F-Test (less sens.)" stands for the p-value of the consumer-based factor statistical significance. NH: $\phi_1=...=\phi_p=0$ (see equation 1) against the alternative of at least one term is equal to zero. Green-shaded cells=$p<10\%$. Orange-shaded cells=$p<15\%$. Sample: 2015.I-2019.III (19 observations). Source: Authors' calculations.

The key advantage is that it is possible to link, with no error, the perception of a consumer with her/his characteristics as a labour market participant. Thus, it is possible to exploit databases' richness by re-grouping consumer perceptions indexes based on labour-market characteristics, aiming to improve their forecasting ability over macro aggregates and hypothesis testing. This treatment also aims to disentangle labour market characteristics more akin to the forecasting task.

Our first hypothesis comes out as a multi-horizon forecast comparison between a simple AR model for a given macro aggregate and its corresponding survey-based factor-augmentation version, using different computations of consumer indexes. The second hypothesis consists in an out-of-sample comparison between two survey-based factors, one grouping indicators from consumers currently working in sectors more sensitive to the business cycle, and the other conformed by consumers working in the remaining sectors surveyed. We proxy the business cycle by means of an output gap estimation.

These hypotheses are tested for Private consumption, Non-durable consumption, and Durable consumption, plus Gross fixed capital formation, Construction & works, and Machinery & equipment, using the quarterly sample covering from 2000.I to 2019.III (75 observations). We also make use of a re-classification of answers based on timing (current/future) and subject (personal/country). Remarkably, we are able to distinguish the economic sector in which the consumer is currently working, adding new dimensions to exploit on top of the previous re-classification.

Our in-sample results suggest that the adjusted goodness-of-fit coefficient of the AR model improves in most cases when including any of the consumer-based factors. In particular, the PFEI and the OFEI specifications improve for almost all macro aggregates considering any sectorial definition of the factor. In contrast, the PCSI is less helpful in explaining the dynamics of any macro aggregate built with any sector. Most of these improvements are found for GFCF and its components, and DC somewhat less. Consumers working in *Commerce* and *Industry* sectors provide more useful information than remaining sectors, as well as when adding consumers on *Construction* and *Personal Services* sectors without manufacturing. When accounting for the statistical significance of the consumer-based factor, there is a concentration of significant cases using future-based indexes (PFEI, CFEI, and OFEI) for the same macro aggregates that exhibit a better adjustment (GFCF and DC). Also, the evidence is most favourable for sectors mostly related to the business cycle–proxied by the output gap–rather than those that are less so or plainly insensitive to it.

Our out-of-sample results show, with a baseline added to alternative setups, predictive gains at all horizons for all variables, in some cases of a sizable magnitude and statistically non-significant in others. The most fruitful results are obtained for NDC and GFCF, which are statistically superior to the predictive benchmark model when conformed by sectors more akin to the business cycle. There is not a silver-bullet definition of the factor helping at the same time for all aggregates across all horizons. However, more often than not for consumption series, the PCSI followed by the CCSI lead to the best results. In turn, the OFEI do so for investment series. Regarding the economic sectors in which consumers participate and provide more useful predictive information, unquestionably

the best forecasting results are concentrated in *Commerce*, *Industry*, *Construction*, and *Personal Services* (thus, out of 3,060 individuals surveyed per quarter, this factor is composed by an average of 1,735 answers per quarter) and in *Commerce*, *Construction*, and *Personal Services* (comprising 1,313 answers per quarter on average). When comparing between factors, the results are largely favourable to the factors based on consumers more *exposed* to the business cycle. In this line, the most fruitful results are obtained with *Commerce*, *Industry*, and *Transportation* sectors and *Commerce*, *Construction*, and *Personal Services* that outperform the remaining sectors less exposed to the business cycle.

Although surveys of consumers perceptions provide rich information, these results are important as it is necessary to disentangle ideally from the most disaggregate level to have a better revealing economic behaviour.

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A Baseline results: AR(1) model

Table 1A. Multi-horizon RMSFE ratio between native AR(1) and factor-augmented AR(1) model (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	1.006	1.175***	1.072*	1.015	1.088**	0.994	1.178***	1.084**	1.015	1.086**	0.983	1.171*	1.126**	1.037	1.095*	0.989	1.164*	1.114**	1.029	1.088*
2	0.974	1.373**	1.086	1.079	1.217***	0.961	1.367**	1.104*	1.106	1.217***	0.958	1.314**	1.152**	1.176*	1.223**	0.958	1.314**	1.125**	1.158*	1.215**
3	0.919	1.487**	1.018	1.099	1.249**	0.904	1.489**	1.016	1.128	1.259**	0.880	1.467**	1.056	1.217*	1.289*	0.874	1.459**	1.035	1.192*	1.275*
4	0.947	1.469**	1.002	1.119	1.222**	0.918	1.472**	0.997	1.143	1.235*	0.818	1.477**	1.044	1.233*	1.282*	0.830	1.465**	1.029	1.203*	1.267*
h	Durable Consumption																			
1	1.004	0.983	0.946	0.902	0.932	0.992	0.985	0.941	0.863*	0.905*	0.996	0.997	0.932	0.894	0.934	0.993	0.995	0.917	0.889	0.934
2	1.005	0.987	0.972	0.941	0.954	1.000	0.985	0.961	0.937	0.940	1.016	0.977	0.964	0.959	0.940	1.011	0.980	0.953	0.964	0.949
3	1.006	0.968	0.898	0.970	0.938	1.000	0.965	0.887	0.962	0.925	1.021	0.962	0.893	0.967	0.924	1.016	0.967	0.886	0.969	0.932
4	1.009	0.948	0.878	0.945	0.893	1.003	0.948	0.867	0.934	0.882	1.021	0.950	0.860	0.928	0.882	1.018	0.953	0.856	0.931	0.891
h	Non-durable Consumption																			
1	1.015	1.176***	1.061	0.972	1.074**	1.006	1.174***	1.057	0.982	1.074**	0.958	1.163**	1.060	1.019	1.072	0.961	1.153*	1.068	1.008	1.067
2	0.975	1.304**	1.089	0.901	1.085**	0.956	1.303**	1.066	0.937	1.090*	0.872	1.295***	1.052	1.038	1.118*	0.885	1.287**	1.045	1.013	1.109*
3	0.934***	1.360**	1.094	0.859	1.078	0.914***	1.363**	1.060	0.886	1.084	0.791*	1.381***	1.007	1.016	1.127	0.809**	1.367***	1.007	0.989	1.118
4	0.947	1.356***	1.057	0.848	1.060	0.925	1.362***	1.021	0.875	1.068	0.760**	1.414***	0.967	1.009	1.129	0.791**	1.396***	0.977	0.984	1.123
h	Gross Fixed Capital Formation																			
1	1.019	1.001	1.067	0.984	0.978	1.025	1.022	1.058	0.997	0.997	1.051	1.014	1.021	0.945	v0.970	1.049	1.000	1.015	0.950	0.965
2	1.001	1.010	1.015	0.916	0.969	1.008	1.036	1.018	0.923	0.992	1.047	1.019	0.995	0.862	0.941**	1.040	0.998	0.987	0.855	0.923**
3	1.005	1.064	0.983	0.850	0.982	1.006	1.083	0.979	0.862	1.007	1.034	1.060	0.998	0.829	0.958*	1.030	1.042	0.992	0.809	0.935*
4	0.994	1.080*	1.009	0.833	0.977	0.993	1.090*	1.005	0.842	1.002	1.008	1.055	1.036	0.810	0.951*	1.005	1.041	1.022	0.787	0.928**
h	Construction and Works																			
1	1.034*	1.040	1.073	1.002	1.031	1.032**	1.047	1.084	1.006	1.032	1.022	1.038*	1.079	1.009	1.013	1.023	1.036*	1.075	1.002	1.009
2	1.004	1.035	1.043	0.959	1.014	1.006	1.040	1.055	0.967	1.017	1.009	1.032	1.073	0.968	0.997	1.007	1.030	1.062	0.960	0.991
3	0.995	1.048	1.037	0.910	1.015	0.998	1.053	1.039	0.919	1.019	0.996	1.041	1.083	0.926	0.991	0.995	1.040	1.066	0.913	0.983
4	0.989	1.068	1.066	0.887	1.020	0.990	1.071	1.066	0.899	1.027	0.979	1.053*	1.128**	0.910	0.993	0.979	1.053	1.103**	0.893	0.984
h	Machinery and Equipment																			
1	1.013	1.008	1.074*	1.026	1.002	1.016	1.015	1.068*	1.031	1.013	1.035	0.992	1.028*	1.002	1.004	1.034*	0.994	1.024	1.010	1.004
2	0.998	0.997	1.023	1.020	1.007	1.002	1.017	1.028	1.012	1.024	1.036	1.014	0.989	0.980	1.009	1.030	1.001	0.985	0.986	0.999
3	1.015	1.148*	1.033	0.982	1.068*	1.013	1.154**	1.034	0.989	1.100*	1.030	1.137	1.035	0.991	1.093*	1.029	1.127	1.029	0.976	1.061
4	0.993	1.065	0.997	0.922**	1.006	0.995	1.059	0.995	0.923**	1.025	1.026	1.035	1.012	0.915*	1.013	1.022	1.037	1.008	0.897*	0.995

(*) Relative RMSFE_h^1 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells=Figures below 1 and statistically significant.
Clark and West (2007) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Table 2A: Multi-horizon RMSFE ratio between factor-augmented AR(1) models according to its relationship with the business cycle (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	1.001	1.072	0.971	1.061	1.079	0.982	1.089	0.976	1.048	1.077	0.986	1.044	1.046	1.059	1.052	0.980	0.986	1.029	1.009	0.995
2	0.947	1.114**	0.899	0.895	1.000	0.933	1.117**	0.916	0.924	1.004	0.879	1.022	0.965	0.989	0.981	0.883	1.001	0.926	0.962	0.959
3	0.959	1.119*	0.878	0.908	0.985	0.949	1.124*	0.874	0.938	0.997	0.831	1.083	0.910	1.046	1.008	0.830	1.048	0.882	1.019	0.984
4	1.012	1.064	0.857	0.887	0.932	0.984	1.070	0.851	0.911	0.945	0.757*	1.068	0.909	1.043	0.992	0.773	1.038	0.904	1.009	0.977
h	Durable Consumption																			
1	1.025	0.989	1.015	0.997	0.993	1.002	0.990	1.008	0.916	0.942	0.992	0.994	0.979	0.962	0.983	0.989	0.975	0.944	0.933	0.965
2	1.003	1.029	1.042	0.961	1.017	0.993	1.028	1.027	0.942	0.990	1.025	1.003	1.018	0.986	0.983	1.021	1.006	0.984	1.011	1.012
3	1.016	1.040	1.083	1.015	1.037	1.005	1.036	1.064	0.993	1.010	1.057	1.026	1.057	0.995	1.010	1.047	1.030	1.040	1.007	1.041
4	1.015	1.039	1.090	1.041	1.045	1.000	1.040	1.069	1.016	1.023	1.048	1.036	1.032	1.001	1.032	1.036	1.044	1.018	1.004	1.069
h	Non-durable Consumption																			
1	0.976	1.097**	0.962	0.943	1.026	0.964	1.099**	0.958	0.943	1.021	0.928	1.060	0.969	0.977	0.978	0.912	1.005	1.010	0.953	0.943
2	0.961	1.119***	0.918	0.803	0.940	0.944*	1.120***	0.893	0.840	0.949	0.807	1.102**	0.855	0.959	0.968	0.818	1.071	0.856	0.931	0.952
3	0.949	1.127***	0.917**	0.764*	0.917	0.935*	1.132**	0.882**	0.791*	0.925	0.742	1.156**	0.810*	0.966	0.963	0.760	1.110*	0.816**	0.944	0.953
4	0.988	1.088	0.907*	0.754*	0.885	0.973	1.093*	0.868*	0.781*	0.893	0.719*	1.177***	0.803	0.987	0.967	0.750*	1.135***	0.829	0.976	0.971
h	Gross Fixed Capital Formation																			
1	1.060	0.998	0.995	1.014	0.970	1.063	1.026	0.999	1.040	1.004	1.126	1.002	0.927	0.934	0.946	1.112	0.933	0.896	0.921	0.906
2	1.007	0.935	0.925	1.006	0.922	1.010	0.973	0.942	1.041	0.972	1.090	0.957	0.922	0.880	0.858	1.069	0.896	0.901	0.812	0.782
3	1.003	0.896	0.849*	0.944	0.871	1.004	0.924	0.844*	0.992	0.925	1.041	0.889	0.905*	0.870	0.811	1.039	0.833	0.898	0.764	0.728*
4	1.031	0.891	0.826**	0.905	0.850*	1.033	0.909	0.820**	0.954	0.901	1.016	0.852	0.897**	0.844	0.793*	1.020	0.809	.876***	0.743	0.715**
h	Construction and Works																			
1	1.005	0.984	0.956	1.004	0.994	1.004	0.997	0.971	1.011	1.000	0.982	0.973	0.963	1.016	0.952	0.972	0.943	0.955	0.984	0.921
2	0.989	0.985	0.926**	0.996	0.989	0.992	0.994	0.940**	1.014	0.998	1.000	0.974	0.983	1.016	0.946	0.995	0.961	0.965	0.975	0.909
3	0.993	0.989	0.906**	0.981	0.991	0.998	0.996	0.903**	1.001	1.004	0.999	0.969	0.985	1.015	0.936	0.998	0.960	0.954	0.960	0.897
4	0.994	0.974**	0.872**	0.948	0.971	0.996	0.979	0.865***	0.978	0.991	0.967	0.937	0.972	0.999	0.911**	0.967	0.929	0.924*	0.935*	0.872**
h	Machinery and Equipment																			
1	1.063	1.098	1.061	1.017	1.026	1.060	1.111	1.066	1.022	1.039	1.131	1.045	0.955	0.978	1.023	1.129	1.013	0.930	0.993	1.023
2	1.020	0.999	0.996	0.994	0.955	1.018	1.028	1.024	1.001	0.982	1.113	1.005	0.967	0.935	0.958	1.097	0.964	0.946	0.937	0.938
3	1.018	0.975	0.860	0.869	0.887	1.004	0.980	0.874	0.897	0.923	1.032	0.912	0.910	0.908	0.905	1.044	0.865*	0.892	0.885	0.860
4	1.044	0.984	0.899	0.918	0.923	1.041	0.984	0.899	0.937	0.951	1.121	0.936	0.941	0.922	0.920	1.126	0.909	0.930	0.878	0.875

(*) Relative RMSFE_h^2 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells= Figures below 1 and statistically significant.
Harvey, Leybourne, and Newbold (1997) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Does the Exposure to the Business Cycle Improve Consumer Perceptions for Forecasting? Microdata Evidence from Chile*

Online Appendix

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September 1, 2020

Abstract

This is the Online Appendix of the Faure, F. and C.A. Medel (2020), "*Does the Exposure to the Business Cycle Improve Consumer Perception for Forecasting? Microdata Evidence from Chile*" paper containing robustness exercises' results referred in subsection 4.3. These exercises are different variations of the baseline setup displayed according to the following scheme:

		Factor		In-sample		Out-of-sample		
No.	Model	Spec.	Terms	Adj. R-sq.	F-test	ARX/AR(1)	ARX(p)/AR(p)	ARX1/ARX2
Baseline	AR(1)	Δy	4	Table 2	Table 3	Table 1A	-	Table 2A
1	AR(2)	Δy	4	Table 1.A1		Table 2.A1	Table 3.A1	Table 4.A1
2	AR(3)	Δy	4	Table 1.A2		Table 2.A2	Table 3.A2	Table 4.A2
3	AR(4)	Δy	4	Table 1.A3		Table 2.A3	Table 3.A3	Table 4.A3
4	AR(1)	Δy	1	Table 1.A4		Table 2.A4	-	Table 4.A4
5	AR(1)	Δy	2	Table 1.A5		Table 2.A5	-	Table 4.A5
6	AR(1)	Δy	3	Table 1.A6		Table 2.A6	-	Table 4.A6
7	AR(1)	y	1	Table 1.A7		Table 2.A7	-	Table 4.A7
8	AR(1)	y	2	Table 1.A8		Table 2.A8	-	Table 4.A8
9	AR(1)	y	3	Table 1.A9		Table 2.A9	-	Table 4.A9
10	AR(1)	y	4	Table 1.A10		Table 2.A10	-	Table 4.A10

*The views and ideas expressed in this paper do not necessarily represent those of the Central Bank of Chile or its authorities. Any error or omission remains at authors' sole responsibility.

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1 Robustness results I: AR(2) native model, 4-term factor in differences

Table 1.A1. Adjusted R-squared ratio between AR(2) factor-augmented and native AR(2) model (*) and *F*-test results (*p*-value) of the consumer-based factor statistical significance (**)

	Factor: More sensitive sectors					Factor: Less sensitive sectors					Factor: More sensitive sectors					Factor: Less sensitive sectors				
	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
Factor: *Commerce + Industry*																				
PC	0.981	1.024	0.990	1.000	1.015	0.984	0.999	1.021	0.998	1.002	0.968	0.100	0.615	0.277	0.053	0.916	0.434	0.017	0.446	0.274
DC	0.990	1.049	0.988	0.996	1.021	0.983	1.002	1.004	0.986	0.993	0.521	0.001	0.629	0.581	0.052	0.954	0.251	0.086	0.866	0.575
NDC	0.948	1.029	0.955	0.989	1.018	0.954	0.986	0.977	0.977	0.990	0.982	0.046	0.894	0.199	0.049	0.881	0.444	0.634	0.432	0.284
GFCF	0.991	1.005	1.020	1.009	1.014	1.009	0.999	1.022	1.016	1.019	0.765	0.250	0.011	0.277	0.091	0.305	0.344	0.063	0.220	0.112
CWK	0.995	0.999	1.013	1.027	1.019	1.002	1.004	1.006	1.017	1.016	0.977	0.880	0.365	0.060	0.166	0.626	0.672	0.502	0.143	0.122
MEQ	0.993	1.008	1.022	1.013	1.022	1.019	0.990	1.075	1.035	1.038	0.728	0.311	0.096	0.436	0.200	0.203	0.555	0.017	0.331	0.200
Factor: *Commerce + Industry + Transportation*																				
PC	0.983	1.017	1.000	1.000	1.011	0.983	1.004	1.015	0.998	1.002	0.951	0.131	0.237	0.290	0.085	0.956	0.302	0.047	0.434	0.230
DC	0.994	1.047	0.992	0.992	1.012	0.983	1.003	1.001	0.986	0.994	0.354	0.000	0.345	0.737	0.192	0.941	0.280	0.150	0.811	0.451
NDC	0.950	1.022	0.958	0.983	1.007	0.953	0.990	0.977	0.981	0.996	0.964	0.129	0.865	0.327	0.110	0.867	0.356	0.637	0.339	0.198
GFCF	0.996	1.002	1.025	1.009	1.014	0.997	0.998	1.023	1.016	1.019	0.702	0.320	0.008	0.308	0.129	0.538	0.369	0.066	0.181	0.084
CWK	0.994	1.001	1.011	1.027	1.021	1.000	1.003	1.008	1.017	1.016	0.983	0.854	0.441	0.044	0.077	0.680	0.718	0.432	0.183	0.190
MEQ	1.005	1.000	1.028	1.007	1.016	0.995	0.992	1.085	1.043	1.047	0.656	0.408	0.067	0.515	0.290	0.353	0.564	0.010	0.280	0.144
Factor: *Commerce + Industry + Construction + Personal Services*																				
PC	0.990	0.994	1.020	0.996	0.996	0.984	1.037	0.993	1.002	1.021	0.684	0.663	0.013	0.505	0.450	0.896	0.014	0.628	0.202	0.013
DC	0.981	1.001	1.003	0.986	0.993	0.990	1.049	0.990	0.993	1.015	0.972	0.354	0.086	0.873	0.598	0.515	0.000	0.567	0.587	0.074
NDC	0.956	0.976	0.973	0.979	0.987	0.957	1.051	0.955	0.985	1.019	0.783	0.594	0.634	0.399	0.356	0.933	0.030	0.942	0.259	0.035
GFCF	1.011	0.998	1.024	1.018	1.020	0.988	1.004	1.013	1.008	1.014	0.265	0.394	0.050	0.171	0.086	0.876	0.260	0.047	0.341	0.135
CWK	1.007	1.005	1.005	1.018	1.015	0.996	0.998	1.012	1.025	1.019	0.345	0.587	0.556	0.126	0.140	0.952	0.937	0.327	0.069	0.129
MEQ	1.017	0.991	1.075	1.043	1.045	0.987	1.002	1.027	1.008	1.018	0.210	0.585	0.019	0.262	0.146	0.784	0.361	0.092	0.544	0.293
Factor: *Commerce + Construction + Personal Services*																				
PC	0.987	1.003	1.022	0.999	1.004	0.986	1.033	0.994	0.997	1.010	0.861	0.307	0.009	0.370	0.206	0.901	0.012	0.642	0.323	0.090
DC	0.983	1.012	1.001	0.991	1.002	0.991	1.052	0.994	0.985	1.002	0.931	0.078	0.132	0.702	0.312	0.509	0.000	0.389	0.849	0.372
NDC	0.951	0.989	0.966	0.987	1.002	0.965	1.044	0.972	0.970	0.996	0.913	0.361	0.692	0.281	0.176	0.857	0.082	0.643	0.509	0.169
GFCF	1.005	1.003	1.028	1.017	1.022	0.991	0.993	1.001	1.003	1.003	0.431	0.347	0.037	0.180	0.073	0.840	0.664	0.281	0.429	0.326
CWK	1.002	1.005	1.007	1.021	1.017	0.997	0.997	1.011	1.024	1.019	0.603	0.645	0.475	0.107	0.134	0.947	0.922	0.381	0.059	0.096
MEQ	1.012	1.005	1.074	1.044	1.051	0.996	0.977	1.016	0.990	0.992	0.322	0.442	0.015	0.232	0.108	0.676	0.777	0.175	0.743	0.610

(*) Adjusted R-squared ratio=Adjusted R-squared with the factor/Adjusted R-squared without the factor. Orange-shaded cells=Adjusted R-squared ratio greater than 1. Green-shaded cells=Adjusted R-squared ratio greater than 1.05 (5% of adjustment gain). Sample: 2001.I-2014.IV (56 observations). (**) *p*-value of the null hypothesis: NH: ϕ_1=...=ϕ_4=0 (see equation 1) against the alternative of at least one term is equal to zero. Green-shaded cells=p<10%. Orange-shaded cells=p<15%. Sample: 2001.I-2019.III (75 observations). Source: Authors' calculations.

Table 2.A1. Multi-horizon RMSFE ratio between native AR(1) and factor-augmented AR(2) model (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	1.254	1.328**	1.254*	1.236*	1.286**	1.239	1.334**	1.263	1.233	1.283*	1.183	1.353**	1.295	1.244	1.294*	1.201	1.342*	1.297*	1.239	1.288*
2	1.351***	1.617***	1.390**	1.416**	1.507***	1.340**	1.614***	1.384**	1.423**	1.503**	1.283**	1.611***	1.384*	1.484**	1.523**	1.299**	1.602***	1.381*	1.471**	1.516**
3	1.416***	1.793***	1.523**	1.520**	1.631***	1.404***	1.791***	1.498**	1.529**	1.629**	1.327**	1.800***	1.453*	1.622**	1.664**	1.340***	1.788***	1.464*	1.607**	1.660**
4	1.489***	1.806***	1.584***	1.560**	1.652**	1.471***	1.807***	1.560**	1.569**	1.653**	1.363***	1.829***	1.519**	1.657**	1.694**	1.387***	1.812***	1.534**	1.644**	1.692**
h	Durable Consumption																			
1	1.032	1.006	0.975	0.955	0.979	1.018	1.008	0.975	0.914	0.952	1.016	1.030	0.977	0.941	0.981	1.014	1.028	0.963	0.934	0.980
2	0.965	0.965	0.945	0.913	0.940	0.961	0.970	0.936	0.908	0.928	0.970	0.968	0.951	0.932	0.930	0.964	0.970	0.937	0.934	0.935
3	0.945	0.941	0.866	0.921	0.912	0.939	0.940	0.858	0.915	0.901	0.948	0.937	0.875	0.925	0.901	0.943	0.943	0.865	0.923	0.907
4	0.928	0.907	0.839	0.882	0.857	0.923	0.911	0.831	0.873	0.850	0.931	0.912	0.835	0.872	0.849	0.927	0.915	0.827	0.869	0.855
h	Non-durable Consumption																			
1	1.249*	1.336***	1.266***	1.222**	1.288***	1.238*	1.331***	1.266**	1.225*	1.285**	1.183*	1.344**	1.244*	1.247**	1.287**	1.195*	1.334**	1.261*	1.243*	1.284**
2	1.344***	1.554***	1.470***	1.317**	1.435***	1.332***	1.551***	1.438***	1.339**	1.437***	1.253**	1.581***	1.364**	1.423**	1.468***	1.269**	1.570***	1.384***	1.407**	1.465***
3	1.404***	1.659***	1.607***	1.376**	1.515***	1.389***	1.658***	1.567***	1.400***	1.518***	1.290***	1.698***	1.471***	1.513***	1.555***	1.309***	1.684***	1.495***	1.496***	1.555***
4	1.477***	1.694***	1.650***	1.408**	1.550***	1.458***	1.696***	1.612***	1.436**	1.556***	1.338***	1.751***	1.530***	1.550***	1.599***	1.366***	1.732***	1.557***	1.533***	1.601***
h	Gross Fixed Capital Formation																			
1	1.065	1.039*	1.108**	1.032	1.023	1.074*	1.060**	1.098**	1.044	1.043*	1.107*	1.057*	1.058*	0.992	1.017	1.103*	1.043*	1.053*	0.998	1.012
2	1.042	1.041*	1.060	0.965	1.014	1.050	1.062**	1.059	0.971	1.037	1.095	1.058**	1.027	0.915	0.989	1.087	1.039*	1.021	0.910	0.972
3	0.996	1.060*	0.996	0.823	0.972	0.997	1.078**	0.986	0.837	1.004	1.017	1.053	0.997	0.808	0.947	1.014	1.036	0.991	0.786	0.920*
4	1.022	1.097**	1.039	0.862	1.002	1.024	1.107**	1.029	0.869	1.030	1.034	1.080**	1.050*	0.846	0.978	1.032	1.066**	1.039	0.828	0.955
h	Construction and Works																			
1	0.883	0.901	0.915	0.879	0.880	0.878	0.903	0.918	0.885	0.883	0.873	0.877	0.906	0.881	0.868	0.873	0.875	0.904	0.880	0.865
2	0.972	1.016	0.991	0.967	0.989	0.971	1.018	1.001	0.976	0.992	0.972	0.996	0.999	0.975	0.979	0.971	0.993	0.996	0.972	0.975
3	1.021	1.088	1.017	1.010	1.056	1.024	1.091	1.025	1.018	1.061	1.022	1.069	1.036	1.021*	1.045	1.022	1.066	1.032	1.015*	1.040
4	1.054	1.136*	1.056	1.058**	1.103*	1.057	1.139*	1.061	1.064**	1.108*	1.048	1.116*	1.082	1.071***	1.092*	1.049	1.114*	1.077	1.064***	1.088*
h	Machinery and Equipment																			
1	1.004	0.990	1.052	1.003	0.980	1.002	0.996	1.047	1.003	0.988	1.018*	0.973	1.006	0.974	0.981	1.019*	0.975	1.002	0.983	0.983
2	1.002	0.952	1.010	1.014	0.994	1.004	0.962	1.017	1.005	1.004	1.044	0.961	0.980	0.978	0.990	1.036	0.955	0.977	0.984	0.988
3	1.079	1.087*	1.086	1.023	1.102**	1.077	1.091*	1.090	1.033	1.126**	1.098	1.060	1.077	1.046	1.107**	1.095	1.057	1.081	1.030	1.091*
4	1.060	1.057*	1.033	0.963	1.053	1.061	1.047	1.033	0.960	1.070*	1.099	1.017	1.048	0.946	1.048	1.092	1.023	1.047	0.928	1.034

(*) Relative RMSFE_h^1 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells=Figures below 1 and statistically significant.
Clark and West (2007) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Table 3.A1. Multi-horizon RMSFE ratio between native AR(2) and factor-augmented AR(2) model (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	1.026	1.087***	1.026	1.011	1.052**	1.014	1.091***	1.034	1.009	1.050*	0.968	1.107**	1.060	1.018	1.059	0.983	1.098*	1.061	1.014	1.054
2	0.980	1.173***	1.008	1.027*	1.093**	0.972	1.171**	1.004	1.032	1.090**	0.930**	1.168**	1.004	1.076**	1.105*	0.942**	1.162**	1.002	1.067**	1.100*
3	0.954*	1.208**	1.026	1.024	1.099*	0.946*	1.206**	1.009	1.030	1.097*	0.894**	1.212***	0.979	1.093*	1.121*	0.903**	1.204**	0.986	1.083	1.118*
4	0.972	1.179***	1.034	1.019	1.079	0.960**	1.180***	1.019	1.024	1.079	0.890***	1.194***	0.992	1.082	1.106	0.906***	1.183**	1.002	1.073	1.104
h	Durable Consumption																			
1	1.003	0.977	0.948	0.928	0.951	0.989	0.979	0.947	0.888	0.925*	0.987	1.001	0.949	0.915	0.953	0.986	0.999	0.936	0.908	0.952
2	0.997	0.997	0.976	0.944	0.972	0.993	1.002	0.967	0.938	0.959	1.002	1.001	0.983	0.963	0.961	0.996	1.002	0.968	0.965	0.966
3	1.001	0.997	0.918	0.976	0.967	0.995	0.996	0.909	0.969	0.955	1.004	0.993	0.927	0.980	0.955	0.999	0.999	0.916	0.977	0.961
4	1.005	0.983	0.909	0.955	0.929	1.000	0.987	0.900	0.946	0.921	1.008	0.988	0.904	0.945	0.920	1.004	0.991	0.896	0.941	0.926
h	Non-durable Consumption																			
1	1.029	1.101***	1.043**	1.007	1.062***	1.020	1.097***	1.043**	1.010	1.059**	0.975	1.108**	1.025	1.028	1.061	0.985	1.099**	1.039	1.024	1.058
2	0.991	1.146**	1.084*	0.971	1.059	0.982	1.144**	1.061*	0.988	1.060	0.924***	1.166**	1.006	1.049	1.082	0.936***	1.158**	1.020	1.037	1.080
3	0.977	1.154**	1.118**	0.958	1.054	0.966*	1.153**	1.091**	0.974	1.056	0.897***	1.182***	1.024	1.053	1.082	0.911***	1.172***	1.040	1.041	1.082
4	0.988	1.134***	1.104**	0.942	1.038	0.976*	1.135***	1.079**	0.961	1.041	0.896***	1.172***	1.024	1.037	1.070	0.914***	1.159***	1.042	1.026	1.071
h	Gross Fixed Capital Formation																			
1	1.017	0.992	1.058	0.985	0.977	1.025	1.012	1.049	0.996	0.996	1.057	1.010	1.011	0.947	0.971	1.053	0.996	1.005	0.953	0.967
2	0.999	0.997	1.016	0.925	0.972	1.006	1.018	1.015	0.931	0.994	1.049	1.014	0.985	0.877	0.948*	1.041	0.996	0.979	0.872	0.932*
3	1.007	1.072	1.007	0.832	0.983	1.008	1.090*	0.997	0.847	1.015	1.028	1.065	1.008	0.817	0.957	1.025	1.047	1.001	0.795	0.930*
4	0.992	1.065	1.009	0.837	0.973	0.994	1.075*	1.000	0.843	1.000	1.004	1.049	1.020	0.822	0.950	1.002	1.035	1.009	0.804	0.927*
h	Construction and Works																			
1	1.034	1.054	1.071	1.029	1.030	1.028	1.057	1.074	1.036	1.033	1.021**	1.027**	1.060	1.031	1.015	1.022**	1.024**	1.058	1.030	1.013
2	1.003	1.048	1.023	0.998	1.021	1.002	1.050	1.033	1.007	1.024	1.003	1.028**	1.031	1.006	1.010	1.002	1.025**	1.028	1.003	1.007
3	0.990	1.055*	0.986	0.979	1.024	0.993	1.058*	0.994	0.987	1.028	0.991	1.037**	1.005	0.990	1.013	0.991	1.034**	1.001	0.985	1.009
4	0.983	1.060**	0.985	0.987	1.029*	0.985	1.062**	0.989	0.992	1.033**	0.977*	1.040**	1.009	0.999	1.018	0.978*	1.039**	1.004	0.992	1.014
h	Machinery and Equipment																			
1	1.030*	1.015	1.079**	1.028	1.005	1.027*	1.021	1.074**	1.029	1.014	1.044	0.998	1.031	0.999	1.006	1.045*	1.000	1.028	1.008	1.008
2	1.012	0.961	1.020	1.024	1.004	1.014	0.972	1.027	1.015	1.014	1.054	0.970	0.990	0.988	1.000	1.046	0.965	0.987	0.994	0.997
3	1.026	1.034	1.033	0.973	1.048	1.024	1.037	1.037*	0.982	1.071	1.044	1.008	1.024	0.995	1.053	1.042	1.005	1.028*	0.980	1.037
4	1.007	1.005	0.982	0.915**	1.001	1.008	0.995	0.982	0.913***	1.017	1.044	0.967	0.996	0.899**	0.996	1.038	0.973	0.995	0.882**	0.983

(*) Relative RMSFE_h^1 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells=Figures below 1 and statistically significant.
Clark and West (2007) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Table 4.A1: Multi-horizon RMSFE ratio between factor-augmented AR(2) models according to its relationship with the business cycle (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	1.022	1.049*	0.960	1.073	1.081	1.000	1.070**	0.966	1.059	1.078	0.968	1.091	1.032	1.053	1.066	0.963	1.010	1.046	1.020	1.010
2	0.953*	1.046	0.918*	0.918	0.973	0.944**	1.052*	0.916*	0.922	0.973	0.875**	1.044	0.906	0.969	0.977	0.881**	1.001	0.912	0.953	0.956
3	0.959*	1.056*	0.922**	0.895**	0.960	0.953**	1.056*	0.907**	0.899**	0.957	0.856***	1.063	0.868*	0.981	0.977	0.868**	1.021	0.880*	0.976	0.969
4	0.978	1.022	0.929**	0.887**	0.938	0.968*	1.027	0.914**	0.893**	0.938	0.845***	1.045	0.882*	0.985	0.969	0.865**	1.003	0.905*	0.983	0.968
h	Durable Consumption																			
1	1.028	0.971	0.992	0.994	0.987	1.002	0.973	0.991	0.916	0.939	0.973	0.999	0.985	0.956	0.978	0.972	0.975	0.957	0.928**	0.961
2	0.999	0.995	1.008	0.956	0.999	0.990	1.003	0.993	0.938	0.975	0.992	0.997	1.005	0.988	0.973	0.987	0.987	0.969	1.006	0.992
3	1.017	1.018	1.041	0.991	1.013	1.007	1.019	1.024	0.973	0.989	1.016	1.012	1.036	0.998	0.994	1.009	1.011	1.016	1.002	1.020
4	1.016	1.010	1.044	1.011	1.014	1.004	1.018	1.028	0.994	0.996	1.009	1.022	1.008	0.995	1.008	1.001	1.026	0.990	0.984	1.040
h	Non-durable Consumption																			
1	0.992	1.083**	0.985	0.991	1.045	0.977	1.079***	0.992	0.979	1.031	0.967	1.088	0.984	0.987	0.997	0.952	1.027	1.033	0.978	0.966
2	0.961***	1.072**	0.966	0.869***	0.953	0.951**	1.068**	0.945	0.886**	0.954	0.884**	1.109***	0.852	0.970	0.978	0.888**	1.075**	0.881	0.965	0.977
3	0.961**	1.071***	0.960*	0.836**	0.938	0.951**	1.068***	0.935*	0.855**	0.939	0.862***	1.122***	0.848*	0.971	0.969	0.875***	1.084**	0.875*	0.975	0.977
4	0.977	1.047	0.957	0.832**	0.924	0.966**	1.047	0.932	0.855**	0.927	0.859***	1.118***	0.864	0.983	0.968	0.879***	1.078***	0.895	0.989	0.982
h	Gross Fixed Capital Formation																			
1	1.060	1.000	1.000	1.015	0.975	1.063	1.027	1.004	1.037	1.008	1.142	1.009	0.923	0.940	0.954	1.127	0.949	0.896	0.929	0.918
2	1.006	0.946	0.942	1.008	0.934	1.010	0.977	0.954	1.036	0.981	1.109	0.986	0.912	0.899	0.879	1.085	0.926	0.899	0.836	0.806*
3	1.004	0.904	0.841**	0.928	0.863*	1.005	0.930	0.831**	0.984	0.925	1.028	0.898	0.867	0.867	0.802*	1.026	0.837	0.864	0.754*	0.712**
4	1.030	0.901	0.823***	0.917	0.857**	1.035	0.918	0.813***	0.959	0.912	1.015	0.875	0.866*	0.866	0.801**	1.017	0.829	0.850**	0.767	0.721**
h	Construction and Works																			
1	1.015	0.986	0.966	0.989	0.979	1.012	0.993	0.974	1.002	0.987	0.958	0.934	0.952	0.989	0.950	0.961	0.905	0.941	0.988	0.934
2	0.991	0.986	0.948*	0.987	0.980**	0.992	0.991	0.963	1.005	0.989	0.976	0.949	0.975	0.996	0.950	0.976	0.925	0.965	0.975	0.922
3	0.986	0.986*	0.927**	0.979*	0.981**	0.992	0.994	0.935*	0.995	0.992	0.979	0.951	0.973	0.992	0.945	0.981	0.925	0.961	0.963	0.916
4	0.988	.974**	0.908**	0.967**	0.971*	0.994	0.981*	0.911**	0.981	0.984*	0.964	0.933	0.966	0.985	0.938	0.966	0.908	0.948*	0.958	0.911
h	Machinery and Equipment																			
1	1.070	1.077	1.046	1.033	1.024	1.057	1.089	1.047	1.033	1.036	1.108	1.020	0.933	0.992	1.021	1.116	1.006	0.905	1.007	1.024
2	1.012	1.021	1.030	1.031	1.009	1.006	1.039	1.052	1.024	1.027	1.130	1.021	0.980	0.970	0.991	1.119	0.985	0.968	0.973	0.975
3	1.017	0.971	0.944	0.904	0.928	1.001	0.976	0.957	0.928	0.961	1.085	0.916	0.943	0.944	0.922	1.098	0.870*	0.961	0.910	0.883
4	1.036	1.018	0.911	0.940	0.956	1.027	1.012	0.912	0.951	0.983	1.137	0.967	0.932	0.919	0.935	1.136	0.943	0.933	0.862	0.888

(*) Relative RMSFE_h^2 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells= Figures below 1 and statistically significant.
Harvey, Leybourne, and Newbold (1997) test's p-value: (***) p<1%, (**) p<5%, and (*) p<10%. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

2 Robustness results II: AR(3) native model, 4-term factor in differences

Table 1.A2. Adjusted R-squared ratio between AR(3) factor-augmented and native AR(3) model (*) and *F*-test results (*p*-value) of the consumer-based factor statistical significance (**)

	Factor: More sensitive sectors					Factor: Less sensitive sectors					Factor: More sensitive sectors					Factor: Less sensitive sectors				
	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
Factor: *Commerce + Industry*																				
PC	0.983	1.017	0.994	0.999	1.011	0.985	0.998	1.017	0.997	1.000	0.968	0.121	0.559	0.298	0.079	0.961	0.521	0.024	0.563	0.358
DC	0.987	1.033	0.987	1.002	1.021	0.984	0.998	1.002	0.990	0.996	0.740	0.002	0.749	0.314	0.033	0.968	0.371	0.091	0.622	0.411
NDC	0.947	1.032	0.954	0.991	1.023	0.954	0.990	0.979	0.980	0.995	0.980	0.044	0.900	0.166	0.033	0.886	0.405	0.512	0.380	0.191
GFCF	0.989	1.005	1.019	1.006	1.013	1.009	0.996	1.020	1.013	1.016	0.838	0.312	0.018	0.338	0.142	0.308	0.444	0.111	0.282	0.153
CWK	0.994	0.999	1.012	1.027	1.019	1.001	1.003	1.005	1.017	1.016	0.979	0.879	0.389	0.060	0.156	0.662	0.672	0.482	0.153	0.129
MEQ	0.990	1.007	1.023	1.009	1.018	1.021	0.986	1.072	1.030	1.034	0.804	0.337	0.100	0.500	0.257	0.188	0.634	0.026	0.399	0.241
Factor: *Commerce + Industry + Transportation*																				
PC	0.985	1.010	1.001	0.999	1.007	0.983	1.003	1.013	0.997	1.002	0.953	0.206	0.300	0.346	0.138	0.985	0.383	0.060	0.538	0.287
DC	0.990	1.031	0.990	0.998	1.013	0.984	0.998	0.999	0.991	0.998	0.597	0.001	0.492	0.438	0.128	0.975	0.403	0.160	0.549	0.302
NDC	0.949	1.024	0.956	0.985	1.011	0.952	0.994	0.978	0.985	1.002	0.963	0.136	0.877	0.295	0.083	0.875	0.324	0.535	0.289	0.126
GFCF	0.995	1.002	1.023	1.006	1.012	0.997	0.995	1.020	1.014	1.016	0.785	0.402	0.011	0.368	0.183	0.551	0.463	0.120	0.239	0.120
CWK	0.993	1.000	1.010	1.027	1.021	0.999	1.003	1.007	1.017	1.015	0.985	0.849	0.460	0.044	0.078	0.728	0.721	0.403	0.190	0.186
MEQ	1.004	0.999	1.029	1.002	1.012	0.996	0.988	1.081	1.039	1.042	0.730	0.430	0.072	0.587	0.351	0.359	0.660	0.015	0.336	0.178
Factor: *Commerce + Industry + Construction + Personal Services*																				
PC	0.991	0.994	1.016	0.996	0.996	0.985	1.027	0.994	1.001	1.015	0.650	0.686	0.020	0.602	0.492	0.957	0.028	0.636	0.260	0.035
DC	0.983	0.997	1.000	0.991	0.997	0.988	1.032	0.989	0.998	1.015	0.971	0.414	0.096	0.635	0.413	0.733	0.000	0.656	0.349	0.055
NDC	0.959	0.978	0.974	0.982	0.992	0.954	1.057	0.952	0.986	1.023	0.764	0.592	0.534	0.347	0.251	0.955	0.020	0.953	0.227	0.021
GFCF	1.011	0.995	1.022	1.015	1.017	0.987	1.004	1.012	1.005	1.012	0.274	0.492	0.087	0.227	0.121	0.914	0.322	0.059	0.407	0.195
CWK	1.006	1.005	1.005	1.018	1.015	0.995	0.997	1.012	1.025	1.019	0.366	0.589	0.524	0.132	0.143	0.953	0.936	0.337	0.071	0.126
MEQ	1.019	0.987	1.072	1.038	1.040	0.984	1.001	1.026	1.003	1.014	0.181	0.655	0.028	0.306	0.174	0.850	0.393	0.095	0.632	0.370
Factor: *Commerce + Construction + Personal Services*																				
PC	0.987	1.002	1.018	0.999	1.003	0.986	1.022	0.997	0.995	1.005	0.873	0.299	0.014	0.422	0.214	0.969	0.055	0.597	0.435	0.166
DC	0.983	1.006	0.999	0.997	1.006	0.990	1.033	0.992	0.989	1.001	0.963	0.122	0.138	0.381	0.165	0.714	0.000	0.529	0.718	0.349
NDC	0.954	0.994	0.968	0.993	1.010	0.961	1.045	0.971	0.969	0.996	0.888	0.314	0.585	0.208	0.092	0.896	0.080	0.657	0.533	0.159
GFCF	1.005	1.001	1.025	1.014	1.019	0.990	0.993	1.000	1.001	1.001	0.453	0.429	0.059	0.237	0.104	0.880	0.675	0.319	0.492	0.407
CWK	1.001	1.004	1.006	1.020	1.017	0.996	0.996	1.011	1.024	1.019	0.633	0.648	0.458	0.107	0.129	0.951	0.923	0.385	0.061	0.099
MEQ	1.014	1.002	1.072	1.039	1.047	0.993	0.975	1.013	0.986	0.988	0.299	0.526	0.023	0.275	0.132	0.742	0.791	0.176	0.819	0.703

(*) Adjusted R-squared ratio=Adjusted R-squared with the factor/Adjusted R-squared without the factor. Orange-shaded cells=Adjusted R-squared ratio greater than 1. Green-shaded cells=Adjusted R-squared ratio greater than 1.05 (5% of adjustment gain). Sample: 2001.I-2014.IV (56 observations). (**) *p*-value of the null hypothesis: NH: ϕ_1=...=ϕ_4=0 (see equation 1) against the alternative of at least one term is equal to zero. Green-shaded cells=p<10%. Orange-shaded cells=p<15%. Sample: 2001.I-2019.III (75 observations). Source: Authors' calculations.

Table 2.A2. Multi-horizon RMSFE ratio between native AR(1) and factor-augmented AR(3) model (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	1.339**	1.483***	1.346**	1.306**	1.396**	1.320**	1.490***	1.339**	1.312**	1.400**	1.259**	1.486***	1.390**	1.345**	1.406**	1.281**	1.476***	1.383**	1.335**	1.401**
2	1.658***	1.973***	1.690**	1.741***	1.844***	1.643***	1.983***	1.678**	1.751**	1.844***	1.577***	1.966***	1.704**	1.804***	1.855***	1.596***	1.947***	1.693**	1.793***	1.848***
3	1.983***	2.389***	2.098***	2.103***	2.222***	1.970***	2.406***	2.073***	2.109***	2.223***	1.884***	2.400***	2.057**	2.191***	2.248***	1.900***	2.374***	2.056**	2.178***	2.242***
4	2.176***	2.529***	2.276***	2.262***	2.370***	2.157***	2.545***	2.256***	2.271***	2.372***	2.039***	2.551***	2.252***	2.352***	2.403***	2.066***	2.522***	2.254***	2.339***	2.398***
h	Durable Consumption																			
1	0.995	0.992	0.951	0.908	0.963	0.987	0.996	0.942	0.867	0.940	0.982	1.000	0.962	0.915	0.964	0.980	0.999	0.947	0.902	0.961
2	0.937	0.949	0.917	0.916	0.949	0.936	0.957	0.906	0.909	0.939	0.943	0.951	0.929	0.939	0.941	0.938	0.953	0.914	0.937	0.943
3	0.904	0.925	0.836	0.906	0.915	0.901	0.928	0.827	0.899	0.904	0.908	0.917	0.852	0.911	0.901	0.904	0.924	0.843	0.906	0.904
4	0.856	0.864	0.781	0.852	0.837	0.853	0.870	0.772	0.844	0.831	0.859	0.859	0.787	0.845	0.825	0.856	0.861	0.781	0.839	0.827
h	Non-durable Consumption																			
1	1.341**	1.470***	1.361***	1.289**	1.393***	1.326**	1.475***	1.347***	1.301**	1.394**	1.244**	1.476***	1.350**	1.336**	1.393**	1.263**	1.460***	1.357**	1.329**	1.390**
2	1.615***	1.858***	1.728***	1.609***	1.739***	1.597***	1.868***	1.697***	1.622**	1.737***	1.491***	1.889***	1.666***	1.694***	1.757***	1.516***	1.867***	1.672***	1.678***	1.753***
3	1.858***	2.141***	2.053***	1.856***	2.007***	1.840***	2.157***	2.017***	1.867***	2.005***	1.719***	2.185***	1.969***	1.968***	2.031***	1.744***	2.158***	1.974***	1.950***	2.029***
4	2.038***	2.297***	2.197***	2.004***	2.158***	2.019***	2.312***	2.166***	2.019***	2.158***	1.883***	2.357***	2.133***	2.120***	2.191***	1.915***	2.324***	2.140***	2.103***	2.189***
h	Gross Fixed Capital Formation																			
1	1.108	1.090*	1.166**	1.056*	1.058	1.114*	1.109**	1.156**	1.070	1.078	1.131*	1.093*	1.117	1.016	1.046	1.133*	1.079	1.108	1.021	1.040
2	1.021	1.032*	1.059*	0.931	0.979	1.027	1.054**	1.057*	0.940	1.003	1.051	1.034	1.017	0.883	0.949	1.050	1.014	1.012	0.880	0.934
3	1.069	1.125*	1.066	0.945	1.035	1.074	1.146**	1.056	0.952	1.063	1.087	1.116*	1.045	0.920	1.008	1.088	1.096	1.044	0.908	0.987
4	1.109*	1.164*	1.120*	1.025*	1.087	1.116*	1.176*	1.112*	1.021*	1.108	1.123	1.149*	1.108	1.002*	1.064	1.125*	1.135*	1.105	0.996*	1.050
h	Construction and Works																			
1	0.957	0.978	0.992	0.953	0.954	0.951	0.980	0.997	0.957	0.957	0.947	0.954	0.987	0.952	0.942	0.947	0.953	0.984	0.951	0.940
2	1.029	1.074*	1.049*	1.029*	1.046	1.028	1.075*	1.061*	1.036*	1.049	1.031	1.053	1.059*	1.033*	1.036	1.030	1.051	1.056*	1.030*	1.033
3	1.108*	1.174**	1.106**	1.104**	1.140**	1.110*	1.177**	1.115**	1.110**	1.146**	1.110*	1.153**	1.128**	1.109**	1.130**	1.109*	1.151**	1.125**	1.105**	1.125**
4	1.163**	1.243**	1.167**	1.177***	1.207**	1.164**	1.244**	1.174**	1.180***	1.212**	1.159**	1.218**	1.197**	1.182***	1.197**	1.159**	1.217**	1.192**	1.177***	1.193**
h	Machinery and Equipment																			
1	1.055*	1.007	1.145**	1.034	1.024	1.046*	1.000	1.145**	1.032	1.029	1.059	0.982	1.082	1.014	1.018	1.057	0.988	1.080	1.019	1.019
2	1.058	1.012	1.140**	1.033	1.075**	1.053	1.011	1.152**	1.028	1.087**	1.064*	0.990	1.104*	1.019	1.060**	1.062*	0.990	1.101*	1.015	1.052*
3	1.163	1.129	1.241**	1.129	1.260**	1.161	1.124	1.261**	1.136	1.277**	1.170	1.101*	1.214*	1.166*	1.246**	1.171*	1.102*	1.224*	1.140	1.228**
4	1.047	1.025	1.120	0.994	1.133	1.052	1.016	1.133	0.988	1.152	1.085	1.012	1.111	0.994	1.119	1.077	1.014	1.120	0.968	1.098

(*) Relative RMSFE_h^1 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells=Figures below 1 and statistically significant.
Clark and West (2007) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Table 3.A2. Multi-horizon RMSFE ratio between native AR(3) and factor-augmented AR(3) model (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	1.022	1.132**	1.027	0.997	1.065*	1.007	1.137***	1.022	1.001	1.068*	0.961	1.134**	1.061	1.026	1.073	0.978	1.126**	1.056	1.019	1.069
2	0.988	1.175***	1.007	1.037	1.099**	0.979	1.181***	1.000	1.043	1.099**	0.939**	1.171***	1.015	1.075*	1.105**	0.951**	1.160**	1.009	1.068*	1.101**
3	0.975	1.174**	1.031	1.033	1.092**	0.968	1.182***	1.019	1.036	1.093*	0.926**	1.179***	1.011	1.077	1.105*	0.934**	1.167**	1.010	1.071	1.102*
4	0.984	1.144***	1.030	1.023	1.072*	0.975*	1.151***	1.021	1.027	1.073*	0.922***	1.154***	1.019	1.064	1.087*	0.935***	1.141***	1.019	1.058	1.085*
h	Durable Consumption																			
1	1.001	0.998	0.957	0.913	0.969	0.993	1.002	0.948	0.872*	0.946	0.988	1.006	0.968	0.920	0.970	0.986	1.005	0.953	0.908	0.967
2	0.995	1.008	0.974	0.973	1.009	0.994	1.017	0.963	0.966	0.998	1.002	1.010	0.987	0.997	1.000	0.997	1.013	0.971	0.995	1.002
3	1.001	1.025	0.926	1.004	1.013	0.998	1.028	0.916	0.995	1.001	1.006	1.015	0.944	1.009	0.997	1.001	1.023	0.934	1.003	1.001
4	1.009	1.019	0.921	1.005	0.987	1.006	1.026	0.911	0.996	0.980	1.013	1.013	0.928	0.997	0.973	1.010	1.016	0.921	0.989	0.976
h	Non-durable Consumption																			
1	1.031	1.131**	1.047*	0.992	1.072*	1.020	1.135***	1.036	1.001	1.073*	0.957	1.136**	1.039	1.028	1.072	0.971	1.123**	1.044	1.022	1.069
2	0.999	1.150**	1.069*	0.995	1.076*	0.988	1.156**	1.050	1.003	1.075	0.922***	1.169***	1.031	1.048	1.087	0.938***	1.155**	1.034	1.038	1.084*
3	0.989	1.140***	1.093**	0.988	1.068	0.979	1.148***	1.073*	0.994	1.067	0.915***	1.163***	1.048	1.048	1.081	0.928***	1.149***	1.051	1.038	1.080
4	0.993	1.119***	1.071**	0.977	1.052	0.984	1.126***	1.056*	0.984	1.052	0.918***	1.149***	1.040	1.033	1.068	0.933***	1.133***	1.043	1.025	1.067
h	Gross Fixed Capital Formation																			
1	1.025	1.008	1.078*	0.976	0.978	1.030*	1.025	1.069**	0.990	0.996	1.046	1.010	1.033	0.940	0.967	1.048*	0.997	1.025	0.944	0.962
2	1.006	1.016	1.043	0.917	0.964	1.012	1.038	1.041	0.926	0.988	1.035	1.018	1.002	0.870	0.935*	1.034	0.998	0.997	0.867	0.920*
3	0.999	1.051*	0.996	0.883	0.967	1.004	1.071*	0.987	0.890	0.993	1.016	1.043	0.977	0.859	0.942	1.017	1.025	0.976	0.849	0.922
4	0.990	1.039*	1.000	0.915	0.970	0.995	1.049*	0.993	0.911	0.988	1.002	1.025	0.989	0.894	0.949	1.003	1.012	0.986	0.889	0.937
h	Construction and Works																			
1	1.029	1.053	1.067*	1.025	1.026	1.023	1.054	1.072*	1.030	1.029	1.018	1.027**	1.062	1.025	1.013	1.018	1.025**	1.058	1.024	1.011
2	1.002	1.046	1.022	1.002	1.018	1.001	1.047	1.033	1.009	1.022	1.004	1.026*	1.031	1.006	1.009	1.003	1.024*	1.028	1.003	1.006
3	0.992	1.052	0.991	0.989	1.022	0.995	1.054	0.999	0.995	1.026	0.994	1.033**	1.010	0.993	1.012	0.993	1.031**	1.007	0.990	1.008
4	0.987	1.055*	0.990	0.999	1.025**	0.988	1.056*	0.996	1.002	1.029**	0.984*	1.034**	1.016	1.003	1.016*	0.984*	1.032**	1.012	0.999	1.012
h	Machinery and Equipment																			
1	1.029**	0.982	1.116***	1.008	0.998	1.019*	0.975	1.116***	1.006	1.003	1.032	0.957	1.055	0.988	0.992	1.030	0.963	1.052*	0.993	0.993
2	1.020	0.975	1.099***	0.996	1.036	1.015	0.974	1.111***	0.991	1.048	1.026	0.954	1.064	0.983	1.022	1.024	0.954	1.061*	0.979	1.014
3	1.017	0.987	1.086**	0.987	1.102	1.016	0.984	1.103***	0.994	1.117	1.023	0.963	1.062**	1.020	1.090	1.024	0.964	1.071**	0.997	1.074
4	0.994	0.973	1.063*	0.943	1.075	0.999	0.964	1.075**	0.938*	1.093	1.030	0.960	1.055**	0.943	1.062	1.022	0.962	1.063**	0.918**	1.042

(*) Relative RMSFE_h^1 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells=Figures below 1 and statistically significant.
Clark and West (2007) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Table 4.A2: Multi-horizon RMSFE ratio between factor-augmented AR(3) models according to its relationship with the business cycle (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	0.977	1.028	0.907	0.969	1.012	0.955	1.047	0.900*	0.978	1.022	0.911	1.025	0.961	1.015	1.007	0.918	0.968	0.960	0.990	0.969
2	0.953**	1.023	0.894	0.919*	0.963	0.944**	1.036	0.889*	0.930	0.968	0.875**	1.018	0.907	0.959	0.962	0.883*	0.974	0.900	0.946	0.940
3	0.972	1.031	0.924	0.921*	0.966	0.969	1.043	0.912*	0.926*	0.968	0.885*	1.038	0.906*	0.977	0.973	0.894*	0.992	0.902	0.972	0.958
4	0.997	1.008	0.935*	0.912*	0.950	0.991	1.019	0.927*	0.920*	0.952	0.888**	1.027	0.928	0.978	0.967	0.902**	0.988	0.934	0.977	0.960
h	Durable Consumption																			
1	1.015	0.967	0.926	0.970	0.974	0.996	0.970	0.911	0.896*	0.931*	0.961	0.952	0.932	0.994	0.961	0.968	0.943	0.906	0.947	0.950
2	0.978	0.965	0.932	0.958	0.984	0.974	0.976	0.913	0.943*	0.967	0.969	0.951	0.959	0.998	0.955	0.972	0.947	0.919*	0.996	0.964
3	1.005	0.990	0.976	0.993	1.002	1.001	0.994	0.958	0.975	0.981	1.004	0.972	1.007	0.997	0.973	1.008	0.974	0.988	0.990	0.990
4	0.998	0.971	0.955	0.988	0.982	0.991	0.983	0.940	0.976	0.971	0.985	0.960	0.965	0.974	0.966	0.987	0.963	0.953	0.952	0.980
h	Non-durable Consumption																			
1	0.966	1.074	0.953	0.933	1.014	0.951	1.086*	0.945	0.943	1.015	0.910	1.078	0.955	0.967	0.984	0.908	1.020	0.981	0.958	0.957
2	0.971**	1.069	0.964	0.903**	0.978	0.959***	1.079*	0.947	0.912*	0.978	0.881**	1.110***	0.908	0.963	0.986	0.890**	1.064	0.921	0.951	0.974
3	0.977	1.070*	0.969	0.893*	0.976	0.968	1.079**	0.951	0.899*	0.974	0.883**	1.112**	0.917*	0.974	0.985	0.894**	1.066	0.925*	0.967	0.978
4	0.999	1.049	0.970	0.894**	0.965	0.991	1.057	0.954	0.903**	0.963	0.897***	1.106**	0.933	0.982	0.984	0.912**	1.064*	0.943	0.979	0.984
h	Gross Fixed Capital Formation																			
1	1.079	0.980	0.980	0.996	0.957	1.081	1.006	0.982	1.023	0.991	1.098	0.978	0.913	0.928	0.930	1.093	0.915	0.887	0.914	0.894
2	1.008	0.913	0.930	0.998	0.906	1.011	0.954	0.939	1.040	0.962	1.058	0.929	0.900	0.883	0.837*	1.043	0.842	0.881	0.813	0.754**
3	0.986	0.841	0.837**	0.952	0.844**	0.991	0.878	0.827**	1.000	0.904**	0.979	0.840	0.849*	0.874	0.780**	0.984	0.757*	0.850	0.781	0.693**
4	1.015	0.845	0.826**	0.950	0.848**	1.022	0.870	0.819**	0.976	0.896*	0.974	0.827	0.855**	0.894	0.794**	0.978	0.754*	0.847**	0.823	0.718**
h	Construction and Works																			
1	1.000	0.952	0.912**	0.979	0.957*	0.996	0.956*	0.923*	0.992	0.968*	0.937	0.890	0.908*	0.980	0.925	0.936	0.861	0.891	0.976	0.909
2	0.982	0.951**	0.912**	0.976	0.955**	0.982	0.954**	0.931*	0.995	0.967**	0.959	0.905	0.943	0.981	0.923*	0.957	0.880	0.929	0.962**	0.897
3	0.981	0.945**	0.895***	0.968*	0.949*	0.985	0.950**	0.905**	0.985	0.965*	0.961	0.897	0.938*	0.974	0.914	0.962	0.873	0.929*	0.950	0.887
4	0.981	0.928*	0.872**	0.955*	0.935*	0.985	0.933*	0.878**	0.970**	0.951*	0.944	0.874	0.930*	0.967*	0.903	0.947	0.852	0.917**	0.945	0.879
h	Machinery and Equipment																			
1	1.054	1.043	1.079	1.003	1.011	1.031	1.035	1.083	1.000	1.017	1.071	0.989	0.967	0.980	1.002	1.072	0.978	0.942	0.994	1.001
2	1.024	1.016	1.054	0.958	1.001	1.007	1.018	1.081	0.959	1.017	1.073	0.990	1.005	0.943	0.978	1.067	0.965	1.004	0.935	0.958
3	1.038	0.974	0.973	0.886	0.972	1.025	0.971	1.010	0.898	0.993	1.077	0.939	0.951	0.951	0.954	1.080	0.894**	0.971	0.906	0.908
4	1.001	0.943	0.885	0.906	0.945	0.998	0.939	0.907	0.916	0.977	1.069	0.930	0.890*	0.923	0.913	1.058	0.903	0.901*	0.833	0.849

(*) Relative RMSFE_h^2 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells= Figures below 1 and statistically significant.
Harvey, Leybourne, and Newbold (1997) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

3 Robustness results III: AR(4) native model, 4-term factor in differences

Table 1.A3. Adjusted R-squared ratio between AR(4) factor-augmented and native AR(4) model (*) and *F*-test results (*p*-value) of the consumer-based factor statistical significance (**)

	Factor: More sensitive sectors					Factor: Less sensitive sectors					Factor: More sensitive sectors					Factor: Less sensitive sectors				
	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
Factor: *Commerce + Industry*																				
PC	0.985	1.008	0.991	0.992	1.001	0.986	0.991	1.005	0.990	0.992	0.966	0.288	0.755	0.625	0.349	0.942	0.821	0.159	0.721	0.604
DC	0.986	1.033	0.986	1.002	1.021	0.983	0.997	1.002	0.989	0.995	0.759	0.002	0.763	0.296	0.039	0.968	0.375	0.067	0.615	0.422
NDC	0.971	1.004	0.975	0.988	1.001	0.977	0.973	0.965	0.976	0.977	0.823	0.150	0.787	0.406	0.174	0.702	0.711	0.933	0.630	0.581
GFCF	0.988	0.997	1.005	1.003	1.005	1.008	0.994	1.009	1.008	1.011	0.870	0.514	0.064	0.319	0.178	0.376	0.528	0.119	0.215	0.121
CWK	0.993	0.998	1.012	1.027	1.018	1.000	1.003	1.005	1.017	1.015	0.980	0.874	0.367	0.060	0.152	0.659	0.684	0.422	0.153	0.132
MEQ	0.985	0.979	1.004	1.006	1.001	1.027	0.988	1.040	1.021	1.027	0.773	0.625	0.235	0.383	0.334	0.114	0.474	0.042	0.224	0.141
Factor: *Commerce + Industry + Transportation*																				
PC	0.986	1.003	0.996	0.992	0.998	0.985	0.994	1.000	0.990	0.993	0.949	0.484	0.505	0.612	0.425	0.968	0.696	0.278	0.723	0.549
DC	0.990	1.031	0.990	0.997	1.012	0.983	0.997	0.999	0.990	0.997	0.632	0.001	0.476	0.411	0.130	0.979	0.412	0.134	0.550	0.329
NDC	0.970	0.991	0.975	0.985	0.994	0.978	0.977	0.963	0.977	0.981	0.843	0.409	0.806	0.491	0.298	0.745	0.584	0.956	0.592	0.465
GFCF	0.993	0.994	1.009	1.003	1.005	1.000	0.992	1.010	1.009	1.012	0.800	0.624	0.037	0.362	0.211	0.547	0.591	0.131	0.182	0.095
CWK	0.993	1.000	1.010	1.027	1.021	0.998	1.002	1.007	1.017	1.015	0.985	0.840	0.428	0.044	0.076	0.725	0.735	0.354	0.191	0.191
MEQ	0.997	0.976	1.003	1.003	1.002	1.012	0.984	1.050	1.025	1.031	0.674	0.711	0.211	0.434	0.367	0.159	0.633	0.022	0.202	0.123
Factor: *Commerce + Industry + Construction + Personal Services*																				
PC	0.988	0.989	1.004	0.988	0.989	0.987	1.014	0.991	0.994	1.004	0.770	0.880	0.150	0.767	0.736	0.943	0.125	0.806	0.557	0.212
DC	0.982	0.996	1.000	0.990	0.996	0.988	1.032	0.988	0.998	1.015	0.972	0.417	0.070	0.628	0.425	0.742	0.000	0.671	0.327	0.059
NDC	0.971	0.968	0.965	0.976	0.976	0.984	1.018	0.973	0.986	1.001	0.654	0.808	0.929	0.622	0.655	0.614	0.102	0.831	0.449	0.140
GFCF	1.006	0.994	1.010	1.010	1.012	0.988	0.997	1.001	1.003	1.005	0.348	0.560	0.104	0.177	0.100	0.907	0.519	0.145	0.380	0.215
CWK	1.006	1.004	1.004	1.017	1.015	0.994	0.996	1.012	1.024	1.019	0.365	0.596	0.483	0.133	0.146	0.958	0.934	0.317	0.071	0.125
MEQ	1.014	0.987	1.037	1.027	1.031	0.989	0.980	1.013	1.002	1.002	0.183	0.483	0.051	0.152	0.103	0.732	0.652	0.184	0.525	0.396
Factor: *Commerce + Construction + Personal Services*																				
PC	0.986	0.994	1.005	0.991	0.994	0.988	1.014	0.994	0.990	0.997	0.899	0.669	0.110	0.637	0.502	0.941	0.186	0.705	0.677	0.456
DC	0.982	1.005	0.999	0.996	1.005	0.990	1.033	0.991	0.988	1.001	0.964	0.123	0.111	0.384	0.193	0.723	0.000	0.565	0.694	0.349
NDC	0.967	0.970	0.962	0.981	0.983	1.003	1.023	0.986	0.978	0.992	0.832	0.739	0.961	0.511	0.452	0.296	0.083	0.568	0.597	0.271
GFCF	1.003	0.996	1.012	1.010	1.013	0.990	0.991	0.994	0.998	0.997	0.460	0.512	0.070	0.181	0.094	0.900	0.739	0.464	0.511	0.477
CWK	1.001	1.004	1.006	1.020	1.016	0.995	0.995	1.011	1.024	1.019	0.627	0.654	0.415	0.108	0.132	0.953	0.923	0.350	0.062	0.101
MEQ	1.015	0.989	1.034	1.029	1.032	0.994	0.972	1.013	0.987	0.985	0.229	0.534	0.058	0.138	0.094	0.669	0.837	0.189	0.761	0.721

(*) Adjusted R-squared ratio=Adjusted R-squared with the factor/Adjusted R-squared without the factor. Orange-shaded cells=Adjusted R-squared ratio greater than 1. Green-shaded cells=Adjusted R-squared ratio greater than 1.05 (5% of adjustment gain). Sample: 2001.I-2014.IV (56 observations). (**) *p*-value of the null hypothesis: NH: ϕ_1=...=ϕ_4=0 (see equation 1) against the alternative of at least one term is equal to zero. Green-shaded cells=p<10%. Orange-shaded cells=p<15%. Sample: 2001.I-2019.III (75 observations). Source: Authors' calculations.

Table 2.A3. Multi-horizon RMSFE ratio between native AR(1) and factor-augmented AR(4) model (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	1.439***	1.723***	1.501**	1.491**	1.582***	1.430***	1.724***	1.503**	1.501**	1.583**	1.396***	1.726***	1.535**	1.560**	1.618**	1.401***	1.720***	1.520**	1.549**	1.611**
2	1.932***	2.462***	2.022**	2.100***	2.228***	1.926***	2.462***	2.018**	2.114***	2.229***	1.887***	2.443***	2.034**	2.200***	2.270***	1.892***	2.435***	2.018**	2.183***	2.260***
3	2.412***	3.006***	2.545***	2.614***	2.751***	2.402***	3.008***	2.524***	2.627***	2.752***	2.331***	3.010***	2.505**	2.730***	2.803***	2.342***	2.997***	2.501***	2.714***	2.795***
4	2.756***	3.229***	2.859***	2.886***	3.008***	2.739***	3.231***	2.845***	2.902***	3.012***	2.638***	3.258***	2.840***	2.997***	3.065***	2.658***	3.241***	2.840***	2.983***	3.058***
h	Durable Consumption																			
1	1.021	1.035*	0.998	0.948	1.003	1.015	1.033*	0.992	0.909	0.979	1.021	1.033	0.993	0.952	1.000	1.016	1.033	0.968	0.940	0.996
2	0.937	0.967	0.954	0.933	0.969	0.939	0.970	0.951*	0.929	0.961	0.959	0.959	0.962	0.958	0.960	0.951	0.962	0.940	0.953	0.959
3	0.883	0.913	0.830	0.922	0.925	0.881	0.912	0.830	0.916	0.917	0.899	0.911	0.862	0.930	0.913	0.893	0.917	0.847	0.921	0.913
4	0.848	0.865	0.776	0.870	0.856	0.845	0.868	0.774	0.865	0.852	0.855	0.869	0.799	0.869	0.845	0.852	0.871	0.792	0.857	0.844
h	Non-durable Consumption																			
1	1.453***	1.687***	1.538***	1.474***	1.580***	1.440***	1.688***	1.527***	1.483***	1.578***	1.361***	1.704***	1.512***	1.544***	1.599***	1.373***	1.693***	1.516***	1.532***	1.595***
2	1.873***	2.262***	2.055***	1.928***	2.078***	1.856***	2.267***	2.030***	1.942***	2.077***	1.749***	2.298***	1.989***	2.033***	2.116***	1.769***	2.282***	1.988***	2.013***	2.108***
3	2.181***	2.584***	2.398***	2.238***	2.396***	2.164***	2.591***	2.366***	2.246***	2.394***	2.043***	2.642***	2.312***	2.355***	2.436***	2.067***	2.622***	2.313***	2.336***	2.430***
4	2.515***	2.839***	2.668***	2.514***	2.670***	2.498***	2.848***	2.643***	2.530***	2.672***	2.371***	2.929***	2.608***	2.631***	2.719***	2.398***	2.901***	2.611***	2.614***	2.714***
h	Gross Fixed Capital Formation																			
1	0.943	1.004*	0.962	0.926	0.955	0.945	1.000*	0.974	0.939	0.963	0.976	0.982	0.975	0.898	0.943	0.973	0.975	0.973	0.892	0.934
2	1.049	1.172**	1.050	1.074	1.119	1.057	1.180**	1.072	1.098	1.133	1.119	1.161	1.107	1.060	1.112	1.110	1.146	1.095	1.049	1.100
3	1.277	1.466**	1.282*	1.314*	1.377	1.281	1.468**	1.287	1.339*	1.391	1.323	1.430*	1.325	1.315*	1.370	1.317	1.419*	1.324	1.301*	1.358
4	1.476*	1.672***	1.539**	1.512**	1.572*	1.478*	1.666***	1.542*	1.533**	1.586*	1.501*	1.614**	1.578*	1.505**	1.560*	1.499*	1.604**	1.572*	1.492**	1.546*
h	Construction and Works																			
1	1.043	1.094	1.097*	1.033	1.045	1.036	1.088	1.105*	1.042	1.049	1.032	1.045	1.098	1.038	1.030	1.032	1.045	1.090	1.035	1.027
2	1.142*	1.218**	1.164**	1.144**	1.169*	1.142*	1.213*	1.181**	1.155**	1.173*	1.148*	1.176*	1.183*	1.153**	1.157*	1.146*	1.175*	1.178*	1.148**	1.153*
3	1.207*	1.302**	1.202**	1.212**	1.254**	1.210*	1.300**	1.216**	1.222**	1.260**	1.211*	1.267**	1.233**	1.224**	1.243**	1.210*	1.266*	1.229**	1.218**	1.239**
4	1.284**	1.393**	1.305**	1.303***	1.340**	1.284**	1.389**	1.313**	1.310***	1.345**	1.278**	1.351**	1.338**	1.317***	1.330**	1.278**	1.351**	1.331**	1.310***	1.326**
h	Machinery and Equipment																			
1	0.833	0.834*	0.903*	0.867	0.839	0.821	0.810	0.904*	0.860	0.829	0.830	0.782	0.882*	0.847	0.830	0.828	0.795	0.881*	0.854	0.839
2	0.953	0.951*	0.986	1.027	0.988	0.945	0.939*	0.994	1.022	0.984	0.986	0.920	1.002	1.001	0.983	0.980	0.928	0.990	1.011	0.991
3	1.306*	1.309**	1.312*	1.363*	1.372**	1.297*	1.296**	1.318*	1.357*	1.365*	1.339*	1.265*	1.325*	1.355*	1.357*	1.334*	1.272*	1.321*	1.354*	1.361*
4	1.173	1.185**	1.183*	1.234	1.245*	1.172	1.181**	1.187*	1.235	1.250*	1.222	1.199**	1.203*	1.220	1.247*	1.214	1.192**	1.202*	1.214	1.243*

(*) Relative RMSFE_h^1 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells=Figures below 1 and statistically significant.
Clark and West (2007) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Table 3.A3. Multi-horizon RMSFE ratio between native AR(4) and factor-augmented AR(4) model (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	1.006	1.204***	1.049	1.042	1.106**	1.000	1.205**	1.051	1.049	1.107**	0.976	1.206**	1.073	1.091	1.131	0.980	1.203**	1.063	1.083	1.126
2	0.981	1.250**	1.026	1.066	1.131**	0.977	1.250**	1.024	1.073	1.131**	0.958	1.240**	1.033	1.117*	1.152*	0.961	1.236**	1.024	1.108	1.147*
3	0.982	1.224**	1.037	1.065	1.120**	0.978	1.225**	1.028	1.070	1.121*	0.949*	1.226**	1.020	1.112	1.141*	0.954*	1.220**	1.019	1.105	1.138*
4	0.999	1.171***	1.037	1.046	1.090*	0.993	1.172***	1.032	1.052	1.092*	0.956*	1.181***	1.030	1.086	1.111*	0.964*	1.175***	1.030	1.081	1.109*
h	Durable Consumption																			
1	0.995	1.008	0.972	0.923	0.977	0.988	1.007	0.966	0.885	0.954	0.994	1.006	0.968	0.927	0.974	0.989	1.006	0.943	0.915	0.970
2	0.987	1.018	1.004*	0.982	1.020	0.989	1.021	1.001**	0.978	1.012	1.010	1.010	1.013	1.008	1.010	1.001	1.012	0.989	1.003	1.010
3	0.988	1.021	0.929	1.032	1.035	0.986	1.021	0.928	1.025	1.025	1.006	1.019	0.964	1.041	1.022	0.999	1.025	0.948	1.031	1.022
4	1.008	1.027	0.922	1.033	1.017	1.004	1.030	0.919	1.027	1.012	1.015	1.032	0.949	1.032	1.004	1.011	1.034	0.940	1.018	1.003
h	Non-durable Consumption																			
1	1.022	1.187**	1.082*	1.037	1.112**	1.013	1.188**	1.075	1.044	1.110**	0.957*	1.199**	1.064	1.086	1.125*	0.966	1.191**	1.067	1.078	1.122*
2	0.995	1.202**	1.092	1.025	1.104*	0.986	1.204**	1.078	1.032	1.103*	0.929***	1.221**	1.057	1.080	1.125*	0.940***	1.213**	1.056	1.070	1.120*
3	0.993	1.177**	1.092*	1.019	1.091*	0.986	1.180**	1.077	1.023	1.090*	0.930***	1.203***	1.053	1.073	1.109*	0.941***	1.194***	1.053	1.064	1.107*
4	1.006	1.136***	1.067*	1.006	1.068	0.999	1.139***	1.057*	1.012	1.069	0.948**	1.172***	1.043	1.053	1.088*	0.959**	1.161***	1.045	1.046	1.086*
h	Gross Fixed Capital Formation																			
1	1.023	1.089**	1.043	1.005	1.036	1.025	1.084**	1.056	1.019	1.045	1.059*	1.065*	1.058	0.974	1.023	1.055	1.058	1.056	0.968	1.014
2	0.980	1.095**	0.981	1.004	1.046	0.987	1.103**	1.002	1.026*	1.059*	1.045	1.085**	1.034	0.991	1.038	1.037	1.071**	1.023	0.980	1.028
3	0.979	1.124**	0.983	1.007*	1.056*	0.982	1.126**	0.987	1.026**	1.066*	1.014	1.096**	1.016	1.008	1.051	1.010	1.088**	1.015	0.997	1.041
4	0.988	1.119**	1.030	1.012	1.052**	0.989	1.115**	1.032	1.026**	1.061**	1.004	1.081**	1.056**	1.007	1.044*	1.004	1.074**	1.052**	0.998	1.035
h	Construction and Works																			
1	1.034	1.085*	1.088	1.025	1.036	1.028	1.079*	1.096	1.034	1.040	1.023	1.037	1.089	1.030	1.022	1.023	1.036	1.081	1.027	1.019
2	1.008	1.075*	1.027	1.009	1.032	1.008	1.071*	1.043	1.020	1.036	1.013	1.038*	1.044	1.017	1.021	1.011	1.037*	1.040	1.013	1.018
3	0.998	1.077**	0.994	1.003	1.037*	1.001	1.075*	1.006	1.011	1.042*	1.002	1.048*	1.020	1.012	1.028	1.001	1.047*	1.017	1.007	1.025
4	0.998	1.083**	1.015	1.013	1.041**	0.998	1.079**	1.020	1.019*	1.046**	0.993	1.050**	1.040*	1.024**	1.034*	0.994	1.050**	1.035*	1.019*	1.030*
h	Machinery and Equipment																			
1	1.010	1.012	1.095**	1.051*	1.018	0.996	0.982	1.096**	1.043**	1.006	1.007	0.948	1.070	1.028	1.006	1.004	0.965	1.068	1.036	1.017
2	0.973	0.972	1.007	1.049***	1.010	0.965	0.959	1.016*	1.044**	1.006	1.008	0.940	1.024	1.023	1.005	1.001	0.948	1.012	1.033*	1.013
3	0.987	0.990	0.992	1.030**	1.037	0.981	0.979	0.997	1.026	1.032	1.012	0.956	1.001	1.024	1.026	1.008	0.962	0.999	1.024	1.029*
4	0.988	0.998	0.996	1.039	1.049**	0.987	0.995	1.000	1.040	1.053**	1.029	1.010	1.013	1.028	1.050**	1.022	1.004	1.012	1.023	1.047**

(*) Relative RMSFE_h^1 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells=Figures below 1 and statistically significant.
Clark and West (2007) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Table 4.A3: Multi-horizon RMSFE ratio between factor-augmented AR(4) models according to its relationship with the business cycle (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	0.989	1.055	0.905	0.959	1.004	0.981	1.060	0.905	0.966	1.005	0.938	1.029	0.944	1.028	1.018	0.938	0.987	0.922	1.013	0.992
2	0.949**	1.038	0.883	0.921	0.962	0.948**	1.042	0.882	0.933	0.965	0.889	1.014	0.891	0.984	0.978	0.896*	0.993	0.872	0.975	0.964
3	0.970	1.035	0.927	0.943	0.974	0.969	1.039	0.919	0.951	0.976	0.900	1.030	0.908	1.006	0.992	0.908	1.003	0.899	1.001	0.980
4	0.997	1.015	0.951	0.944	0.969	0.993	1.017	0.948	0.953	0.971	0.917**	1.028	0.948	1.006	0.991	0.926*	1.005	0.947	1.006	0.985
h	Durable Consumption																			
1	1.015	0.990	0.963	0.976	0.988	1.001	0.986	0.947	0.903*	0.943*	0.992	0.955	0.940	0.994	0.967	0.996	0.951	0.901	0.955	0.959
2	0.982	0.985	0.952	0.950	0.985	0.984	0.990	0.941	0.936*	0.969	1.011	0.958	0.959	0.995	0.959	1.013	0.962	0.907*	0.994	0.967
3	0.993	0.988	0.955	0.979	0.994	0.991	0.987	0.947	0.964	0.976	1.022	0.982	1.022	0.985	0.969	1.021	0.981	0.985	0.972	0.977
4	0.996	0.985	0.968	0.972	0.988	0.990	0.991	0.964	0.963	0.979	1.014	1.004	1.025	0.963	0.971	1.013	0.999	1.008	0.935	0.975
h	Non-durable Consumption																			
1	0.975	1.068*	0.959	0.933	1.004	0.966	1.069**	0.956	0.936	1.000	0.901	1.067	0.947	0.988	0.995	0.899	1.025	0.962	0.977	0.976
2	0.963**	1.053	0.951	0.907	0.972	0.955**	1.056	0.940	0.916	0.972	0.870**	1.077**	0.907*	0.975	0.989	0.879**	1.051	0.905	0.963	0.978
3	0.975	1.048	0.973	0.920	0.979	0.970	1.052	0.960	0.923	0.977	0.887*	1.082*	0.926*	0.991	0.992	0.897*	1.053	0.924*	0.980	0.983
4	0.999	1.028	0.985	0.930	0.977	0.995	1.031	0.976	0.937	0.977	0.920**	1.083**	0.957	0.999	0.997	0.930**	1.056**	0.958	0.993	0.992
h	Gross Fixed Capital Formation																			
1	0.997	1.022	0.942	1.006	0.999	0.994	1.027	0.961	1.035	1.021	1.047	0.955	0.955	0.952	0.953	1.046	0.909	0.953	0.925	0.918
2	0.979	0.991	0.914*	0.986	0.985	0.984	1.011	0.938	1.024	1.008	1.087	0.977	0.993	0.956	0.952	1.080	0.927	0.979	0.923	0.907
3	0.993	0.983	0.928	0.971	0.973	0.997	0.996	0.927	1.004	0.993	1.042	0.943	0.974	0.967	0.943	1.044	0.902	0.981	0.939	0.906
4	1.038	0.998	0.946	0.973	0.977	1.040	0.998	0.946	0.998	0.994	1.033	0.940	0.988	0.964	0.953	1.046	0.917	0.981	0.947	0.932
h	Construction and Works																			
1	1.017	0.996	0.934**	0.978	0.975**	1.013	0.992	0.947	0.996	0.985	0.961	0.900	0.930	0.988	0.942	0.962	0.883	0.909	0.984	0.929
2	1.004	0.999	0.941*	0.980	0.980	1.005	0.995	0.964	0.999	0.989	0.994	0.932	0.972	0.990	0.952	0.994	0.918	0.958	0.977	0.934
3	0.995	0.987	0.920*	0.973*	0.975	1.000	0.987	0.933	0.990	0.987	0.988	0.926	0.964	0.986	0.944	0.989	0.908	0.955	0.968	0.923
4	1.000	0.976	0.911	0.962**	0.965	1.003	0.975	0.917	0.976**	0.976	0.972	0.908	0.960	0.982	0.939	0.976	0.892	0.945	0.967	0.921
h	Machinery and Equipment																			
1	0.984	1.019	0.959	1.018	0.999	0.958	0.984	0.963	1.021	0.993	0.949	0.869	0.914	0.993	0.959	0.954	0.873	0.908	1.006	0.962
2	0.965	1.007	0.924	1.042**	1.021	0.947	0.998	0.934	1.050*	1.024	1.005	0.916	0.940	0.999	0.990	1.005	0.914	0.914	1.011	0.984
3	1.017	1.062	0.957	1.016	1.049	1.002	1.049	0.963	1.010	1.043	1.051	0.959	0.967	1.002	1.009	1.056	0.946	0.960	0.990	0.994
4	1.001	0.998	0.938	1.000	1.020	0.993	0.995	0.944	1.007	1.029	1.063	0.994	0.964	0.977	1.010	1.058	0.977	0.964	0.958	0.998

(*) Relative RMSFE_h^2 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells= Figures below 1 and statistically significant.
Harvey, Leybourne, and Newbold (1997) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

4 Robustness results IV: AR(1) native model, 1-term factor in differences

Table 1.A4. Adjusted R-squared ratio between AR(1) factor-augmented (1-term) and native AR(1) model (*) and *F*-test results (*p*-value) of the consumer-based factor statistical significance (**)

	Factor: More sensitive sectors					Factor: Less sensitive sectors					Factor: More sensitive sectors					Factor: Less sensitive sectors				
	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
Factor: *Commerce + Industry*																				
PC	0.995	1.014	0.996	1.002	1.009	0.996	1.006	0.996	0.998	1.002	0.706	0.170	0.599	0.237	0.128	0.582	0.256	0.611	0.396	0.254
DC	0.996	1.026	0.994	1.009	1.021	0.995	1.008	0.994	1.000	1.005	0.424	0.065	0.884	0.101	0.031	0.626	0.178	0.677	0.265	0.151
NDC	0.989	1.016	0.990	0.998	1.007	0.990	1.021	0.989	0.995	1.005	0.991	0.139	0.778	0.329	0.184	0.729	0.171	0.934	0.465	0.290
GFCF	0.999	1.005	1.011	1.002	1.005	1.000	1.000	1.003	1.006	1.007	0.656	0.304	0.183	0.349	0.262	0.460	0.570	0.306	0.153	0.177
CWK	0.994	0.994	0.994	0.998	0.998	0.996	0.994	0.993	1.000	0.997	0.736	0.718	0.805	0.401	0.413	0.487	0.790	0.942	0.260	0.428
MEQ	1.008	1.012	1.031	1.005	1.009	1.002	1.009	1.011	1.009	1.012	0.349	0.285	0.114	0.494	0.357	0.719	0.464	0.259	0.302	0.259
Factor: *Commerce + Industry + Transportation*																				
PC	0.995	1.009	0.997	1.001	1.006	0.997	1.010	0.995	0.998	1.003	0.724	0.199	0.522	0.286	0.183	0.540	0.213	0.702	0.361	0.202
DC	0.996	1.024	0.994	1.006	1.016	0.995	1.008	0.994	1.001	1.007	0.405	0.046	0.945	0.164	0.054	0.652	0.188	0.597	0.215	0.117
NDC	0.989	1.013	0.990	0.998	1.006	0.992	1.025	0.989	0.995	1.006	0.875	0.217	0.753	0.343	0.227	0.560	0.127	0.968	0.464	0.261
GFCF	1.001	1.002	1.012	1.002	1.004	0.998	1.001	1.001	1.007	1.008	0.388	0.404	0.163	0.366	0.307	0.709	0.507	0.369	0.118	0.131
CWK	0.993	0.994	0.994	0.997	0.997	0.995	0.993	0.993	1.000	0.997	0.968	0.816	0.800	0.452	0.489	0.570	0.845	0.907	0.206	0.357
MEQ	1.012	1.008	1.034	1.005	1.007	1.001	1.012	1.008	1.010	1.014	0.210	0.408	0.088	0.497	0.407	0.978	0.391	0.341	0.267	0.207
Factor: *Commerce + Industry + Construction + Personal Services*																				
PC	0.995	1.004	0.996	0.998	1.001	0.996	1.015	0.995	1.002	1.009	0.695	0.281	0.520	0.412	0.285	0.605	0.149	0.733	0.236	0.115
DC	0.994	1.007	0.994	1.001	1.006	0.997	1.022	0.994	1.006	1.017	0.685	0.214	0.723	0.250	0.145	0.363	0.060	0.814	0.135	0.044
NDC	0.989	1.016	0.990	0.995	1.004	0.989	1.020	0.989	0.998	1.009	0.838	0.175	0.793	0.499	0.342	0.858	0.096	0.986	0.302	0.140
GFCF	1.000	1.001	1.004	1.006	1.007	0.998	1.002	1.006	1.003	1.005	0.398	0.529	0.245	0.151	0.162	0.718	0.424	0.265	0.304	0.265
CWK	0.998	0.994	0.993	1.001	0.997	0.994	0.995	0.994	0.997	0.997	0.372	0.684	0.901	0.220	0.413	0.689	0.667	0.806	0.436	0.429
MEQ	1.002	1.013	1.013	1.008	1.012	1.007	1.007	1.021	1.007	1.009	0.715	0.390	0.208	0.341	0.251	0.391	0.459	0.180	0.395	0.351
Factor: *Commerce + Construction + Personal Services*																				
PC	0.995	1.009	0.996	1.000	1.005	0.997	1.005	0.996	0.997	1.001	0.682	0.154	0.552	0.296	0.185	0.581	0.239	0.668	0.426	0.243
DC	0.994	1.013	0.994	1.004	1.011	0.998	1.011	0.994	1.000	1.007	0.677	0.112	0.668	0.195	0.100	0.303	0.111	0.913	0.206	0.080
NDC	0.989	1.023	0.989	0.999	1.010	0.991	1.006	0.989	0.991	0.997	0.939	0.112	0.874	0.372	0.247	0.722	0.175	0.852	0.565	0.295
GFCF	1.000	1.002	1.007	1.006	1.007	0.999	1.000	1.002	1.002	1.003	0.465	0.497	0.177	0.180	0.172	0.643	0.531	0.427	0.329	0.324
CWK	0.996	0.994	0.993	1.000	0.997	0.994	0.995	0.993	0.996	0.997	0.538	0.807	0.973	0.229	0.390	0.671	0.648	0.961	0.527	0.510
MEQ	1.002	1.014	1.021	1.008	1.013	1.009	1.003	1.011	1.006	1.006	0.651	0.387	0.119	0.357	0.262	0.352	0.635	0.373	0.409	0.417

(*) Adjusted R-squared ratio=Adjusted R-squared with the factor/Adjusted R-squared without the factor. Orange-shaded cells=Adjusted R-squared ratio greater than 1. Green-shaded cells=Adjusted R-squared ratio greater than 1.05 (5% of adjustment gain). Sample: 2001.I-2014.IV (56 observations). (**) *p*-value of the null hypothesis: NH: ϕ_1=...=ϕ_4=0 (see equation 1) against the alternative of at least one term is equal to zero. Green-shaded cells=p<10%. Orange-shaded cells=p<15%. Sample: 2001.I-2019.III (75 observations). Source: Authors' calculations.

Table 2.A4. Multi-horizon RMSFE ratio between native AR(1) and factor-augmented AR(1) model, 1-term factor (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	1.008	1.015	1.025	0.996	1.003	1.010	1.017	1.026	0.989	1.003	1.001	1.014	1.023	0.992	1.004	1.006	1.011	1.021	0.989	1.000
2	1.008	0.998	0.994	0.989	0.993	1.007	1.002	0.994	0.984	0.994	0.998**	1.010*	0.998	0.983	0.998	1.001	1.007	0.999	0.983	0.995
3	0.998	1.003	1.000	0.994	0.999	0.999	1.005	1.001	0.991	0.999	0.999	1.005	1.001	0.992	0.999	1.000	1.004	1.001	0.991	0.998
4	0.998	1.002	1.004	0.997	1.000	0.999	1.003	1.004	0.997	1.000	0.998	1.006*	1.006	0.998	1.002	0.999	1.005	1.007	0.997	1.001
h	Durable Consumption																			
1	0.999	0.992	0.994	0.940**	0.966***	0.998	0.995	0.998	0.930**	0.965***	0.996	0.998	1.003	0.941**	0.975**	0.995	0.997	0.995	0.935**	0.970**
2	1.004	0.995	1.002	0.973	0.987	1.005	0.998	1.003	0.970	0.988	1.003	1.002	1.001	0.978	0.993	1.003	1.001	1.002	0.977	0.992
3	1.002	1.000	1.001	0.995	1.001	1.002	1.000	1.002	0.992	0.999	1.002	1.003	1.001	0.992	1.001	1.002	1.003	1.002	0.993	1.001
4	1.004	1.000	1.004	1.008	1.006	1.004	1.000	1.004	1.006	1.005	1.003	1.003	1.003	1.007	1.007	1.003	1.004	1.006	1.008	1.008
h	Non-durable Consumption																			
1	1.014	1.019	1.015	1.013	1.019	1.014	1.018	1.013	1.013	1.018	1.000	1.018	1.015	1.016	1.016	1.006	1.014	1.016	1.016	1.015
2	1.004	1.004	0.994	0.995	1.004	1.003	1.006	0.991	0.992	1.003	0.991*	1.013	0.991*	0.996	1.005	0.994	1.009	0.994	0.995	1.004
3	0.998	1.007	1.002	0.996	1.005	0.998	1.007	1.001	0.994	1.003	0.991*	1.007	0.999	1.002	1.004	0.995	1.005	1.001	1.001	1.004
4	1.000	1.005	1.003	0.995	1.003	1.001	1.005	1.002	0.995	1.003	0.995	1.007	1.001	1.003	1.005	0.997	1.005	1.003	1.002	1.005
h	Gross Fixed Capital Formation																			
1	1.001	1.001	1.003	1.010	0.991	1.003**	1.003	0.997	1.006	0.993	1.005	1.007	0.991	0.994	0.992	1.005	1.006	0.993	0.997	0.992
2	1.001	0.991	0.998	0.978	0.975*	1.001	0.998	0.999	0.984	0.984	1.005	1.002	0.993	0.963	0.979	1.003	0.997	0.992	0.965	0.976
3	1.001	0.998	0.998	0.968	0.983	1.002	1.000	0.998	0.974	0.988	1.000	1.006	0.995	0.961	0.986	1.001	1.004	0.996	0.961	0.984
4	1.001**	0.997	0.995	0.970*	0.985*	1.002**	0.999	0.995	0.975*	0.990*	1.002	1.001	0.997	0.960**	0.986*	1.002	1.000	0.997	0.961*	0.985*
h	Construction and Works																			
1	1.006	1.006	1.017***	1.016	1.006	1.005	1.006	1.017***	1.013	1.004	1.003	1.008***	1.011	1.009	1.004	1.002	1.007**	1.011	1.011	1.004
2	1.002	1.003	1.007***	1.000	1.000	1.001	1.003	1.007***	1.001	1.001	1.000	1.004**	1.005	0.999	1.000	1.000	1.003**	1.005	0.999	1.000
3	1.001	1.002	1.000	0.994	0.999	1.001	1.003	1.001	0.996	1.000	0.998	1.002*	1.001	0.995	0.999	0.999	1.003*	1.001	0.995	0.999
4	1.001	1.002	0.999	0.991	0.999	1.001	1.003	1.000	0.993	1.000	0.999	1.001	1.002	0.993	0.999	0.999	1.002	1.002	0.992	0.998
h	Machinery and Equipment																			
1	0.998	1.004	1.000	1.003	0.996	1.001	1.005	0.993	1.000	0.997	1.003	1.006	0.989	0.994	0.998	1.003	1.007	0.993	0.996	0.999
2	0.999	0.993	0.993	0.986	0.982	1.000	0.997	0.993	0.989	0.989	1.005	1.003	0.986	0.977	0.988	1.004	1.000	0.986	0.979	0.987
3	0.998	0.997	0.991	0.978	0.987	1.000	0.998	0.991	0.980	0.991	1.000	1.014	0.982	0.973	0.995	1.002	1.013	0.985	0.975	0.995
4	0.998	0.999	0.995	0.998	0.998	1.000	1.000	0.996	0.999	1.000	1.002	1.016	0.996	0.995	1.010	1.002	1.016	0.996	0.998	1.011

(*) Relative RMSFE_h^1 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells=Figures below 1 and statistically significant.
Clark and West (2007) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Table 4.A4: Multi-horizon RMSFE ratio between 1-term factor-augmented AR(1) models according to its relationship with the business cycle (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	1.004	1.061**	1.032	1.102	1.105**	1.005	1.074**	1.033	1.078	1.103**	1.048	1.056	1.042	1.076	1.093*	1.038	1.032	1.034	1.058	1.061*
2	0.995	1.027	0.984	1.043	1.051	0.995	1.038*	0.985	1.036	1.053*	1.005	1.052**	0.992	1.035	1.058*	0.997	1.038**	0.993	1.032	1.044*
3	0.990	1.032**	0.994	1.053	1.049	0.990	1.035*	0.997	1.052	1.051	1.014	1.037	1.004	1.042	1.046	1.009	1.029	1.004	1.036	1.035
4	0.991	1.031**	0.996	1.035	1.035	0.991	1.036**	0.996	1.036	1.038	1.011	1.043**	1.009	1.033	1.039	1.007	1.033***	1.009	1.027	1.029*
h	Durable Consumption																			
1	0.995	0.994	0.966**	0.976**	0.980*	0.994	0.997	0.971**	0.962***	0.979**	0.986	0.995	0.981**	0.973	0.992	0.984	0.990	0.963*	0.937**	0.973*
2	1.001	0.999	1.002	0.993	0.997	1.002	1.002	1.003	0.986	0.997	0.999	1.012	1.002	0.995	1.007	0.996	1.008	1.004	0.979	0.999
3	1.000	1.007	1.002	1.005	1.007	1.000	1.005	1.003	0.998	1.003	1.000	1.007	1.000	0.998	1.005	1.000	1.006	0.999	0.994	1.003
4	1.002	1.004	1.000	1.006	1.005	1.002	1.003	1.000	1.003	1.004	0.999	1.007	0.996	1.005	1.007	0.999	1.009	1.000	1.006	1.008
h	Non-durable Consumption																			
1	1.003	1.089**	1.002	1.037	1.072	1.002	1.093***	1.001	1.025	1.065	1.040	1.057	1.018	1.018	1.033	1.035	1.033	1.025	1.013	1.019
2	0.991	1.061**	0.970	0.987	1.025	0.990	1.066***	0.965	0.983	1.025	0.999	1.066***	0.971	0.989	1.021	0.997	1.048**	0.974	0.988	1.014
3	0.987	1.049**	0.990	0.990	1.020	0.987	1.050**	0.987	0.987	1.018	1.004	1.038*	0.997	0.993	1.010	1.002	1.023	1.001	0.990	1.002
4	0.993	1.049***	0.991	0.985	1.016	0.993	1.051***	0.988	0.984	1.016	1.009	1.049***	1.001	0.992	1.013	1.008	1.034**	1.002	0.990	1.007
h	Gross Fixed Capital Formation																			
1	1.008	0.997	0.991	1.017	0.990	1.013	0.998	0.983	1.011	0.994	1.020	0.989	0.971	0.992	0.989	1.024	0.976	0.963	0.994	0.982
2	1.006	0.973	0.968	1.006	0.975	1.006	0.979	0.967	1.023**	0.991	0.998	0.982	0.963	0.984	0.982	1.002	0.977	0.956	0.982	0.973
3	0.997	0.990	0.995	1.006	0.987	0.999	0.994	0.994	1.020*	0.997	1.000	1.001	0.991	0.985	0.989	1.004	0.993	0.993	0.977	0.978
4	1.001	0.988	0.984	0.999	0.983*	1.003	0.990	0.984	1.014	0.992	1.004	0.991	0.988*	0.978	0.984	1.006	0.986	0.988*	0.972	0.977
h	Construction and Works																			
1	1.005	1.004	0.999	1.016	1.007	1.004	1.003	0.999	1.012	1.005	0.998	1.000	0.989	1.004	1.002	0.997	0.991	0.987	1.009	0.999
2	1.000	1.000	0.996	1.002	0.999	1.000	1.000	0.996	1.006	1.000	0.996	0.998	0.993	1.002	0.999	0.996	0.995	0.993	1.002	0.996
3	0.999	0.998	0.995	0.996	0.995	0.999	0.999	0.996	1.002	0.998	0.996	0.997	0.999	1.000	0.996	0.997	0.996	0.999	0.998	0.994
4	1.000	0.996	0.991	0.993	0.993	1.000	0.998	0.992	0.999	0.996	0.996	0.996	1.000	0.997	0.994	0.997	0.996	1.001	0.993	0.991
h	Machinery and Equipment																			
1	1.003	1.001	0.999	1.008	0.992	1.010	1.002	0.990	1.004	0.994	1.018	0.989	0.975*	0.995	0.991	1.020	0.980	0.977	0.994	0.986
2	1.004	0.980	0.975	1.005	0.981	1.004	0.983	0.973	1.012**	0.991	1.002	0.988	0.965*	0.992	0.989	1.004	0.985	0.958	0.992	0.984
3	0.999	0.996	1.001	1.016	0.993	1.004	0.998	0.997	1.021	1.000	1.011	1.012	0.979	0.999	1.000	1.014	0.996	0.978	0.992	0.988
4	0.999	1.003	0.980	1.017	1.001	1.002	1.002	0.979	1.020	1.003	1.006	1.007	0.982	1.011	1.012	1.008	0.995	0.974	1.012	1.007

(*) Relative RMSFE_h^2 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells= Figures below 1 and statistically significant.
Harvey, Leybourne, and Newbold (1997) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

5 Robustness results V: AR(1) native model, 1-term factor in differences

Table 1.A5. Adjusted R-squared ratio between AR(1) factor-augmented (2-term) and native AR(1) model (*) and *F*-test results (*p*-value) of the consumer-based factor statistical significance (**)

	Factor: More sensitive sectors					Factor: Less sensitive sectors					Factor: More sensitive sectors					Factor: Less sensitive sectors				
	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
Factor: *Commerce + Industry*																				
PC	0.994	1.018	0.996	1.007	1.014	0.995	1.005	1.006	1.004	1.007	0.860	0.222	0.781	0.282	0.164	0.800	0.481	0.276	0.373	0.285
DC	0.990	1.029	0.990	1.012	1.025	0.989	1.003	1.000	1.000	1.005	0.742	0.065	0.743	0.195	0.074	0.902	0.437	0.358	0.384	0.282
NDC	0.979	1.023	0.980	1.000	1.012	0.985	1.011	1.004	0.996	1.004	0.960	0.228	0.941	0.352	0.219	0.569	0.394	0.330	0.413	0.368
GFCF	0.996	1.013	1.010	1.014	1.019	0.995	0.999	1.023	1.027	1.026	0.759	0.242	0.370	0.144	0.076	0.715	0.556	0.074	0.048	0.057
CWK	0.987	0.988	0.987	0.992	0.991	0.991	0.988	0.986	0.994	0.990	0.927	0.912	0.968	0.681	0.708	0.710	0.916	0.992	0.504	0.704
MEQ	1.005	1.030	1.037	1.045	1.051	0.993	1.017	1.077	1.073	1.076	0.510	0.149	0.199	0.060	0.022	0.903	0.246	0.011	0.025	0.016
Factor: *Commerce + Industry + Transportation*																				
PC	0.995	1.015	0.998	1.006	1.013	0.995	1.007	1.005	1.004	1.007	0.812	0.169	0.595	0.315	0.186	0.804	0.491	0.336	0.354	0.264
DC	0.990	1.028	0.992	1.008	1.020	0.989	1.003	1.000	1.001	1.006	0.734	0.048	0.666	0.279	0.126	0.919	0.461	0.315	0.324	0.236
NDC	0.980	1.019	0.983	0.997	1.008	0.988	1.015	1.004	0.998	1.005	0.938	0.248	0.855	0.438	0.299	0.490	0.324	0.330	0.343	0.300
GFCF	0.997	1.008	1.011	1.013	1.016	0.993	1.000	1.025	1.029	1.029	0.656	0.321	0.319	0.164	0.105	0.890	0.520	0.059	0.037	0.042
CWK	0.987	0.987	0.987	0.991	0.990	0.991	0.988	0.987	0.995	0.991	0.990	0.961	0.966	0.737	0.777	0.738	0.927	0.984	0.424	0.629
MEQ	1.005	1.024	1.040	1.042	1.047	0.991	1.020	1.084	1.080	1.083	0.411	0.208	0.146	0.075	0.034	0.996	0.227	0.006	0.021	0.011
Factor: *Commerce + Industry + Construction + Personal Services*																				
PC	0.994	1.002	1.006	1.004	1.006	0.995	1.021	0.996	1.007	1.015	0.813	0.547	0.267	0.370	0.314	0.798	0.155	0.759	0.299	0.161
DC	0.988	1.002	0.999	1.001	1.006	0.991	1.025	0.992	1.009	1.020	0.933	0.492	0.376	0.357	0.254	0.665	0.056	0.633	0.255	0.126
NDC	0.986	1.006	1.002	0.998	1.002	0.979	1.035	0.982	0.997	1.013	0.538	0.407	0.343	0.369	0.393	0.950	0.151	0.892	0.397	0.205
GFCF	0.995	0.999	1.026	1.028	1.027	0.995	1.012	1.007	1.014	1.019	0.660	0.569	0.055	0.036	0.044	0.849	0.282	0.398	0.154	0.095
CWK	0.993	0.989	0.986	0.995	0.991	0.988	0.988	0.987	0.991	0.991	0.577	0.869	0.994	0.433	0.669	0.921	0.893	0.967	0.730	0.732
MEQ	0.993	1.018	1.083	1.079	1.081	1.002	1.028	1.035	1.044	1.050	0.918	0.233	0.008	0.016	0.009	0.562	0.191	0.188	0.078	0.037
Factor: *Commerce + Construction + Personal Services*																				
PC	0.994	1.007	1.005	1.005	1.009	0.995	1.022	0.996	1.005	1.012	0.825	0.363	0.265	0.327	0.258	0.797	0.071	0.810	0.310	0.150
DC	0.988	1.008	0.998	1.005	1.011	0.993	1.027	0.991	1.003	1.014	0.933	0.335	0.414	0.298	0.205	0.578	0.039	0.668	0.316	0.172
NDC	0.985	1.013	0.996	1.001	1.008	0.980	1.035	0.984	0.992	1.005	0.643	0.286	0.457	0.329	0.314	0.923	0.095	0.848	0.523	0.290
GFCF	0.995	1.001	1.024	1.028	1.027	0.996	1.010	1.004	1.009	1.013	0.721	0.506	0.064	0.043	0.044	0.776	0.318	0.567	0.217	0.144
CWK	0.991	0.988	0.987	0.995	0.991	0.988	0.991	0.986	0.990	0.992	0.738	0.910	0.990	0.449	0.640	0.904	0.744	0.998	0.798	0.763
MEQ	0.993	1.024	1.083	1.081	1.083	1.006	1.016	1.020	1.027	1.032	0.881	0.209	0.010	0.014	0.008	0.454	0.332	0.353	0.156	0.097

(*) Adjusted R-squared ratio=Adjusted R-squared with the factor/Adjusted R-squared without the factor. Orange-shaded cells=Adjusted R-squared ratio greater than 1. Green-shaded cells=Adjusted R-squared ratio greater than 1.05 (5% of adjustment gain). Sample: 2001.I-2014.IV (56 observations). (**) *p*-value of the null hypothesis: NH: ϕ_1=...=ϕ_4=0 (see equation 1) against the alternative of at least one term is equal to zero. Green-shaded cells=p<10%. Orange-shaded cells=p<15%. Sample: 2001.I-2019.III (75 observations). Source: Authors' calculations.

Table 2.A5. Multi-horizon RMSFE ratio between native AR(1) and factor-augmented AR(1) model, 2-term factor (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	0.997	1.001	0.912	0.967	0.983	0.994	1.014	0.913	0.945	0.981	0.992	1.025	0.949	0.937	0.983	0.992	1.017	0.953	0.934	0.977
2	0.994	1.050**	0.942	1.029	1.035**	0.993	1.051***	0.935	1.025	1.033**	0.978*	1.046*	0.938	1.045	1.039**	0.981*	1.045**	0.944	1.038	1.035**
3	0.986	1.064***	0.975	1.019	1.031*	0.986	1.057***	0.969	1.017	1.028*	0.974*	1.041**	0.954	1.042	1.034*	0.976*	1.045**	0.958	1.036	1.033
4	0.986	1.036***	0.950	0.985	0.999	0.984	1.033***	0.945	0.982	0.999	0.974	1.023**	0.941	0.992	1.002	0.977	1.025**	0.945	0.988	1.001
h	Durable Consumption																			
1	1.001	0.971	0.954	0.963	0.972	0.996	0.975	0.951	0.943	0.963	0.991	0.995	0.960	0.964	0.979	0.989	0.992	0.953	0.955	0.975
2	1.002	0.985	1.009	1.022	1.008	1.001	0.990	1.001	1.026	1.008	0.999	0.997	0.993	1.050*	1.013	0.999	0.996	0.993	1.043*	1.012
3	1.002	1.000	0.993	1.011	1.003	1.000	0.999	0.987	1.006	0.999	1.000	0.999	0.980	1.013	1.001	1.001	1.000	0.980	1.011	1.001
4	1.005	0.998	0.985	0.996	0.992	1.003	0.998	0.981	0.993	0.991	1.003	0.998	0.972	0.989	0.992	1.003	0.999	0.973	0.991	0.993
h	Non-durable Consumption																			
1	0.985	1.030	0.961	0.967	0.998	0.982	1.029	0.959	0.944	0.991	0.970	1.030	0.959	0.937	0.985	0.970	1.023	0.967	0.935	0.979
2	0.970	1.053*	0.957	0.960	0.998	0.969	1.052	0.946	0.950	0.997	0.934**	1.062	0.919**	0.970	1.012	0.936**	1.059	0.927**	0.963	1.007
3	0.975	1.046**	0.977	0.946	0.994	0.974	1.040**	0.971	0.944	0.994	0.943*	1.039*	0.942	0.963	1.002	0.948*	1.041*	0.949	0.958	1.002
4	0.982	1.027***	0.963	0.923	0.977	0.980	1.023***	0.956*	0.922	0.978	0.959	1.023***	0.936*	0.926	0.981	0.963	1.024***	0.942*	0.923	0.979
h	Gross Fixed Capital Formation																			
1	1.005	1.006	1.026	1.005	0.985	1.008	1.013	1.024	1.005	0.992	1.001	1.015	1.013	0.990	0.988	1.004	1.008	1.012	0.993	0.985
2	1.000	0.997	1.015	0.976	0.972*	0.999	1.006	1.018	0.981	0.982	1.001	0.999	1.000	0.947	0.963*	1.001	0.989	0.995	0.949	0.955**
3	1.006	1.003	0.990	0.978	0.989	1.004	1.008	0.993	0.975	0.994	1.005	1.010**	0.981	0.942	0.979	1.005	1.005	0.980	0.943	0.972
4	1.002	1.005	0.992	0.976	0.990	1.000	1.008	0.992	0.975	0.995	0.999	1.007*	0.987*	0.943**	0.982*	0.999	1.004	0.985*	0.944**	0.977*
h	Construction and Works																			
1	1.014*	1.020	1.042**	1.019	1.011	1.011	1.019	1.041**	1.020	1.011	1.007	1.015***	1.024	1.013	1.006	1.007	1.014**	1.025	1.013	1.005
2	1.007	1.016	1.015**	0.994	1.001	1.005	1.016	1.017**	1.001	1.004	1.003	1.009*	1.013	0.994	1.001	1.003	1.009*	1.012	0.993	0.998
3	1.006	1.013	0.998	0.981	1.002	1.006	1.015	1.000	0.987	1.005	1.001	1.009**	1.006	0.983	1.001	1.002	1.009**	1.005	0.980	0.998
4	1.005**	1.010	0.997	0.972	1.001	1.004*	1.012*	0.999	0.978	1.004	0.999	1.008*	1.010*	0.973	0.998	1.000	1.008**	1.008*	0.969	0.996
h	Machinery and Equipment																			
1	1.004	1.011	1.011	1.001	0.995	1.006	1.014	1.010	0.998	0.998	0.996	1.016	1.003	0.995	1.001	1.002	1.015	1.002	0.996	1.001
2	0.996	0.997	1.009	0.990	0.982**	0.996	1.000	1.015	0.987	0.990	0.996	0.999	0.993	0.968	0.982*	0.997	0.995	0.989	0.971	0.977*
3	0.995	1.006	0.968	0.991	0.996	0.994	1.005	0.977	0.984	0.999	0.991	1.016*	0.957	0.971	0.997	0.995	1.016	0.958	0.974	0.992
4	0.997	1.004**	0.977	0.999	0.998	0.995*	1.002	0.978	0.996	0.999	0.996	1.013	0.980	0.990	1.007	0.998	1.018	0.981	0.993	1.007

(*) Relative RMSFE_h^1 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells=Figures below 1 and statistically significant.
Clark and West (2007) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Table 4.A5: Multi-horizon RMSFE ratio between 2-term factor-augmented AR(1) models according to its relationship with the business cycle (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	1.001	1.021	0.957	1.172	1.118*	0.997	1.053	0.953	1.110	1.111*	1.042	1.052	1.039	1.061	1.089	1.018	0.999	1.060	1.021	1.025
2	1.005	1.019	0.977	0.993	1.008	1.007	1.026	0.966	0.980	1.003	0.982	1.012	0.958	1.022	1.015	0.976	1.000	0.958	1.007	1.002
3	1.005	1.025	0.998	0.989	1.002	1.005	1.016	0.989	0.982	0.996	0.983	0.991	0.953	1.028	1.003	0.985	0.998	0.953	1.019	1.003
4	0.995	1.013	0.983	1.014	1.004	0.991	1.013	0.973	1.012	1.007	0.982	0.994	0.967	1.029	1.006	0.983	0.993	0.971	1.013	0.997
h	Durable Consumption																			
1	1.010	0.978	0.987	0.984	0.985	1.001	0.982	0.982	0.947	0.968	0.981	1.014	0.994	0.971	0.991	0.973	0.999	0.981	0.928*	0.965
2	1.008	1.001	1.029	0.945	0.983	1.004	1.008	1.017	0.944	0.982	0.996	1.021	0.994	0.989	0.990	0.991	1.012	0.993	0.968	0.981
3	1.005	1.020	1.027	0.992	1.009	1.002	1.019	1.018	0.979	1.001	1.001	1.014	0.997	0.993	1.000	1.001	1.012	0.989	0.985	0.999
4	1.003	1.019	1.021	1.026	1.022	1.000	1.019	1.015	1.019	1.020	1.000	1.016	0.991	1.011	1.017	1.000	1.019	0.988	1.011	1.021
h	Non-durable Consumption																			
1	0.984	1.068***	0.959	1.068	1.066	0.980	1.073***	0.958	1.014	1.047	1.008	1.039	0.968	0.970	0.998	0.988	1.008	0.998	0.950	0.962
2	0.992	1.045***	0.971	0.984	0.989	0.995	1.044***	0.955	0.964	0.986	0.941	1.058**	0.905***	1.001	1.009	0.940	1.052**	0.907**	0.982	0.997
3	0.993	1.036**	0.995	0.975	0.986	0.993	1.028*	0.985	0.969	0.985	0.951	1.023	0.937**	1.004	0.994	0.954	1.025	0.945*	0.991	0.989
4	0.994	1.036*	0.991	0.992	0.993	0.993	1.030*	0.980	0.989	0.995	0.973	1.030	0.951*	0.992	0.994	0.974	1.026	0.955	0.974	0.982
h	Gross Fixed Capital Formation																			
1	1.012	0.994	0.988	1.016	0.989	1.015	1.006	0.987	1.017	1.002	1.011	0.987	0.970	0.992	0.989	1.012	0.955	0.952*	0.992	0.968
2	1.003	0.979	0.985	1.025	0.988	1.001	0.992	0.990	1.039**	1.008	0.993	0.966	0.965	0.970	0.969	0.994	0.939	0.945	0.958	0.931*
3	0.997	1.000	1.028	1.051**	1.013	0.996	1.009	1.032	1.050*	1.023*	1.005	1.006	1.008	0.963	0.984	1.008	0.983	0.999	0.942	0.947
4	1.002	0.990	1.003	1.034*	0.998	1.001	0.995	1.005	1.036	1.008	0.998	0.987*	0.992	0.958**	0.978*	1.001	0.974	0.982*	0.941**	0.951*
h	Construction and Works																			
1	1.002	1.008	1.014	1.013	1.001	0.998	1.008	1.011	1.019	1.004	0.990	0.987	0.979	1.006	0.989	0.990	0.974	0.981	1.009	0.981
2	0.996	1.006	0.997	0.997	0.991	0.994	1.008	0.997	1.012	0.996	0.995	0.985	0.993	1.001	0.987	0.996	0.978	0.993	0.997	0.973
3	0.997	0.999	0.988	0.984	0.985	0.996	1.003	0.989	0.999	0.990	0.996	0.989	1.006	0.993	0.981	0.999	0.985	1.008	0.982	0.967
4	1.000	0.988	0.978	0.978*	0.978	0.999	0.993	0.978	.992	0.984*	0.993	0.986	1.007	0.986	0.973	0.995	0.982	1.008	0.970*	0.959
h	Machinery and Equipment																			
1	1.008	1.001	0.994	1.001	0.988	1.011	1.008	0.996	0.994	0.992	1.012	0.992	0.980	0.993	0.994	1.012	0.971	0.967	0.989	0.982
2	1.006	0.979	0.984	1.014	0.985	1.006	0.983	0.996	1.015	0.999	0.994	0.970	0.964	0.978	0.982	0.995	0.960	0.944*	0.974	0.960
3	1.004	0.998	1.043	1.037*	1.006	1.004	0.999	1.060	1.019	1.011	1.003	1.003	1.018	0.985	0.998	1.011	0.984	1.013	0.972	0.968
4	1.007	0.989	0.994	1.023	0.995	1.005	0.985	0.995	1.015	0.996	0.998	0.983	0.999	1.007	1.004	1.005	0.978	0.994	1.005	0.994

(*) Relative RMSFE_h^2 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells= Figures below 1 and statistically significant.
Harvey, Leybourne, and Newbold (1997) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

6 Robustness results VI: AR(1) native model, 3-term factor in differences

Table 1.A6. Adjusted R-squared ratio between AR(1) factor-augmented (3-term) and native AR(1) model (*) and *F*-test results (*p*-value) of the consumer-based factor statistical significance (**)

	Factor: More sensitive sectors					Factor: Less sensitive sectors					Factor: More sensitive sectors					Factor: Less sensitive sectors				
	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
Factor: *Commerce + Industry*																				
PC	0.985	1.010	0.989	0.999	1.007	0.985	0.996	1.012	0.995	0.999	0.943	0.345	0.737	0.400	0.233	0.938	0.643	0.098	0.531	0.442
DC	0.981	1.024	0.982	1.010	1.024	0.981	0.997	0.997	0.993	0.999	0.893	0.139	0.805	0.138	0.051	0.948	0.551	0.394	0.412	0.301
NDC	0.968	1.009	0.962	0.984	0.998	0.967	0.994	0.998	0.980	0.989	0.927	0.415	0.975	0.547	0.351	0.802	0.609	0.379	0.563	0.490
GFCF	0.990	1.008	1.010	1.007	1.011	0.989	0.993	1.020	1.020	1.018	0.916	0.428	0.293	0.316	0.191	0.893	0.779	0.108	0.133	0.148
CWK	0.978	0.995	0.979	0.992	0.995	0.983	0.986	0.978	0.991	0.990	0.984	0.559	0.980	0.635	0.564	0.870	0.857	0.992	0.496	0.561
MEQ	0.997	1.021	1.049	1.036	1.041	0.985	1.009	1.080	1.064	1.066	0.735	0.335	0.102	0.185	0.080	0.972	0.458	0.028	0.085	0.058
Factor: *Commerce + Industry + Transportation*																				
PC	0.984	1.007	0.996	0.998	1.005	0.985	0.998	1.008	0.996	0.999	0.931	0.237	0.442	0.457	0.277	0.936	0.690	0.180	0.501	0.403
DC	0.981	1.024	0.986	1.004	1.018	0.982	0.997	0.995	0.995	1.001	0.881	0.090	0.622	0.228	0.096	0.954	0.610	0.419	0.341	0.250
NDC	0.966	1.004	0.966	0.982	0.994	0.971	0.998	0.997	0.983	0.992	0.943	0.473	0.908	0.649	0.482	0.724	0.532	0.393	0.446	0.376
GFCF	0.991	1.002	1.013	1.006	1.009	0.987	0.995	1.021	1.022	1.021	0.837	0.547	0.236	0.344	0.247	0.980	0.706	0.110	0.110	0.113
CWK	0.977	0.992	0.978	0.989	0.991	0.982	0.986	0.978	0.994	0.993	0.998	0.656	0.993	0.733	0.650	0.893	0.847	0.975	0.377	0.446
MEQ	0.997	1.016	1.052	1.032	1.037	0.983	1.011	1.084	1.070	1.073	0.635	0.400	0.088	0.206	0.113	0.998	0.443	0.019	0.077	0.045
Factor: *Commerce + Industry + Construction + Personal Services*																				
PC	0.985	0.996	1.011	0.995	0.997	0.988	1.013	0.992	0.998	1.007	0.876	0.587	0.076	0.510	0.449	0.831	0.300	0.699	0.441	0.260
DC	0.979	0.999	0.995	0.995	1.002	0.984	1.018	0.986	1.005	1.016	0.987	0.539	0.395	0.373	0.238	0.788	0.122	0.691	0.201	0.118
NDC	0.968	0.989	0.994	0.983	0.988	0.976	1.026	0.967	0.981	0.999	0.729	0.597	0.377	0.496	0.537	0.813	0.273	0.941	0.600	0.314
GFCF	0.990	0.993	1.023	1.021	1.019	0.990	1.006	1.010	1.007	1.012	0.837	0.784	0.101	0.109	0.124	0.945	0.482	0.254	0.311	0.219
CWK	0.984	0.989	0.978	0.991	0.991	0.978	0.988	0.979	0.992	0.994	0.782	0.786	0.988	0.439	0.516	0.985	0.715	0.978	0.650	0.606
MEQ	0.986	1.009	1.083	1.069	1.072	0.995	1.018	1.051	1.034	1.041	0.963	0.443	0.025	0.059	0.038	0.793	0.392	0.084	0.218	0.118
Factor: *Commerce + Construction + Personal Services*																				
PC	0.985	1.000	1.011	0.997	1.001	0.989	1.014	0.990	0.995	1.004	0.925	0.399	0.061	0.447	0.340	0.830	0.199	0.807	0.518	0.304
DC	0.979	1.006	0.994	1.000	1.009	0.987	1.020	0.985	0.996	1.007	0.986	0.429	0.442	0.269	0.158	0.698	0.095	0.690	0.357	0.253
NDC	0.966	0.997	0.988	0.986	0.996	0.982	1.028	0.969	0.975	0.990	0.837	0.459	0.447	0.457	0.436	0.742	0.246	0.934	0.735	0.464
GFCF	0.989	0.995	1.023	1.021	1.020	0.991	1.005	1.004	1.003	1.007	0.886	0.749	0.079	0.122	0.121	0.915	0.449	0.442	0.412	0.293
CWK	0.982	0.990	0.978	0.993	0.993	0.979	0.988	0.978	0.988	0.989	0.894	0.757	0.985	0.433	0.474	0.980	0.702	0.984	0.768	0.747
MEQ	0.986	1.015	1.088	1.071	1.073	0.999	1.008	1.032	1.018	1.023	0.960	0.397	0.016	0.053	0.031	0.703	0.527	0.196	0.364	0.237

(*) Adjusted R-squared ratio=Adjusted R-squared with the factor/Adjusted R-squared without the factor. Orange-shaded cells=Adjusted R-squared ratio greater than 1. Green-shaded cells=Adjusted R-squared ratio greater than 1.05 (5% of adjustment gain). Sample: 2001.I-2014.IV (56 observations). (**) *p*-value of the null hypothesis: NH: ϕ_1=...=ϕ_4=0 (see equation 1) against the alternative of at least one term is equal to zero. Green-shaded cells=p<10%. Orange-shaded cells=p<15%. Sample: 2001.I-2019.III (75 observations). Source: Authors' calculations.

Table 2.A6. Multi-horizon RMSFE ratio between native AR(1) and factor-augmented AR(1) model, 3-term factor (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	0.993	1.015	0.957	0.978	0.992	0.994	1.029*	0.966	0.954	0.986	0.993	1.030	0.982	0.954	0.992	0.990	1.019	0.981	0.952	0.983
2	0.965	1.108**	0.961	1.030	1.057*	0.969	1.104**	0.955	1.026	1.054*	0.960*	1.090**	0.942	1.073**	1.069*	0.958	1.093**	0.938	1.062*	1.065*
3	0.969	1.157***	0.976	1.032	1.070**	0.968	1.143***	0.967	1.037	1.067**	0.950*	1.125***	0.939	1.081**	1.079**	0.952*	1.134***	0.937	1.070*	1.077**
4	0.977	1.097***	0.942	0.987	1.014	0.974	1.092***	0.937	0.987	1.015	0.960	1.087***	0.913	1.014	1.022	0.961	1.090***	0.914	1.006	1.019
h	Durable Consumption																			
1	1.005	0.972	0.971	0.942	0.954	1.002	0.978	0.967	0.928	0.950	0.996	0.994	0.959	0.957	0.973	0.993	0.990	0.950	0.949	0.968
2	1.001	0.985	1.006	1.007	0.998	1.001	0.984	0.995	1.010	0.994	1.003	0.986	0.978	1.044	1.000	1.000	0.986	0.973	1.038	0.998
3	1.008	0.992	0.980	1.011	0.992	1.005	0.986	0.971	1.008	0.986	1.006	0.981	0.951	1.020	0.984	1.004	0.983	0.949	1.016	0.985
4	1.009	0.985	0.964	0.976	0.966	1.007	0.984	0.958	0.971	0.963	1.009	0.981	0.924	0.967	0.957	1.008	0.981	0.927	0.971	0.960
h	Non-durable Consumption																			
1	0.980	1.042	0.987	0.973	1.002	0.980	1.040	0.991	0.950	0.993	0.963**	1.036	0.985	0.951	0.988	0.964**	1.030	0.989	0.949	0.984
2	0.951**	1.092*	0.995	0.944	1.006	0.950***	1.091*	0.982	0.935	1.001	0.913***	1.101*	0.942	0.977	1.018	0.916***	1.101*	0.941	0.966	1.015
3	0.961**	1.098**	1.026	0.932	1.005	0.958**	1.095**	1.014	0.929	1.000	0.917**	1.105***	0.961	0.968	1.010	0.925**	1.106***	0.959	0.959	1.008
4	0.977	1.066***	1.001	0.901	0.979	0.975	1.065***	0.990	0.898	0.977	0.944*	1.081***	0.949	0.921	0.980	0.950*	1.079***	0.947	0.913	0.979
h	Gross Fixed Capital Formation																			
1	1.019	0.991	1.051	1.016	0.987	1.022*	1.010	1.045	1.018	0.999	1.026	1.006	1.008	1.000	0.988	1.028*	0.997	1.008	1.006	0.987
2	1.008	1.003	1.041	0.989	1.002	1.009	1.019	1.045	0.999	1.014	1.022	1.013	1.011	0.984	1.004	1.020	1.004	1.010	0.985	0.997
3	1.011**	1.034	1.014	0.992	1.044**	1.010	1.040	1.017	0.994	1.046**	1.021	1.050	1.021	1.010	1.058***	1.020	1.050	1.024	1.003	1.053***
4	1.006**	1.025	1.016	0.986	1.028***	1.004*	1.029	1.016	0.990	1.031***	1.006**	1.035	1.024*	0.999	1.040**	1.006*	1.034	1.024	0.993	1.035**
h	Construction and Works																			
1	1.018	1.033	1.044	1.022	1.019	1.016	1.031	1.049	1.026	1.020	1.013	1.020**	1.034	1.022	1.014	1.013	1.020**	1.033	1.022	1.012
2	1.009	1.027	1.009	0.985	1.007	1.009	1.027	1.015	0.992	1.010	1.007	1.017	1.020	0.986	1.005	1.007	1.018	1.018	0.984	1.001
3	1.007	1.026	0.992	0.945	1.005	1.007	1.027	0.994	0.952	1.006	1.000	1.018	1.016	0.951	0.999	1.001	1.019	1.012	0.944	0.995
4	1.003	1.021	1.002	0.932	1.004	1.003	1.022	1.001	0.941	1.007	0.995	1.018	1.026*	0.942	0.999	0.996	1.018	1.021*	0.932	0.994
h	Machinery and Equipment																			
1	1.017**	0.992	1.045*	1.018	0.993	1.019***	1.006	1.038	1.017	1.001	1.019	0.998	1.003	1.012	0.996	1.022*	0.995	1.004	1.016	0.998
2	1.006	0.983	1.032*	1.004	1.004	1.006	0.997	1.035*	1.009	1.016	1.017	0.998	0.996	1.006	1.011	1.015	0.990	0.995	1.009	1.008
3	1.005	1.041	1.023	1.035	1.072*	1.005	1.044	1.032	1.036*	1.076*	1.018*	1.062	1.017	1.079**	1.104**	1.019*	1.067	1.024*	1.075**	1.102**
4	1.002	1.012	0.994	1.013	1.021	1.001	1.009	0.998	1.014	1.022	1.011	1.009	1.007	1.036*	1.039	1.012	1.016	1.010	1.035*	1.039

(*) Relative RMSFE_h^1 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells=Figures below 1 and statistically significant.
Clark and West (2007) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Table 4.A6: Multi-horizon RMSFE ratio between 3-term factor-augmented AR(2) models according to its relationship with the business cycle (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	0.994	1.031	0.989	1.168	1.116*	0.994	1.069**	0.994	1.113	1.107*	1.040	1.055	1.058	1.061	1.086	1.013	1.000	1.068	1.024	1.024
2	0.973	1.059	0.976	0.981	1.017	0.983	1.064**	0.970	0.973	1.013	0.963	1.033	0.937	1.039	1.030	0.953	1.018	0.926	1.020	1.017
3	0.982	1.086**	0.970	0.997	1.026	0.983	1.072*	0.963	1.002	1.022	0.952	1.035	0.914	1.064	1.030	0.957	1.041	0.900	1.050	1.027
4	0.983	1.054*	0.955	0.997	1.009	0.980	1.052	0.951	0.997	1.011	0.966	1.038	0.921	1.035	1.019	0.965	1.033	0.912	1.016	1.008
h	Durable Consumption																			
1	1.013	0.984	1.007	0.973	0.979	1.007	0.994	1.002	0.941	0.969	0.988	1.017	0.982	0.984	1.012	0.975	1.003	0.961	0.961	0.989
2	1.012	1.016	1.049	0.940	0.990	1.011	1.017	1.031	0.935	0.984	1.009	1.016	0.985	1.003	0.994	1.001	1.010	0.969	0.993	0.985
3	1.011	1.035*	1.048	0.984	1.011	1.007	1.028	1.032	0.973	1.000	1.011	1.007	0.982	0.995	0.993	1.007	1.009	0.967	0.983	0.993
4	1.008	1.031*	1.057	1.021	1.029	1.005	1.031*	1.049	1.010	1.024	1.014	1.019	0.970	1.008	1.013	1.010	1.021	0.964	1.012	1.017
h	Non-durable Consumption																			
1	0.973	1.068***	0.975	1.056	1.059	0.972	1.072***	0.980	1.002	1.037	0.993	1.031	0.998	0.963	0.988	0.973	1.005	1.029	0.944	0.957
2	0.965**	1.067***	0.962***	0.948	0.986	0.967**	1.068***	0.948***	0.929*	0.978	0.916*	1.079**	0.897**	0.994	1.005	0.913*	1.074**	0.887*	0.972	0.995
3	0.972*	1.068**	0.968	0.930	0.987	0.970*	1.065**	0.957	0.920	0.979	0.921	1.072***	0.892*	0.984	0.989	0.926	1.066***	0.878*	0.968	0.982
4	0.983	1.060***	0.968	0.936	0.989	0.981	1.060***	0.956	0.927	0.986	0.954	1.083***	0.914	0.965	0.988	0.958	1.071***	0.900	0.943	0.977
h	Gross Fixed Capital Formation																			
1	1.002	0.985	1.013	1.009	0.987	1.002	1.019	1.009	1.012	1.009	1.023	0.982	0.938*	0.984	0.981	1.018	0.938	0.925***	0.988	0.958
2	0.995	0.983	1.006	0.999	0.993	0.994	1.009	1.016	1.017	1.015	1.014	0.990	0.957*	0.994	0.993	1.011	0.959	0.948*	0.986	0.963
3	0.999	0.996	0.989	1.006	1.006	0.998	1.003	0.990	1.007	1.009	1.020	1.017	0.996	1.040*	1.029*	1.023	1.019	1.001	1.018	1.016
4	1.004	0.984	0.983	0.999	0.991	1.002	0.989	0.982	1.003	0.996	1.004	0.996	0.995	1.023	1.011	1.007	0.996	0.994	1.005	1.000
h	Construction and Works																			
1	1.002	1.016	1.010	1.004	1.000	1.000	1.016	1.016	1.013	1.002	0.996	0.986	0.988	1.006	0.987	0.996	0.972	0.990	1.010	0.974
2	1.000	1.012	0.981	1.003	0.997	1.000	1.015	0.986	1.018	1.001	1.000	0.990	0.998	1.011	0.989	1.004	0.987	1.000	1.004	0.973
3	1.001	1.007	0.967	0.996	0.996	1.000	1.010	0.964	1.011	1.001	0.996	0.989	1.007	1.017*	0.984	1.000	0.987	1.004	0.996	0.966
4	1.001	0.992	0.961**	0.984	0.988	1.001	0.996	0.954**	1.002	0.995	0.989	0.986	1.007	1.015**	0.978	0.990	0.983	1.002	0.985	0.958
h	Machinery and Equipment																			
1	1.000	0.980	1.015	0.992	0.981	1.000	1.009	1.008	0.989	0.997	1.018	0.964	0.936**	0.987	0.979	1.012	0.934	0.925***	0.990	0.966
2	0.988	0.975	1.020	0.980	0.984	0.986	0.997	1.029	0.988	1.003	1.009	0.990	0.958	0.986	0.990	1.003	0.961	0.949*	0.987	0.972
3	1.003	0.949	0.993	0.964	0.964	1.003	0.951	1.008	0.962	0.968	1.021	0.972	0.982	1.043*	1.015	1.027	0.979	0.996	1.036	1.014
4	1.008	0.982	0.978	0.990	0.982	1.005	0.978	0.982	0.989	0.982	1.015	0.960	1.003	1.042	1.011	1.020	0.960	1.002	1.041	1.011

(*) Relative RMSFE_h^2 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells= Figures below 1 and statistically significant.
Harvey, Leybourne, and Newbold (1997) test's p-value: (***) p<1%, (**) p<5%, and (*) p<10%. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

7 Robustness results VII: AR(1) native model, 1-term factor in levels

Table 1.A7. Adjusted R-squared ratio between AR(1) factor-augmented (1-term, in levels) and native AR(1) model (*) and *F*-test results (*p*-value) of the consumer-based factor statistical significance (**)

	Factor: More sensitive sectors					Factor: Less sensitive sectors					Factor: More sensitive sectors					Factor: Less sensitive sectors				
	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
Factor: *Commerce + Industry*																				
PC	0.998	1.005	1.013	0.996	0.996	0.996	0.998	1.008	0.998	0.996	0.520	0.248	0.074	0.807	0.826	0.814	0.498	0.135	0.492	0.727
DC	0.995	1.014	1.003	0.995	0.997	0.995	1.001	1.000	0.997	0.995	0.846	0.132	0.388	0.989	0.617	0.873	0.439	0.314	0.540	0.847
NDC	0.998	1.007	1.008	0.992	0.993	0.994	0.999	0.997	0.993	0.992	0.514	0.308	0.150	0.942	0.777	0.735	0.450	0.515	0.743	0.944
GFCF	0.996	1.007	0.994	1.000	1.004	0.999	0.996	0.994	1.002	1.002	0.545	0.186	0.912	0.319	0.205	0.273	0.545	0.841	0.193	0.211
CWK	0.994	1.000	0.995	1.006	1.007	0.996	0.994	0.996	1.001	0.999	0.911	0.443	0.742	0.282	0.263	0.487	0.936	0.607	0.355	0.462
MEQ	0.995	1.003	0.990	0.991	0.995	0.995	0.995	0.990	0.995	0.997	0.400	0.262	0.958	0.683	0.491	0.468	0.466	0.849	0.435	0.383
Factor: *Commerce + Industry + Transportation*																				
PC	0.998	1.002	1.012	0.996	0.996	0.996	1.000	1.007	0.997	0.996	0.492	0.294	0.075	0.742	0.963	0.866	0.432	0.144	0.492	0.777
DC	0.995	1.012	1.003	0.995	0.996	0.995	1.001	0.999	0.997	0.995	0.792	0.126	0.361	0.864	0.747	0.893	0.436	0.344	0.569	0.892
NDC	0.999	1.003	1.007	0.992	0.993	0.993	1.001	0.997	0.993	0.992	0.449	0.363	0.184	0.891	0.879	0.839	0.403	0.536	0.756	0.993
GFCF	0.998	1.002	0.994	1.000	1.002	0.997	0.998	0.994	1.003	1.004	0.293	0.291	0.916	0.341	0.259	0.443	0.444	0.808	0.159	0.160
CWK	0.994	0.997	0.995	1.004	1.004	0.995	0.994	0.995	1.001	0.999	0.838	0.531	0.690	0.320	0.317	0.589	0.999	0.640	0.323	0.419
MEQ	1.000	0.998	0.990	0.992	0.994	0.992	0.998	0.990	0.996	0.999	0.249	0.414	0.912	0.677	0.548	0.648	0.370	0.784	0.400	0.321
Factor: *Commerce + Industry + Construction + Personal Services*																				
PC	0.996	0.998	1.009	0.998	0.996	0.997	1.004	1.009	0.996	0.996	0.783	0.509	0.118	0.471	0.696	0.577	0.286	0.112	0.790	0.856
DC	0.995	1.002	1.000	0.997	0.995	0.996	1.008	1.002	0.995	0.996	0.957	0.412	0.322	0.580	0.915	0.759	0.190	0.367	0.872	0.756
NDC	0.994	0.997	1.000	0.993	0.992	0.997	1.008	1.001	0.992	0.993	0.716	0.481	0.430	0.748	0.925	0.576	0.294	0.311	0.910	0.790
GFCF	0.998	0.997	0.994	1.002	1.003	0.996	1.003	0.994	1.000	1.003	0.336	0.469	0.963	0.186	0.188	0.467	0.292	0.843	0.301	0.229
CWK	0.996	0.994	0.995	1.001	0.999	0.994	0.997	0.996	1.005	1.005	0.539	0.960	0.709	0.339	0.441	0.953	0.516	0.625	0.305	0.304
MEQ	0.993	0.998	0.990	0.995	0.998	0.995	0.998	0.990	0.992	0.995	0.530	0.376	0.983	0.455	0.365	0.397	0.410	0.817	0.607	0.491
Factor: *Commerce + Construction + Personal Services*																				
PC	0.996	1.000	1.009	0.996	0.996	0.997	1.000	1.011	0.997	0.996	0.710	0.359	0.122	0.656	0.921	0.691	0.428	0.085	0.501	0.826
DC	0.995	1.005	0.999	0.996	0.995	0.995	1.003	1.005	0.997	0.995	0.833	0.331	0.355	0.792	0.880	0.918	0.290	0.298	0.522	0.929
NDC	0.996	1.001	1.000	0.992	0.993	0.994	1.000	1.003	0.994	0.992	0.611	0.323	0.429	0.898	0.888	0.742	0.431	0.222	0.627	0.901
GFCF	0.998	0.999	0.994	1.003	1.005	0.996	0.999	0.995	0.998	1.000	0.350	0.408	0.869	0.174	0.159	0.461	0.384	0.655	0.414	0.343
CWK	0.995	0.994	0.995	1.002	1.000	0.994	0.998	0.995	1.003	1.004	0.637	0.952	0.648	0.310	0.394	0.938	0.444	0.735	0.331	0.309
MEQ	0.994	1.000	0.990	0.996	0.999	0.996	0.992	0.994	0.990	0.991	0.488	0.346	0.815	0.422	0.325	0.407	0.621	0.486	0.791	0.702

(*) Adjusted R-squared ratio=Adjusted R-squared with the factor/Adjusted R-squared without the factor. Orange-shaded cells=Adjusted R-squared ratio greater than 1. Green-shaded cells=Adjusted R-squared ratio greater than 1.05 (5% of adjustment gain). Sample: 2001.I-2014.IV (56 observations). (**) *p*-value of the null hypothesis: NH: ϕ_1=...=ϕ_4=0 (see equation 1) against the alternative of at least one term is equal to zero. Green-shaded cells=p<10%. Orange-shaded cells=p<15%. Sample: 2001.I-2019.III (75 observations). Source: Authors' calculations.

Table 2.A7. Multi-horizon RMSFE ratio between native AR(1) and factor-augmented AR(1) model (1-term, in levels) (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	1.010	1.052***	1.010*	1.010	1.041**	1.003	1.050***	1.007**	1.012	1.041**	0.986	1.043*	1.028**	1.026	1.041*	0.989	1.044*	1.026**	1.023	1.041*
2	0.979	1.096**	0.954	1.009	1.053***	0.974	1.096**	0.951*	1.014	1.054***	0.957	1.088**	1.001**	1.038*	1.065**	0.959	1.089**	0.998**	1.031*	1.061**
3	0.974	1.134**	0.990	1.048	1.065**	0.969	1.132**	0.986	1.052	1.066**	0.942	1.114**	1.030	1.086*	1.080*	0.945	1.115**	1.022	1.075*	1.076*
4	0.984	1.133**	0.993	1.071	1.052**	0.976	1.129**	0.991	1.077	1.055*	0.942	1.117**	1.040	1.107*	1.072*	0.947	1.120**	1.036	1.095*	1.068*
h	Durable Consumption																			
1	1.003	0.993	1.006	1.005	1.003	1.002	0.993	1.006	1.005*	1.002*	1.001	0.996	1.019	1.008	1.002	1.001	0.996	1.016	1.006	1.003
2	1.002	0.986	0.989	1.011	0.999	1.001	0.986	0.989	1.012	0.998	1.001	0.993	1.016	1.015	0.999	1.001	0.994	1.011	1.013	1.001
3	1.001	0.985	0.983	1.010	0.996	1.000	0.985	0.981	1.012	0.994	1.000	0.992	1.005	1.015	0.995	1.001	0.993	1.000	1.013	0.999
4	1.004	0.983	0.975	1.009	0.995	1.002	0.983	0.973	1.011	0.991	1.000	0.992	0.992	1.014	0.992	1.001	0.993	0.990	1.011	0.997
h	Non-durable Consumption																			
1	1.002	1.074***	0.995	1.001	1.025**	0.996	1.072***	0.988	1.005	1.027**	0.968	1.070**	1.001	1.026	1.036	0.973	1.070*	1.001	1.020	1.035
2	0.969	1.125**	0.963	0.970	1.021**	0.963	1.125**	0.951	0.974	1.024*	0.923	1.125***	0.962	1.014	1.044*	0.929	1.122**	0.964	1.002	1.039*
3	0.969***	1.141**	0.988	0.979	1.024	0.962***	1.138**	0.977	0.982	1.027	0.914*	1.133***	0.982	1.027	1.048	0.922**	1.132***	0.981	1.014	1.044
4	0.979	1.143***	0.982	0.991	1.024	0.971	1.141***	0.972	0.995	1.029	0.917**	1.140***	0.979	1.037	1.050	0.927**	1.139***	0.981	1.025	1.047
h	Gross Fixed Capital Formation																			
1	0.999	1.003	1.004	1.000	0.994	0.999	1.004	1.003	0.999	0.996	1.001	1.002	1.000	0.995	0.994	1.001	1.002	0.999	0.994	0.992
2	1.002	1.006	1.000	0.993	0.990	1.002	1.008	1.000	0.991	0.996	1.002	1.008	0.997	0.980	0.992**	1.002	1.007	0.997	0.978	0.987**
3	1.000	1.005	0.980	0.980	0.989	1.001	1.008	0.980	0.979	0.997	1.003	1.009	0.978	0.959	0.990*	1.002	1.007	0.979	0.955	0.983*
4	1.000	1.004*	0.990	0.979	0.993	1.001	1.003*	0.989	0.978	0.999	1.003	1.002	0.992	0.961	0.994*	1.001	1.001	0.991	0.956	0.988**
h	Construction and Works																			
1	1.000*	1.009	1.005	0.995	1.003	1.000**	1.009	1.005	0.995	1.004	0.999	1.008*	1.005	0.993	0.999	0.999	1.007*	1.004	0.992	0.997
2	1.003	1.007	1.007	0.981	1.004	1.002	1.008	1.008	0.984	1.005	0.998	1.006	1.012	0.982	1.000	0.999	1.006	1.011	0.979	0.998
3	1.003	1.007	1.007	0.972	1.007	1.002	1.008	1.009	0.979	1.009	0.998	1.005	1.019	0.976	1.004	0.998	1.006	1.017	0.971	1.001
4	1.003	1.010	1.015	0.970	1.010	1.002	1.010	1.016	0.976	1.013	0.996	1.006*	1.029**	0.975	1.007	0.996	1.007	1.026**	0.969	1.004
h	Machinery and Equipment																			
1	1.004	1.005	1.011*	1.011	1.002	1.004	1.000	1.011*	1.010	0.998	1.010	0.994	1.009*	1.016	1.000	1.008*	1.001	1.008	1.017	1.004
2	1.004	1.006	1.016	1.018	0.999	1.004	1.004	1.016	1.016	0.993	1.011	1.004	1.010	1.023	0.998	1.009	1.011	1.011	1.025	1.004
3	1.005	1.035*	0.986	1.037	0.996*	1.006	1.033**	0.986	1.030	0.990*	1.021	1.026	1.000	1.026	0.996*	1.016	1.034	0.999	1.031	1.001
4	1.007	0.986	0.996	1.022**	0.994	1.008	0.978	0.996	1.015**	0.986	1.028	0.993	1.001	1.027*	0.997	1.022	1.007	1.000	1.028*	1.004

(*) Relative RMSFE_h^1 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells=Figures below 1 and statistically significant.
Clark and West (2007) test's p-value: (***) p<1%, (**) p<5%, and (*) p<10%. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Table 4.A7: Multi-horizon RMSFE ratio between factor-augmented (1-term, in levels) AR(1) models according to its relationship with the business cycle (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	1.008	1.051**	0.996	1.003	1.033	1.001	1.048**	0.992	1.005	1.033	0.978**	1.036*	1.018	1.021	1.030*	0.981*	1.033**	1.018	1.018	1.027
2	0.982	1.079***	0.940*	0.992	1.027	0.976*	1.080***	0.935	0.997	1.028	0.950**	1.060**	1.000	1.028	1.039	0.951**	1.057**	0.999	1.019	1.030
3	0.975	1.099***	0.958	1.018	1.026	0.971	1.099***	0.952	1.022	1.028	0.934**	1.067**	1.006	1.065**	1.039	0.937**	1.062**	0.996	1.049*	1.032
4	0.984	1.097***	0.954	1.038	1.013	0.976	1.094***	0.950	1.045	1.017	0.928**	1.067**	1.013	1.080**	1.031	0.934**	1.065**	1.012	1.062**	1.026
h	Durable Consumption																			
1	1.001	1.001	1.002	0.999	1.006**	0.999	1.000	1.002	0.998	1.005*	0.998	1.005	1.024**	1.004	1.004	0.998	1.007	1.023*	1.001	1.005
2	1.000	0.996	0.993	0.998	1.005	0.998	0.996	0.992	0.999	1.004	1.001	1.005	1.041**	1.004	1.005	1.001	1.008	1.040**	1.000	1.010
3	0.998	0.994	1.001	0.996	1.009	0.997	0.993	0.998	0.997	1.006	1.002	1.007	1.041*	1.001	1.007	1.002	1.010	1.038	0.991	1.014*
4	1.000	0.995	1.005	0.992	1.012	0.997	0.993	1.002	0.993	1.007	1.000	1.009	1.039	0.996	1.009	1.001	1.012	1.044	0.982	1.019
h	Non-durable Consumption																			
1	1.000	1.060***	0.985	0.990	1.012	0.994	1.060***	0.978	0.993	1.014	0.962*	1.056***	0.991	1.017	1.022	0.966*	1.054***	0.993	1.010	1.020
2	0.970**	1.094***	0.953**	0.955	0.995	0.965**	1.094***	0.939**	0.958	0.997	0.921**	1.096***	0.947*	1.006	1.020	0.925**	1.088***	0.952*	0.993	1.013
3	0.970**	1.105***	0.968	0.960	0.993	0.963**	1.104***	0.955	0.961	0.996	0.912**	1.101***	0.957	1.015	1.019	0.920**	1.094***	0.957	1.001	1.015
4	0.978	1.109***	0.960	0.971	0.992	0.971*	1.107***	0.949	0.973	0.995	0.912***	1.108***	0.953	1.020	1.018	0.920***	1.102***	0.957	1.007	1.015
h	Gross Fixed Capital Formation																			
1	0.997	1.012	1.005	1.004	0.999	0.997	1.014	1.003	1.001	1.000	1.002	1.009	0.995	0.997	0.997	1.004	1.012	0.991*	0.996	0.994
2	0.997	1.022	0.995	1.000	0.990	0.995	1.023	0.993	0.997	0.995	0.997	1.017	0.991	0.981	0.988	0.999	1.022	0.992	0.977	0.980
3	0.994	1.031	0.978	0.991	0.987	0.994	1.031	0.975	0.990	0.993	1.002	1.021	0.975	0.961	0.984	1.001	1.024	0.976	0.952	0.972
4	0.994	1.036	0.980	0.984	0.995	0.994	1.032	0.977	0.982	0.996	1.001	1.022	0.984	0.964	0.992	0.999	1.028	0.983*	0.955	0.985
h	Construction and Works																			
1	1.000	1.005	0.993	1.001	1.000	1.000	1.006	0.992	1.001	1.001	0.996	1.004	0.994	0.999	0.992	0.998	1.003	0.992	0.996	0.984
2	1.001	1.013	0.988	0.993	0.999	1.000	1.014	0.986	0.999	1.001	0.995	1.010	0.997	0.996	0.991	0.996	1.009	0.995	0.989*	0.983
3	1.001	1.020*	0.979	0.986	0.999	1.000	1.019*	0.978	0.995	1.002	0.995	1.014	0.999	0.993*	0.991	0.995	1.013	0.996	0.981**	0.982
4	1.002	1.021	0.973	0.980	0.998	1.002	1.020	0.971	0.989*	1.002	0.993	1.011	0.996	0.992*	0.990	0.991	1.011	0.990	0.977**	0.982
h	Machinery and Equipment																			
1	0.989	1.029	1.019	1.006	1.043**	0.988	1.024	1.020	1.001	1.031**	1.010	1.016	1.005	1.015	1.031*	1.008	1.033	1.002	1.022*	1.044*
2	0.980	1.008	1.039*	1.016	1.063***	0.978	1.010	1.040*	1.009	1.050***	1.010	1.014	1.021	1.024	1.046***	1.006	1.024	1.023	1.038	1.066***
3	0.971	1.004	0.989	1.043	1.099**	0.968	1.004	0.989	1.027	1.076**	1.014	0.984	1.007	1.030	1.062**	1.009	1.002	1.001	1.053	1.080*
4	0.954	1.017	1.029	1.033	1.094	0.950	1.008	1.028	1.014	1.070	1.027	1.040	1.016	1.039	1.072	1.016	1.075	1.014	1.052	1.094

(*) Relative RMSFE_h^2 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells= Figures below 1 and statistically significant.
Harvey, Leybourne, and Newbold (1997) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

8 Robustness results VIII: AR(1) native model, 2-term factor in levels

Table 1.A8. Adjusted R-squared ratio between AR(1) factor-augmented (2-term, in levels) and native AR(1) model (*) and *F*-test results (*p*-value) of the consumer-based factor statistical significance (**)

	Factor: More sensitive sectors					Factor: Less sensitive sectors					Factor: More sensitive sectors					Factor: Less sensitive sectors				
	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
Factor: *Commerce + Industry*																				
PC	1.006	1.011	1.017	1.008	1.014	0.998	1.005	1.012	1.008	1.012	0.340	0.309	0.094	0.149	0.089	0.598	0.357	0.209	0.160	0.126
DC	1.000	1.023	1.012	1.017	1.027	0.995	1.004	1.006	1.014	1.017	0.370	0.166	0.162	0.066	0.022	0.700	0.293	0.142	0.121	0.083
NDC	0.997	1.009	1.010	0.999	1.008	0.994	1.024	0.993	1.003	1.017	0.443	0.264	0.179	0.364	0.211	0.492	0.162	0.535	0.396	0.225
GFCF	0.993	1.005	1.013	0.998	1.002	0.996	0.994	1.003	1.002	1.002	0.814	0.408	0.183	0.533	0.394	0.591	0.821	0.291	0.290	0.337
CWK	0.988	0.996	0.988	0.998	1.000	0.990	0.987	0.992	0.995	0.992	0.934	0.634	0.935	0.568	0.540	0.745	0.942	0.606	0.541	0.732
MEQ	0.998	1.004	1.042	0.994	0.998	0.995	0.998	1.010	0.999	1.002	0.623	0.528	0.103	0.787	0.643	0.753	0.754	0.272	0.565	0.510
Factor: *Commerce + Industry + Transportation*																				
PC	1.004	1.006	1.016	1.008	1.011	0.999	1.010	1.013	1.008	1.014	0.370	0.402	0.114	0.163	0.122	0.574	0.258	0.181	0.150	0.106
DC	1.001	1.020	1.010	1.016	1.023	0.994	1.005	1.007	1.014	1.018	0.377	0.123	0.188	0.082	0.031	0.700	0.300	0.112	0.121	0.079
NDC	0.996	1.007	1.006	1.001	1.009	0.998	1.029	0.994	1.002	1.017	0.465	0.370	0.245	0.338	0.218	0.389	0.109	0.512	0.418	0.233
GFCF	0.996	0.999	1.015	0.998	1.000	0.994	0.996	1.001	1.003	1.004	0.574	0.593	0.163	0.571	0.485	0.738	0.723	0.334	0.223	0.243
CWK	0.987	0.993	0.988	0.997	0.997	0.989	0.987	0.992	0.996	0.992	0.950	0.724	0.900	0.615	0.603	0.834	0.948	0.575	0.465	0.667
MEQ	1.003	0.998	1.044	0.994	0.997	0.994	1.002	1.006	1.000	1.005	0.433	0.708	0.082	0.792	0.705	0.771	0.641	0.325	0.507	0.417
Factor: *Commerce + Industry + Construction + Personal Services*																				
PC	0.996	1.002	1.012	1.009	1.012	1.007	1.013	1.015	1.007	1.014	0.674	0.466	0.236	0.161	0.148	0.308	0.218	0.107	0.143	0.073
DC	0.992	1.002	1.005	1.015	1.017	1.004	1.021	1.013	1.015	1.025	0.812	0.399	0.195	0.118	0.090	0.248	0.141	0.106	0.080	0.026
NDC	0.992	1.019	0.995	1.003	1.016	0.998	1.014	1.004	1.000	1.011	0.567	0.211	0.513	0.428	0.271	0.418	0.163	0.289	0.323	0.156
GFCF	0.995	0.995	1.002	1.001	1.002	0.994	1.000	1.012	0.999	1.001	0.656	0.765	0.333	0.281	0.301	0.678	0.557	0.161	0.498	0.427
CWK	0.991	0.989	0.991	0.996	0.992	0.990	0.991	0.989	0.997	0.998	0.675	0.837	0.719	0.484	0.712	0.834	0.789	0.812	0.597	0.593
MEQ	0.993	1.002	1.009	0.998	1.002	0.998	0.998	1.035	0.996	0.998	0.831	0.673	0.289	0.607	0.491	0.630	0.723	0.115	0.692	0.639
Factor: *Commerce + Construction + Personal Services*																				
PC	0.998	1.008	1.012	1.009	1.014	1.004	1.003	1.019	1.005	1.008	0.580	0.268	0.218	0.157	0.124	0.416	0.367	0.082	0.191	0.127
DC	0.994	1.009	1.004	1.015	1.020	1.003	1.010	1.018	1.013	1.018	0.711	0.213	0.196	0.134	0.087	0.258	0.218	0.072	0.075	0.027
NDC	0.993	1.025	0.996	1.005	1.019	0.996	1.000	1.004	0.996	1.001	0.555	0.171	0.466	0.379	0.237	0.470	0.270	0.267	0.467	0.276
GFCF	0.995	0.997	1.004	1.002	1.004	0.995	0.997	1.011	0.997	0.998	0.688	0.710	0.256	0.293	0.281	0.680	0.661	0.200	0.592	0.572
CWK	0.989	0.989	0.990	0.996	0.993	0.990	0.992	0.989	0.997	0.997	0.829	0.870	0.760	0.492	0.678	0.828	0.694	0.812	0.614	0.578
MEQ	0.994	1.004	1.016	0.999	1.003	0.999	0.993	1.033	0.996	0.996	0.813	0.650	0.190	0.601	0.480	0.607	0.890	0.132	0.682	0.691

(*) Adjusted R-squared ratio=Adjusted R-squared with the factor/Adjusted R-squared without the factor. Orange-shaded cells=Adjusted R-squared ratio greater than 1. Green-shaded cells=Adjusted R-squared ratio greater than 1.05 (5% of adjustment gain). Sample: 2001.I-2014.IV (56 observations). (**) *p*-value of the null hypothesis: NH: ϕ_1=...=ϕ_4=0 (see equation 1) against the alternative of at least one term is equal to zero. Green-shaded cells=p<10%. Orange-shaded cells=p<15%. Sample: 2001.I-2019.III (75 observations). Source: Authors' calculations.

Table 2.A8. Multi-horizon RMSFE ratio between native AR(1) and factor-augmented AR(1) model (2-term, in levels) (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	0.899	0.873	0.916	0.881	0.850	0.916	0.919	0.923	0.843	0.837	0.997	0.890	1.011	0.862	0.841	0.964	0.861	0.997	0.857	0.829
2	0.932	1.084	1.009	0.961	1.024	0.938	1.082*	1.019	0.966	1.025	0.953	1.025	1.080*	1.061	1.046	0.937	1.027	1.061*	1.045	1.043
3	0.913	1.170**	0.983	1.027	1.060	0.902	1.161**	0.999	1.047	1.066	0.901	1.122	1.102	1.130*	1.096	0.892	1.128	1.084	1.109*	1.091
4	0.909	1.176**	0.930	1.098*	1.046	0.902	1.174**	0.949	1.113**	1.056	0.903	1.134*	1.077*	1.184***	1.089	0.890	1.136*	1.059	1.159**	1.078
h	Durable Consumption																			
1	0.992	0.956	0.912	0.902	0.896***	0.990	0.964	0.916	0.883	0.889***	0.998	0.989	0.949	0.907	0.926**	0.992	0.985	0.937	0.901	0.921**
2	1.006	0.981	0.983	0.971	0.941**	1.010	0.985	0.986	0.972	0.943**	1.023*	0.989	1.037	0.986	0.957*	1.020*	0.988	1.029	0.984	0.957
3	1.008	0.979	0.969	1.036	0.960	1.008	0.977	0.976	1.036	0.957*	1.024*	0.989	1.035	1.034	0.967*	1.023*	0.989	1.030	1.032	0.968
4	1.011	0.974	0.954	1.069	0.955*	1.011	0.976	0.960	1.076	0.956*	1.031	0.986	1.021	1.074	0.967*	1.029	0.984	1.018	1.069	0.966*
h	Non-durable Consumption																			
1	0.908	0.950	0.999	0.964	0.952	0.916	0.951	1.000	0.940	0.929	0.982	0.853*	1.018	0.952	0.895	0.958	0.838*	1.014	0.945	0.889
2	0.915*	1.133***	1.011	0.958	1.018	0.911**	1.124***	1.010	0.970	1.020	0.903**	1.052***	1.028	1.065*	1.043	0.896**	1.063***	1.016	1.037	1.039
3	0.908**	1.209***	0.965	0.964	1.035	0.898***	1.201***	0.968	0.975	1.041	0.874***	1.146***	0.999	1.065	1.073	0.871***	1.151***	0.992	1.035	1.065
4	0.894***	1.222***	0.920	0.989	1.040	0.887***	1.216***	0.923	0.996	1.045	0.857***	1.173***	0.970	1.084*	1.083	0.855***	1.178***	0.962	1.054	1.074
h	Gross Fixed Capital Formation																			
1	1.041	0.992	1.013	1.027	0.997	1.037*	0.998	1.006	1.030	1.003	1.038	1.013	1.002	1.004	1.001	1.036	1.013	1.009	1.010	1.004
2	1.013	0.971	0.981	0.994	0.989	1.016	0.982	0.984	1.001	1.001	1.039	0.989	0.979	0.970	0.987	1.030	0.982	0.977	0.973	0.983
3	1.010	1.003	1.010	0.987	1.016	1.012	1.002	1.013	0.992	1.020	1.017	1.007	1.012	0.982	1.013	1.015	1.005	1.010	0.980	1.011
4	1.009	0.989	1.010	0.978	1.004	1.011	0.989	1.011	0.984	1.009	1.021	0.993	1.013	0.970	1.001	1.015	0.993	1.010	0.968	1.000
h	Construction and Works																			
1	1.029	1.032	1.040	1.045*	1.044*	1.028	1.034	1.042	1.052*	1.049**	1.016	1.039*	1.040	1.052*	1.044*	1.014	1.038*	1.042*	1.049*	1.043*
2	1.011	1.007	1.014	1.012	1.032*	1.011	1.008	1.016	1.018	1.034*	1.005	1.012	1.026	1.022	1.030*	1.005	1.012	1.024	1.017	1.028*
3	1.011	1.000	1.019	0.996	1.034*	1.010	1.002	1.018	1.002	1.037*	0.999	1.006	1.041*	1.011	1.033*	1.000	1.007	1.037*	1.004	1.031*
4	1.012	1.008	1.031**	0.985	1.037*	1.010	1.007	1.029**	0.992	1.040*	0.993	1.006	1.056***	1.004	1.035*	0.993	1.009	1.048***	0.995	1.033*
h	Machinery and Equipment																			
1	1.027	0.986	1.019	1.026*	0.983	1.029	0.985	1.012	1.024	0.980	1.050	0.996	1.001	1.002	0.976	1.043	0.999	1.007	1.008*	0.984
2	1.019	0.977	0.975	0.992	0.944**	1.022	0.985	0.975	0.994	0.950**	1.061	0.991	0.968	0.962	0.937**	1.051	0.985	0.969	0.970	0.942**
3	1.028	1.026	0.999	0.989	0.950*	1.034	1.017	0.997	0.985	0.944*	1.079	1.017	1.001	0.944	0.928**	1.067	1.018	1.000	0.954	0.939*
4	1.036	0.944	0.996	1.022	0.959**	1.043	0.941	0.997	1.018	0.955*	1.106	0.972	0.997	0.973	0.947*	1.089	0.976	0.997	0.988	0.959**

(*) Relative RMSFE_h^1 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells=Figures below 1 and statistically significant.
Clark and West (2007) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Table 4.A8: Multi-horizon RMSFE ratio between factor-augmented (2-term, in levels) AR(1) models according to its relationship with the business cycle (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	0.893	1.016	0.903	0.992	1.057	0.912	1.114	0.909	0.924	1.034	1.119	1.037	1.055	0.929	1.007	1.026	0.915	1.046	0.905	0.927
2	0.921	1.235*	0.906	0.904	1.067	0.933	1.251**	0.921	0.909	1.070	0.944	1.108**	0.998	1.045	1.075	0.913	1.063	0.975	1.039	1.058
3	0.920	1.266***	0.884	0.976	1.076	0.908	1.264**	0.900	1.006	1.089	0.881*	1.165*	1.052	1.100	1.096	0.866*	1.121*	1.038	1.080	1.076
4	0.906	1.275***	0.856	1.016	1.055	0.901	1.290***	0.873	1.036	1.072	0.888*	1.174**	1.072	1.110	1.088	0.866*	1.107	1.056	1.074	1.053
h	Durable Consumption																			
1	0.996	0.964	0.961	0.985	0.957**	0.994	0.974	0.965	0.953**	0.945**	1.007	1.016	1.022	0.993	1.013	0.992	1.009	0.996	0.966	0.995
2	0.996	0.987*	0.981	0.990	0.976	1.001	0.993	0.983	0.989	0.978	1.025	1.003	1.078	1.015	1.008	1.017	1.000	1.071	1.006	1.007
3	0.997	0.983	0.980	1.010	0.981	0.995	0.980	0.987	1.010	0.975	1.025*	1.001	1.100	1.007	0.993	1.022	1.001	1.098	0.999	0.997
4	0.993	0.981	0.973	1.005	0.969	0.992	0.982	0.978	1.015	0.969	1.030	1.000	1.094	1.015	0.993	1.025	0.997	1.101	1.003	0.997
h	Non-durable Consumption																			
1	0.888*	1.163	0.957	0.949	1.057	0.895	1.186**	0.962	0.911	1.017	1.066	0.932	0.993	0.905**	0.914	1.001	0.845*	1.001	0.888*	0.872*
2	0.897**	1.294***	0.916	0.845*	0.987	0.893*	1.293***	0.916	0.857*	0.989	0.883*	1.094***	0.945	0.980	0.998	0.870**	1.064*	0.931*	0.957	0.989
3	0.895**	1.273***	0.900*	0.870	0.978	0.884**	1.277***	0.902	0.882	0.986	0.846***	1.123***	0.957	0.984	0.999	0.837***	1.074	0.954	0.952	0.979
4	0.891**	1.306***	0.869*	0.890	0.984	0.885**	1.314***	0.871*	0.893	0.989	0.839***	1.167***	0.954	0.995	1.016	0.834***	1.118**	0.946	0.959	0.995
h	Gross Fixed Capital Formation																			
1	1.028	0.989	0.999	1.017	0.990	1.023*	0.994	0.992	1.021	0.998	1.033	1.011	0.982	0.980	0.996	1.031	1.011	0.986	0.990	1.003
2	0.997	0.976	0.966	1.007	0.992	0.998	0.989	0.968	1.025	1.010	1.029	1.008	0.961**	0.970	0.992	1.022	1.002	0.951***	0.971	0.989
3	1.005	1.017	0.992	1.006	1.021	1.007	1.013	0.994	1.019	1.028	1.017	1.024	0.992	0.993	1.017	1.017	1.022	0.985	0.985	1.014
4	1.000	1.009	0.988	0.995	1.014	1.003	1.006	0.988	1.010	1.021	1.018	1.017	0.994	0.981*	1.009	1.014	1.023	0.985**	0.975*	1.011
h	Construction and Works																			
1	1.019	1.012	1.005	1.008	1.011	1.019	1.014	1.006	1.020	1.018	1.001	1.022	1.003	1.023	1.010	0.996	1.018	1.009	1.017	1.004
2	1.008	1.012	0.985	0.992	1.007	1.008	1.012	0.984	1.000	1.011	1.003	1.025	0.999	1.011	1.006	1.001	1.029	0.997	1.001	1.000
3	1.010	1.016	0.980	0.983	1.010	1.010	1.018	0.975	0.991	1.013	0.998	1.031*	1.009	1.009	1.010	0.997	1.039	1.003	0.995	1.005
4	1.014	1.023	0.977	0.975	1.013	1.013	1.022	0.970	0.984	1.016	0.988	1.022	1.010	1.009	1.010	0.987	1.030	0.998	0.991	1.005
h	Machinery and Equipment																			
1	1.008	0.998	1.015	1.031	1.019	1.012	0.994	1.006	1.027	1.012	1.055	1.003	0.974	0.988	1.001	1.047	1.011	0.975	0.998	1.015
2	0.995	0.971	0.987	1.038	1.020	0.996	0.981	0.985	1.046	1.029*	1.054	0.994	0.967	0.988	1.006	1.045	0.991	0.961	1.001	1.017
3	1.003	1.000	1.003	1.105	1.089*	1.011	0.988	0.996	1.102	1.077	1.087	0.980	0.990	1.008	1.025	1.075	0.980	0.977	1.017	1.033
4	0.994	0.967	0.983	1.089	1.067	1.001	0.960	0.982	1.091	1.058	1.110	1.014	0.970	1.002	1.032	1.091	1.030	0.959	1.026	1.055

(*) Relative RMSFE^2_h (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells= Figures below 1 and statistically significant.
Harvey, Leybourne, and Newbold (1997) test's p-value: (***) p<1%, (**) p<5%, and (*) p<10%. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

9 Robustness results IX: AR(1) native model, 3-term factor in levels

Table 1.A9. Adjusted R-squared ratio between AR(1) factor-augmented (3-term, in levels) and native AR(1) model (*) and *F*-test results (*p*-value) of the consumer-based factor statistical significance (**)

	Factor: More sensitive sectors					Factor: Less sensitive sectors					Factor: More sensitive sectors					Factor: Less sensitive sectors				
	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
Factor: *Commerce + Industry*																				
PC	1.012	1.030	1.050	1.032	1.039	0.996	1.013	1.078	1.038	1.042	0.467	0.160	0.003	0.040	0.020	0.822	0.465	0.000	0.021	0.021
DC	1.005	1.042	1.050	1.047	1.057	0.991	1.008	1.062	1.040	1.043	0.294	0.006	0.002	0.018	0.003	0.855	0.267	0.001	0.015	0.007
NDC	0.997	1.046	1.031	1.027	1.042	0.984	1.030	1.061	1.034	1.047	0.555	0.227	0.060	0.097	0.035	0.687	0.371	0.014	0.059	0.038
GFCF	1.000	1.007	1.038	1.008	1.013	0.994	0.994	1.070	1.023	1.022	0.457	0.417	0.023	0.262	0.154	0.687	0.687	0.001	0.107	0.106
CWK	0.984	0.992	0.981	0.998	0.999	0.988	0.984	0.988	0.990	0.988	0.894	0.687	0.984	0.608	0.575	0.724	0.923	0.728	0.692	0.825
MEQ	1.006	1.027	1.113	1.051	1.056	0.987	1.020	1.170	1.081	1.087	0.517	0.218	0.001	0.041	0.016	0.892	0.205	0.000	0.024	0.010
Factor: *Commerce + Industry + Transportation*																				
PC	1.007	1.026	1.058	1.034	1.040	0.998	1.015	1.075	1.038	1.041	0.538	0.239	0.001	0.044	0.025	0.791	0.409	0.000	0.019	0.018
DC	1.001	1.039	1.054	1.045	1.055	0.992	1.007	1.061	1.039	1.043	0.472	0.008	0.002	0.023	0.004	0.808	0.282	0.001	0.013	0.006
NDC	0.992	1.044	1.036	1.026	1.042	0.988	1.032	1.061	1.036	1.048	0.630	0.372	0.056	0.123	0.045	0.584	0.275	0.012	0.043	0.032
GFCF	0.997	1.002	1.043	1.007	1.011	0.994	0.995	1.071	1.025	1.025	0.529	0.503	0.013	0.292	0.198	0.739	0.698	0.001	0.087	0.086
CWK	0.983	0.989	0.982	0.995	0.995	0.987	0.985	0.987	0.992	0.989	0.903	0.766	0.954	0.691	0.671	0.770	0.904	0.720	0.614	0.768
MEQ	1.001	1.026	1.116	1.048	1.054	0.987	1.018	1.177	1.087	1.092	0.537	0.223	0.001	0.054	0.020	0.892	0.243	0.000	0.021	0.008
Factor: *Commerce + Industry + Construction + Personal Services*																				
PC	0.994	1.005	1.078	1.038	1.039	1.013	1.043	1.052	1.034	1.043	0.882	0.618	0.000	0.021	0.029	0.427	0.072	0.004	0.038	0.013
DC	0.987	1.001	1.060	1.039	1.041	1.008	1.048	1.054	1.047	1.057	0.915	0.434	0.001	0.016	0.007	0.306	0.003	0.001	0.020	0.003
NDC	0.982	1.017	1.061	1.037	1.045	0.999	1.068	1.031	1.025	1.046	0.701	0.459	0.014	0.048	0.050	0.467	0.110	0.071	0.112	0.026
GFCF	0.991	0.993	1.068	1.025	1.023	1.002	1.006	1.047	1.008	1.013	0.754	0.732	0.001	0.082	0.087	0.379	0.460	0.007	0.278	0.179
CWK	0.987	0.991	0.985	0.992	0.990	0.988	0.984	0.983	0.995	0.994	0.729	0.734	0.820	0.614	0.763	0.784	0.915	0.917	0.686	0.696
MEQ	0.984	1.019	1.168	1.087	1.092	1.005	1.025	1.125	1.050	1.056	0.941	0.204	0.000	0.014	0.006	0.506	0.241	0.000	0.061	0.025
Factor: *Commerce + Construction + Personal Services*																				
PC	0.997	1.010	1.075	1.035	1.037	1.010	1.050	1.051	1.038	1.048	0.812	0.475	0.000	0.029	0.035	0.495	0.069	0.003	0.024	0.007
DC	0.991	1.007	1.057	1.039	1.042	1.005	1.062	1.059	1.050	1.063	0.845	0.311	0.002	0.022	0.011	0.297	0.001	0.001	0.013	0.001
NDC	0.983	1.025	1.054	1.035	1.046	0.999	1.077	1.036	1.026	1.046	0.739	0.352	0.026	0.057	0.048	0.460	0.122	0.040	0.120	0.028
GFCF	0.992	0.995	1.064	1.023	1.022	1.008	1.004	1.046	1.004	1.009	0.764	0.687	0.002	0.095	0.093	0.310	0.490	0.006	0.351	0.232
CWK	0.985	0.991	0.984	0.994	0.992	0.990	0.985	0.982	0.992	0.991	0.822	0.707	0.874	0.594	0.688	0.739	0.861	0.897	0.761	0.761
MEQ	0.986	1.025	1.166	1.087	1.091	1.015	1.013	1.115	1.036	1.041	0.920	0.200	0.000	0.013	0.005	0.402	0.365	0.000	0.103	0.052

(*) Adjusted R-squared ratio=Adjusted R-squared with the factor/Adjusted R-squared without the factor. Orange-shaded cells=Adjusted R-squared ratio greater than 1. Green-shaded cells=Adjusted R-squared ratio greater than 1.05 (5% of adjustment gain). Sample: 2001.I-2014.IV (56 observations). (**) *p*-value of the null hypothesis: NH: ϕ_1=...=ϕ_4=0 (see equation 1) against the alternative of at least one term is equal to zero. Green-shaded cells=p<10%. Orange-shaded cells=p<15%. Sample: 2001.I-2019.III (75 observations). Source: Authors' calculations.

Table 2.A9. Multi-horizon RMSFE ratio between native AR(1) and factor-augmented AR(1) model (3-term, in levels) (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	0.974	0.883	1.196***	1.079	0.957	1.000	0.916	1.229**	1.061	0.946	1.106	0.874	1.239***	1.055	0.941	1.065	0.848	1.217***	1.052	0.932
2	1.033*	0.999	1.341**	1.108	1.024	1.024	0.976	1.380**	1.148	1.030	1.085	0.890	1.367**	1.230*	1.054	1.047	0.902	1.349***	1.212*	1.058
3	0.899	1.050	1.038	1.047	0.999	0.881	1.034	1.076	1.085	1.017	0.955	0.985	1.199**	1.146	1.043	0.924	0.992	1.179**	1.126	1.040
4	0.832	1.102	0.950	1.103**	1.020	0.831	1.096	0.977	1.119**	1.034	0.886	1.047	1.123**	1.185**	1.074	0.853	1.048	1.101**	1.161**	1.063
h	Durable Consumption																			
1	0.999	0.973	0.954	0.934	0.917**	1.001	0.980	0.960	0.913	0.909**	1.013	1.001	0.984	0.946	0.948	1.007	0.998	0.971	0.937	0.943
2	1.015	1.002	1.018	1.000	0.962	1.020	1.008	1.024	1.006	0.965	1.036**	1.012	1.062	1.036	0.986	1.034**	1.011	1.055	1.033	0.985
3	1.023	0.994	0.976	1.046	0.971	1.023	0.995	0.983	1.045	0.968	1.046*	1.006	1.044	1.037	0.980	1.044*	1.005	1.039	1.037	0.981
4	1.024	0.983	0.954	1.072	0.963	1.027	0.986	0.958	1.076	0.964	1.053	0.997	1.022	1.057	0.976	1.050	0.994	1.018	1.057	0.976
h	Non-durable Consumption																			
1	0.978	0.869	1.189**	1.103	1.025	0.991	0.861	1.208**	1.085	1.005	1.092	0.748**	1.197***	1.067	0.967	1.064	0.741**	1.182***	1.063	0.965
2	1.007	0.959	1.229	1.076	1.042	0.993	0.933	1.245	1.108	1.054	1.062	0.799	1.236*	1.161	1.063	1.035	0.823	1.220*	1.133	1.058
3	0.891	1.081	0.970	0.998	1.026	0.879	1.071	0.981	1.015	1.039	0.943	0.983	1.044	1.070	1.062	0.921	0.988	1.032	1.039	1.050
4	0.817***	1.152***	0.925	1.003	1.054	0.815***	1.142***	0.931	1.008	1.063	0.847	1.071	0.995	1.090	1.103	0.831	1.081*	0.983	1.056	1.091
h	Gross Fixed Capital Formation																			
1	1.029	0.973	1.014	1.052	0.998	1.036	0.991	1.011	1.056	1.008	1.056	1.012	0.984	1.023	0.999	1.050	0.999	0.989	1.031	0.999
2	1.009	0.959	1.011	1.035	0.984	1.017	0.975	1.019	1.042	0.999	1.056	0.986	0.988	1.004	0.978	1.042	0.968	0.987	1.008	0.972
3	1.027	1.001	1.028	1.007	1.008	1.023	0.999	1.033	1.007	1.010	1.018	1.007	1.036	0.985	0.995	1.018	1.001	1.033	0.986	0.992
4	1.023	0.986	1.016	0.991	0.995	1.022	0.986	1.014	0.990	0.998	1.024	0.991	1.012	0.962	0.980	1.022	0.988	1.009	0.965	0.980
h	Construction and Works																			
1	1.016	1.045*	1.073*	1.081*	1.068**	1.015	1.046*	1.080*	1.093**	1.075**	1.005	1.052	1.075**	1.093**	1.072*	1.002	1.049	1.074**	1.088*	1.068*
2	1.015	1.012	1.054*	1.059	1.055**	1.011	1.013	1.058**	1.073*	1.062**	0.998	1.024	1.062**	1.084*	1.067**	0.997	1.022	1.058*	1.076*	1.061*
3	1.022	0.998	1.047*	1.020	1.049**	1.018	1.000	1.045**	1.029	1.052**	0.993	1.007	1.066***	1.049	1.054**	0.994	1.006	1.060***	1.040	1.051**
4	1.024	1.004	1.055**	0.988	1.044*	1.018	1.003	1.051**	0.998	1.046*	0.992	1.001	1.074***	1.021	1.042*	0.994	1.002	1.064***	1.010	1.040*
h	Machinery and Equipment																			
1	1.025	0.988	1.013	1.042**	0.986	1.030*	0.995	1.009	1.036*	0.987	1.031*	1.011	0.991	1.019	0.984	1.033*	1.008	0.994	1.025*	0.989
2	1.018	0.986	0.981	1.015	0.941**	1.024	0.991	0.986	1.009	0.949*	1.058	1.000	0.966	0.975	0.933	1.050	0.993	0.964	0.981	0.934
3	1.021	1.039	0.973	1.018	0.950	1.022	1.025	0.985	0.997	0.943	1.012	1.035	0.988	0.947	0.922	1.012	1.036	0.986	0.957	0.927
4	1.029	0.955	0.966	1.041	0.967	1.033	0.954	0.966	1.030	0.963*	1.040	0.995	0.969	0.978	0.952	1.037	0.996	0.976	0.997	0.962

(*) Relative RMSFE_h^1 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells=Figures below 1 and statistically significant.
Clark and West (2007) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Table 4.A9: Multi-horizon RMSFE ratio between factor-augmented (3-term, in levels) AR(1) models according to its relationship with the business cycle (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	0.967	1.024	1.119	1.198**	1.153*	0.996	1.099	1.156	1.143*	1.130	1.241*	1.011	1.204	1.107	1.091	1.142	0.925	1.178	1.079	1.027
2	1.002	1.191	1.143	0.996	1.062	0.998	1.170	1.191	1.034	1.070	1.059	0.997	1.169	1.152	1.093	1.002	0.991	1.147*	1.135	1.100
3	0.894	1.203*	0.929	0.998	1.037	0.872	1.184	0.965	1.045	1.065	0.927	1.080	1.125	1.101	1.071	0.887	1.052	1.112	1.074	1.060
4	0.845	1.276**	0.895	1.102	1.071	0.847	1.282**	0.919	1.124	1.096	0.888	1.149*	1.125	1.179*	1.114	0.842	1.083	1.100	1.130	1.074
h	Durable Consumption																			
1	1.003	0.976	0.989	0.984	0.956	1.003	0.983	0.996	0.945	0.938	1.016	1.019	1.037	0.995	1.004	1.002	1.012	1.008	0.966	0.988
2	1.005	0.995	1.008	0.953	0.957	1.009	1.003	1.012	0.953	0.958	1.034	1.011	1.079	1.017	0.995	1.028	1.011	1.072	1.013	0.998
3	1.007	0.985	0.990	1.028	0.982	1.004	0.986	0.997	1.022	0.975	1.041*	1.001	1.104	1.015	0.993	1.038*	1.002	1.103	1.010	0.997
4	1.005	0.982	0.984	1.068	0.993	1.006	0.987	0.985	1.074	0.993	1.051	1.003	1.097	1.041	1.011	1.044	1.003	1.101	1.030	1.014
h	Non-durable Consumption																			
1	0.953	1.143**	1.098	1.103	1.126**	0.961	1.146**	1.126	1.060	1.088*	1.186	0.874*	1.116	1.011	0.980	1.123	0.831**	1.108	0.991	0.948
2	0.961	1.287**	1.079	0.972	1.023	0.943	1.250**	1.102	1.009	1.041	1.023	0.942	1.075	1.078	1.031	0.990	0.943	1.053	1.035	1.015
3	0.866**	1.289***	0.918	0.951	0.993	0.851***	1.285***	0.930	0.972	1.012	0.912	1.071	1.002	1.016	1.009	0.884*	1.016	0.995	0.966	0.976
4	0.820***	1.385***	0.891	0.974	1.018	0.818***	1.384***	0.895	0.978	1.031	0.840*	1.166***	0.978	1.061	1.051	0.822**	1.116*	0.964	1.001	1.017
h	Gross Fixed Capital Formation																			
1	1.009	0.979	1.028	1.035	1.004	1.016	1.003	1.032	1.043	1.021	1.070	1.029	0.974	0.982	1.005	1.050	0.991	0.968	0.993	0.995
2	0.993	0.970	1.022	1.036	1.016	1.001	0.991	1.040	1.055**	1.040*	1.066	1.014	0.977	0.971	1.004	1.042	0.980	0.964	0.969	0.977
3	1.017	1.015	1.025	1.048*	1.061**	1.013	1.012	1.034	1.051*	1.066*	1.007	1.024	1.028	0.976	1.026	1.007	1.005	1.019	0.962	0.998
4	1.013	1.003	1.031	1.037*	1.049*	1.012	1.002	1.031	1.039**	1.055	1.020	1.013	1.009	0.959	1.012	1.016	1.010	0.998	0.952	0.996
h	Construction and Works																			
1	1.004	1.007	1.013	1.008	1.003	1.003	1.009	1.020	1.028	1.014	0.984	1.009	1.013	1.035	1.008	0.975	0.994	1.016	1.022	0.993
2	1.010	0.991	1.001	0.980	0.986	1.006	0.995	1.003	0.998	0.994	0.990	1.008	1.014	1.026	1.007	0.987	1.006	1.010	1.006	0.990
3	1.020	0.988	0.992	0.959	0.985	1.018	0.992	0.987	0.970	0.988	0.985	1.006	1.023	1.011	0.998	0.986	1.007	1.012	0.989	0.986
4	1.026	0.996	0.992	0.947	0.986	1.021	0.997	0.984	0.960	0.990	0.983	0.999	1.024	1.004	0.992	0.984	1.001	1.005	0.980	0.981
h	Machinery and Equipment																			
1	1.004	0.991	1.043	1.033*	1.018	1.009	1.001	1.042	1.023	1.017	1.042*	1.019	1.001	0.990	1.009	1.033	0.998	0.993	0.998	1.008
2	0.996	0.957	1.016	1.045	1.013	1.000	0.963	1.027	1.044	1.024	1.059	0.981	0.994	0.984	0.998	1.045	0.981	0.976	0.992	0.992
3	1.006	0.980	1.067	1.135**	1.091	1.011	0.960	1.087	1.099*	1.076	1.003	0.977	1.106**	0.979	1.015	1.004	0.985	1.107*	0.981	1.001
4	0.997	0.932	1.052	1.104	1.055	1.003	0.925	1.052	1.090	1.047	1.028	1.006	1.047	0.979	1.018	1.022	1.023	1.066	1.006	1.029

(*) Relative RMSFE^2_h (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells= Figures below 1 and statistically significant.
Harvey, Leybourne, and Newbold (1997) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

10 Robustness results X: AR(1) native model, 4-term factor in levels

Table 1.A10 Adjusted R-squared ratio between AR(1) factor-augmented (4-term, in levels) and native AR(1) model (*) and *F*-test results (*p*-value) of the consumer-based factor statistical significance (**)

	Factor: More sensitive sectors					Factor: Less sensitive sectors					Factor: More sensitive sectors					Factor: Less sensitive sectors				
	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
Factor: *Commerce + Industry*																				
PC	1.014	1.037	1.054	1.039	1.048	0.990	1.016	1.074	1.039	1.045	0.215	0.144	0.001	0.035	0.010	0.846	0.199	0.000	0.032	0.017
DC	1.007	1.059	1.066	1.076	1.088	0.981	1.015	1.061	1.057	1.062	0.201	0.002	0.000	0.000	0.000	0.941	0.029	0.001	0.001	0.000
NDC	0.979	1.034	1.031	1.025	1.040	0.966	1.018	1.050	1.029	1.042	0.710	0.348	0.062	0.113	0.034	0.806	0.547	0.016	0.091	0.056
GFCF	1.005	1.001	1.032	1.001	1.006	0.995	0.990	1.065	1.017	1.016	0.279	0.566	0.055	0.407	0.276	0.537	0.696	0.003	0.189	0.166
CWK	0.977	0.989	0.974	0.991	0.993	0.979	0.979	0.984	0.985	0.983	0.918	0.688	0.899	0.750	0.688	0.817	0.946	0.350	0.707	0.763
MEQ	1.011	1.020	1.102	1.044	1.047	0.986	1.014	1.160	1.074	1.079	0.425	0.312	0.004	0.065	0.032	0.801	0.289	0.000	0.035	0.016
Factor: *Commerce + Industry + Transportation*																				
PC	1.006	1.035	1.058	1.038	1.047	0.992	1.018	1.071	1.039	1.044	0.459	0.200	0.001	0.044	0.016	0.785	0.178	0.000	0.026	0.014
DC	0.998	1.058	1.061	1.072	1.084	0.983	1.014	1.062	1.058	1.062	0.528	0.001	0.001	0.000	0.000	0.898	0.038	0.000	0.001	0.000
NDC	0.974	1.032	1.033	1.026	1.041	0.969	1.020	1.049	1.029	1.041	0.784	0.501	0.065	0.131	0.037	0.733	0.413	0.014	0.069	0.048
GFCF	0.996	0.997	1.036	1.001	1.004	0.999	0.991	1.068	1.018	1.018	0.481	0.642	0.034	0.425	0.324	0.410	0.659	0.003	0.166	0.136
CWK	0.974	0.986	0.975	0.987	0.988	0.980	0.980	0.984	0.987	0.987	0.956	0.784	0.864	0.826	0.781	0.798	0.941	0.301	0.586	0.655
MEQ	1.000	1.020	1.105	1.042	1.048	0.991	1.013	1.168	1.079	1.083	0.555	0.320	0.003	0.066	0.033	0.710	0.308	0.000	0.037	0.016
Factor: *Commerce + Industry + Construction + Personal Services*																				
PC	0.995	1.013	1.075	1.039	1.044	1.007	1.043	1.052	1.038	1.048	0.621	0.182	0.000	0.031	0.015	0.420	0.114	0.002	0.039	0.012
DC	0.980	1.012	1.060	1.057	1.063	1.002	1.058	1.063	1.072	1.082	0.941	0.055	.001	0.001	0.000	0.369	0.000	0.001	0.000	0.000
NDC	0.969	1.010	1.051	1.031	1.042	0.981	1.053	1.023	1.024	1.040	0.706	0.530	0.015	0.076	0.060	0.673	0.219	0.073	0.128	0.033
GFCF	0.993	0.988	1.063	1.018	1.016	1.005	1.002	1.041	1.002	1.007	0.631	0.765	0.004	0.169	0.154	0.242	0.556	0.020	0.371	0.273
CWK	0.978	0.984	0.981	0.985	0.985	0.982	0.981	0.978	0.989	0.989	0.848	0.874	0.420	0.652	0.735	0.817	0.852	0.700	0.804	0.770
MEQ	0.987	1.013	1.159	1.079	1.083	1.004	1.019	1.115	1.043	1.049	0.785	0.289	0.000	0.025	0.011	0.515	0.318	0.002	0.075	0.039
Factor: *Commerce + Construction + Personal Services*																				
PC	0.997	1.018	1.071	1.038	1.044	1.002	1.050	1.054	1.040	1.050	0.645	0.176	0.000	0.035	0.016	0.568	0.059	0.001	0.029	0.008
DC	0.984	1.021	1.057	1.060	1.067	0.998	1.069	1.069	1.072	1.082	0.874	0.044	0.001	0.001	0.000	0.412	0.000	0.001	0.000	0.000
NDC	0.968	1.016	1.042	1.031	1.043	0.983	1.062	1.030	1.023	1.040	0.788	0.450	0.032	0.081	0.054	0.677	0.220	0.032	0.142	0.042
GFCF	0.991	0.990	1.058	1.016	1.016	1.016	1.004	1.040	0.999	1.004	0.675	0.791	0.006	0.183	0.168	0.114	0.384	0.015	0.445	0.297
CWK	0.976	0.985	0.980	0.988	0.988	0.986	0.981	0.979	0.984	0.984	0.917	0.837	0.509	0.649	0.690	0.731	0.840	0.662	0.873	0.861
MEQ	0.985	1.017	1.156	1.079	1.082	1.017	1.013	1.105	1.031	1.036	0.824	0.322	0.000	0.022	0.012	0.381	0.284	0.002	0.110	0.055

(*) Adjusted R-squared ratio=Adjusted R-squared with the factor/Adjusted R-squared without the factor. Orange-shaded cells=Adjusted R-squared ratio greater than 1. Green-shaded cells=Adjusted R-squared ratio greater than 1.05 (5% of adjustment gain). Sample: 2001.I-2014.IV (56 observations). (**) *p*-value of the null hypothesis: NH: ϕ_1=...=ϕ_4=0 (see equation 1) against the alternative of at least one term is equal to zero. Green-shaded cells=p<10%. Orange-shaded cells=p<15%. Sample: 2001.I-2019.III (75 observations). Source: Authors' calculations.

Table 2.A10. Multi-horizon RMSFE ratio between native AR(1) and factor-augmented AR(1) model (4-term, in levels) (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	0.960	0.964	1.223**	1.234*	1.046*	0.975	0.988	1.255**	1.237	1.047*	1.160**	0.997	1.320***	1.218	1.062*	1.110*	0.977	1.308***	1.218	1.055*
2	1.082**	0.974	1.534***	1.454*	1.114*	1.069**	0.953	1.594***	1.486*	1.130*	1.273**	0.937	1.543***	1.468*	1.153**	1.206**	0.932	1.529***	1.460*	1.151**
3	0.955	0.924	1.314***	1.379**	1.037	0.922	0.899	1.360***	1.399**	1.059	1.140**	0.939	1.372***	1.386**	1.102*	1.063*	0.937	1.360***	1.376**	1.098*
4	0.754	0.955	1.025**	1.211***	0.985	0.761	0.941	1.054***	1.197***	0.996	0.983**	0.903	1.166***	1.246***	1.036*	0.914*	0.901	1.137***	1.220***	1.023*
h	Durable Consumption																			
1	1.007	0.989	0.951	0.944	0.932	1.006	0.995	0.966	0.928	0.927	1.022	1.017	0.994	0.962	0.968	1.015	1.015	0.985	0.955	0.963
2	1.030*	1.033	1.043	1.012	0.988	1.037**	1.031	1.054*	1.017	0.988	1.063**	1.027	1.064*	1.051	1.006	1.057**	1.028	1.059*	1.048	1.005
3	1.041	1.027	1.002	1.051	0.994	1.043	1.022	1.013	1.051	0.990	1.071*	1.028	1.032	1.045	1.000	1.066*	1.030	1.032	1.048	1.001
4	1.043	1.003	0.985	1.068*	0.977	1.048	1.004	0.989	1.071*	0.977	1.084*	1.008	1.012	1.050*	0.980	1.078*	1.006	1.013	1.054*	0.980
h	Non-durable Consumption																			
1	0.998	0.859	1.160**	1.246*	1.111	1.009	0.862	1.182***	1.242*	1.100	1.198	0.788	1.221***	1.207	1.065	1.154	0.769	1.219***	1.207	1.060
2	1.068*	0.737	1.317**	1.406*	1.163	1.056**	0.731	1.359***	1.420*	1.171	1.298	0.656	1.363***	1.397	1.160	1.245	0.653	1.346***	1.374*	1.149
3	0.923	0.824	1.143***	1.335*	1.138	0.909	0.821	1.170***	1.333*	1.143	1.149	0.753	1.202***	1.344	1.134	1.092	0.742	1.194***	1.312	1.120
4	0.698*	0.955	0.933	1.159*	1.086	0.700	0.945	0.947	1.142*	1.089	0.901	0.867	1.060	1.218	1.112	0.857	0.873	1.035	1.171	1.096
h	Gross Fixed Capital Formation																			
1	1.040	0.991	1.040	1.070*	1.017	1.045	1.012	1.037	1.073	1.027	1.059	1.040	0.994	1.047	1.031	1.057	1.029	1.001	1.056	1.032
2	1.013	0.983	1.029	1.060	1.014	1.024	1.002	1.039	1.068	1.024	1.062	1.025	0.998	1.055	1.032	1.049	1.011	0.997	1.060	1.029
3	1.053*	1.031	1.050*	1.043*	1.044*	1.050	1.029	1.057*	1.047*	1.041	1.046	1.053	1.062**	1.084**	1.071**	1.043	1.055	1.063**	1.080**	1.073**
4	1.034*	0.994	1.018	1.021	1.016	1.036*	0.995	1.018	1.023*	1.015	1.058*	1.014	1.019	1.041**	1.031**	1.044	1.015	1.020	1.041**	1.035**
h	Construction and Works																			
1	1.019	1.068*	1.109**	1.103*	1.086*	1.013	1.067	1.115**	1.113*	1.091*	0.951	1.071	1.101**	1.119**	1.094*	0.952	1.069	1.098**	1.113*	1.089*
2	1.016	1.034	1.080***	1.084	1.069	1.007	1.033	1.086***	1.094	1.072*	0.950	1.037	1.089***	1.104*	1.080*	0.954	1.037	1.083***	1.095*	1.073*
3	1.034	1.021	1.078**	1.022	1.052	1.026	1.019	1.076**	1.033	1.053	0.963	1.019	1.089***	1.061	1.060	0.970	1.021	1.081***	1.048	1.055
4	1.039	1.012	1.073**	0.955	1.033	1.033	1.008	1.070***	0.969	1.035	0.997	1.000	1.082***	1.007	1.030	0.999	1.004	1.070***	0.992	1.027
h	Machinery and Equipment																			
1	1.037*	0.996	1.039	1.057**	1.005	1.041**	1.011	1.031	1.055**	1.009	1.043**	1.024	0.993	1.048	1.011	1.044**	1.020	0.998	1.054	1.015
2	1.026*	0.982	1.006	1.064***	0.983	1.032*	0.997	1.011	1.059**	0.989	1.068*	1.010	0.968	1.037	0.985	1.060*	1.000	0.969	1.052*	0.990
3	1.052	1.031	1.019	1.133***	1.040*	1.052	1.032	1.032*	1.119***	1.033	1.034	1.072***	1.017	1.116***	1.054	1.038	1.072***	1.026*	1.138***	1.065*
4	1.053	0.966	0.967	1.094**	1.016	1.056	0.971	0.970	1.089**	1.012	1.050*	1.022	0.972	1.075**	1.025	1.050*	1.021	0.983	1.097**	1.035

(*) Relative RMSFE_h^1 (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells=Figures below 1 and statistically significant.
Clark and West (2007) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

Table 4.A10: Multi-horizon RMSFE ratio between factor-augmented (4-term, in levels) AR(1) models according to its relationship with the business cycle (*)

	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI	PCSI	PFEI	CCSI	CFEI	OFEI
	Commerce + Industry					*Commerce + Industry + Transp.*					*Comm. + Ind. + Const. + Pers. Serv.*					*Comm. + Const. + Pers. Serv.*				
h	Private Consumption																			
1	0.919	1.003	1.086	1.252**	1.157	0.929	1.054	1.111	1.239*	1.161	1.278**	1.036	1.273**	1.176*	1.149*	1.172**	0.952	1.271*	1.148	1.076
2	0.983	1.069	1.178	1.205	1.111	0.967	1.050	1.243	1.241	1.137	1.228	1.001	1.219**	1.216	1.178	1.135	0.990	1.188*	1.200	1.174
3	0.916	1.105	1.072	1.191*	1.097	0.873	1.065	1.124	1.211*	1.127	1.126	1.131	1.155*	1.165*	1.191*	1.022	1.108	1.135*	1.142	1.175
4	0.770	1.242	0.914	1.150*	1.078	0.777	1.235	0.945	1.124**	1.093	1.017	1.116	1.104	1.157	1.124	0.925	1.028	1.051	1.096	1.067
h	Durable Consumption																			
1	1.003	0.979	0.966	0.979	0.959	1.000	0.988	0.982	0.945	0.947	1.012	1.022	1.036	1.003	1.017	0.997	1.016	1.024	0.982	1.001
2	1.009	1.017	1.017	0.947	0.973	1.016	1.015	1.025	0.946	0.970	1.048	0.998	1.050	1.020	0.996	1.038	0.998	1.046	1.017	0.992
3	1.019	1.011	1.018	1.016	0.995	1.020	1.005	1.027	1.011	0.987	1.058	0.996	1.067	1.018	0.996	1.047	1.002	1.073*	1.014	0.997
4	1.013	1.000	1.019	1.068	1.020	1.017	1.003	1.020	1.069	1.020	1.071*	0.992	1.055	1.048	1.015	1.058	0.993	1.059	1.046	1.011
h	Non-durable Consumption																			
1	0.921	1.053	1.059	1.128*	1.135	0.923	1.069	1.083	1.104	1.112*	1.300	0.884	1.178*	1.031	1.006	1.205	0.809	1.219**	1.015	0.956
2	0.957	1.170	1.088	1.122	1.118	0.934	1.161	1.136	1.128	1.125	1.293	0.983	1.179**	1.099	1.095	1.227	0.932	1.154*	1.056	1.061
3	0.849	1.288	0.964	1.033	1.081	0.825*	1.293	0.997	1.017	1.083	1.149	1.094	1.049	1.021	1.038	1.073	0.964	1.040	0.968	0.987
4	0.697**	1.475***	0.808	0.967	1.044	0.694**	1.482***	0.823	0.934	1.043	0.932	1.201**	0.975	1.014	1.039	0.881	1.090	0.936	0.940	0.993
h	Gross Fixed Capital Formation																			
1	1.026	0.979	1.038	1.023	0.998	1.028	1.009	1.041	1.029	1.012	1.064	1.039	0.956	0.994	1.022	1.052	1.008	0.958	1.010	1.024
2	0.998	0.967	1.012	0.999	0.998	1.007	0.991	1.033	1.011	1.009	1.064	1.029	0.961	1.012	1.040	1.040	1.013	0.952*	1.027	1.047
3	1.034	1.008	1.000	0.973	1.026	1.030	1.002	1.008	0.967	1.012	1.021	1.043	1.018	1.071**	1.086***	1.017	1.056	1.018	1.088*	1.117**
4	1.011	0.989	1.008	0.968	1.013	1.015	0.985	1.010	0.962	1.002	1.051	1.028	1.001	1.033	1.057**	1.035	1.048	0.999	1.054	1.090**
h	Construction and Works																			
1	1.025	1.014	1.015	1.008	1.001	1.022	1.014	1.020	1.022	1.006	0.917	1.005	1.004	1.032	1.010	0.911*	0.986	1.002	1.021	0.993
2	1.026	0.993	0.987	0.993	0.982	1.017	0.993	0.990	1.007	0.984	0.930	0.992	1.011	1.036	1.003	0.931	0.993	1.002	1.014	0.984
3	1.042	0.994	0.992	0.966	0.980	1.034	0.993	0.984	0.981	0.981	0.948	0.992	1.019	1.047	1.001	0.953	1.001	1.005	1.019	0.989
4	1.040	0.999	0.994	0.942	0.985	1.034	0.997	0.984	0.960	0.989	0.984	0.988	1.018	1.047	0.996	0.985	0.997	0.996	1.013	0.985
h	Machinery and Equipment																			
1	0.999	0.978	1.049	1.003	1.001	1.002	1.004	1.043	0.997	1.007	1.033	1.002	0.962	0.990	1.002	1.023	0.981	0.963	1.000	1.004
2	0.978	0.963	1.046	1.034	1.010	0.982	0.987	1.058	1.028	1.019	1.053	1.002	0.983	0.999	1.012	1.036	0.979	0.977	1.024	1.014
3	0.986	0.940	1.056	1.078	1.018	0.990	0.939	1.076	1.046	1.005	0.986	0.999	1.070**	1.043	1.037	0.986	1.000	1.106**	1.077	1.063
4	0.976	0.925	1.039	1.063	1.015	0.982	0.930	1.043	1.047	1.005	1.008	1.021	1.041	1.026	1.029	0.999	1.023	1.070	1.064	1.053

(*) Relative RMSFE^2_h (see equation 3). Orange-shaded cells=Figures below 1. Green-shaded cells= Figures below 1 and statistically significant.
Harvey, Leybourne, and Newbold (1997) test's p-value: (***) $p<1\%$, (**) $p<5\%$, and (*) $p<10\%$. Sample: 2015.I-2019.III (19 observations).
Source: Authors' calculations.

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