GREECE MACRO MONITOR

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Greek GDP NOWcasting
Full-year recession likely to prove milder than expected

Based on a number of macro data releases up to October 20th, this note provides an estimate of Greek GDP for Q3 2015 as well as our preliminary forecast for the full-year. For this purpose, we utilize two distinct methodologies; namely the *GDP Nowcasting* framework we first introduced in late 2013 as well as a mixed-data sampling methodology employing *MIDAS/Bridge*-type models. As a reminder, our Nowcasting model produces high frequency, real-time estimates of Greece's gross domestic product and other macroeconomic variables by applying an econometric methodology that can properly handle data reporting lags, revisions and other important aspects characterizing the daily flow of macroeconomic information. In a similar fashion, our MIDAS/Bridge-type models combine information from monthly-sampled variables that are released ahead of the respective (quarterly) GDP data. The models fully take into account the publication lags of the monthly variables themselves and use data appropriately aligned so that respective forecasts made ahead of the actual GDP release are as informative as possible. For the particular exercise presented herein, we emphasize that due to reporting lags, the flow of macro data pertaining to Q3 2015 will continue in the following couple of months and thus, our estimates should be considered as strictly preliminary and subject to revisions. That is, taking into consideration the unusually high degree of uncertainty characterizing the present macroeconomic trajectory as a result of, among others, the imposition of capital controls in late June as well as the recessionary impact of the new package of fiscal austerity measures agreed in the context of a new (3rd) bailout programme in mid-August. All in all, we are now looking for a YoY real GDP growth contraction in the vicinity of 2% in Q3, 2015. Furthermore, we revise our full-year GDP growth forecast to around -1.0%. This compares with our earlier forecast of -2.0% and the -2.3% figure currently projected by the European Commission and Greece's draft 2016 Budget. As a note of caution, we emphasize that even our new (milder) forecast for 2015 GDP growth implies a sizeable carry-over (> 2ppts) into the coming year, raising some downside risks to the -1.3% official growth forecast for 2016.

Greek GDP: milder than expected full-year decline, despite worsened dynamics in H2

Consensus view is that the positive economic momentum experienced last year (and, as it turned out, during the greater part of H1 2015) has been lost, with the domestic economy currently undergoing a new slowdown. By implication, a key question arising at the present trajectory is whether this will prove out to be another deep and prolonged recession following a cumulative real GDP contraction of more than 25ppts in 2008-2014 or it will be a brief downturn before the economy stabilizes again and gradually returns to a positive growth path. Our current prediction is that the extraordinary factors that triggered the new domestic downturn will prove transitory, with the economy having the potential to return to positive quarterly growth from Q3 2016 onwards.

Although a thorough analysis of Greece's future growth drivers is beyond the scope of this report, we cite below a few important considerations supporting our view for a milder than previously expected GDP contraction: *a)* Greece's economic adjustment in terms of *e.g.* relative wages, fiscal metrics, current account dynamics as well as corporate and household balance sheets is already in an advance stage; *b)* the timely (before year-end) and successful completion of the upcoming

recapitalization of domestic banks my lead to a significant relaxation or even full-removal of capital controls during the first half of 2016; and c) in contrast to *e.g.* the Cyprus experience with a bank holiday and capital controls (March 2013), Greece experienced a "bank run in slow motion" during the first half of this year, with more than €15bn in notes fleeing the banking system to be kept "under the mattress". This has arguably allowed for some inter-temporal consumption smoothing and it may explain the relative resilience of private consumption in H1 2015 and in the initial period following the imposition of capital controls in Greece.

In our view, the new fiscal austerity package agreed with official lenders in mid-August, the disruptions created by the recent bank holiday (28 June – 19 July) and the imposition of capital controls are expected to be among the key drivers of H2, 2015 GDP dynamics in H2, 2015. On the other hand, a swift resolution of uncertainty as regards current negotiations with official creditors on the first review of the a new bailout programme and, eventually, the stabilization of the domestic banking system and the mobilization of EU funding to support domestic investment and job creation would be instrumental in facilitating a stabilization of the domestic environment and a resumption of positive economic growth as early as in H2 2016.

Nowcasting and MIDAS model estimates for Greek GDP in Q3 2015

Most estimates derived by running alternative specification of our GDP Nowcasting model point to a sharp decline (-5% QoQ s.a. or higher) in Greece's real GDP in Q3, 2015. However, we note that larger scale and multi-frequency models, such as our Nowcasting model (which interpolate values for GDP even at the daily frequency) can be subject to a larger range of uncertainty in their estimates when sudden changes in the data structure occur. It is apparent to us that it is the recent events in Greece, including the political turmoil during the summer months of 2015 and the imposition of capital controls that created such a sudden shift (*i.e.,* deterioration) in the path of the monthly variables used in our estimation. As a result, our Nowcasting model indicates (as it should when real time updates occur) a larg*e* drop in GDP growth which cannot be justified after accounting for growth dynamic effects and lagged publication responses. As this sudden shift in the faster moving indicators may well prove temporary, we augment our Nowcasting model projections with these derived by our MIDAS/Bridge-type models to arrive at a more coherent and consistent range of real GDP estimates for the third quarter of this year. As we discuss in the following paragraph, the full range of MIDAS/Bridge model estimates for YoY real GDP growth in Q3, 2015 fall between -2.1% and 1.2%, with both mean and median forecasts across all estimated models indicating a mildly negative growth outcome. All things considered, we are now looking for a YoY real GDP growth contraction in the vicinity of 2% in Q3, 2015. Furthermore, we revise our full-year GDP growth forecast to around -1.0%. This compares with our earlier forecast of -2.0% and the -2.3% figure currently projected by the European Commission and Greece's draft 2016 Budget. As a note of caution, we emphasize that even our new (milder) forecast for 2015 GDP growth implies a sizeable carry-over (> 2ppts) into the coming year, raising some downside risks for the -1.3% official growth forecast for 2016.

Technical note
Greek GDP NOWcasting

The *Appendix* section at the end of this document lists the high-frequency (*i.e.,* monthly) indicators utilized in our NOWcasting model to produce real time estimates of Greek GDP. Each of these indicators is first transformed in such as way as to allow us to account for its degree of relative persistence as regards its contribution in explaining economic growth. Then, each indicator is linked to both its own high-frequency (monthly) releases and to the lower-frequency (quarterly) releases of GDP growth. The latter is assumed to be driven by the combined effect of its own contributions (daily, monthly, and quarterly) and explained by the evolution of various indicators. All component equations of our models are stochastic and contain error terms whose corresponding variances are estimated and reported as log-variance estimates. The variance estimates are all significant across models, thus validating the stochastic nature of the equations used. Finally, to model the daily contributions to GDP growth we consider the lagged effects of the monthly announcements and we find that their effect is either very small or statistically insignificant; this means that, during the period of examination, there is little persistence generated at the daily level by the releases and announcements of macroeconomic variables and thus the impact of news dies out rather quickly.

A full technical description of our *Nowcasting* model and its output may be obtained by clicking in the following web link:
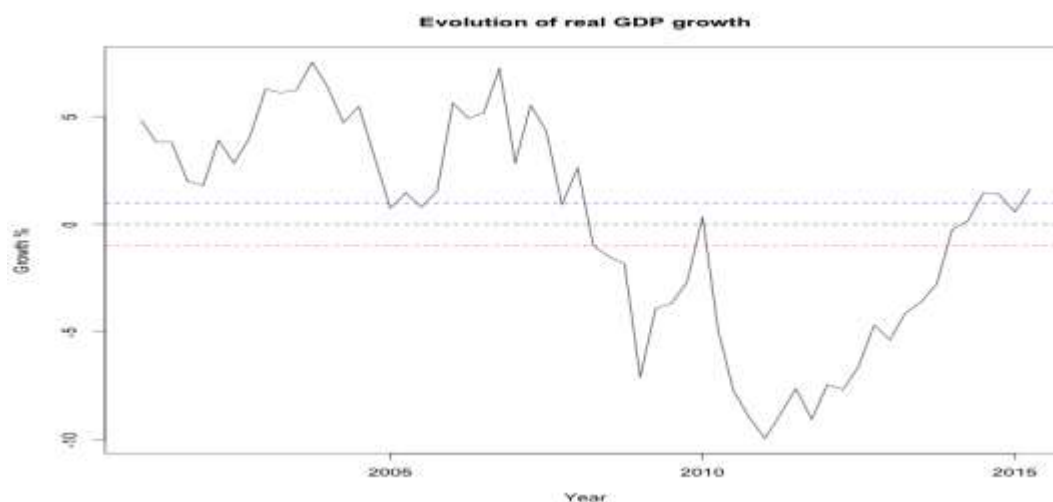http://www.eurobank.gr/Uploads/Reports/GREECE%20MACRO%20FOCUS%20July%20272015GDP%20Nowcasting.pdf

**MIDAS (Mixed Data Sampling)**

MIDAS (Mixed Data Sampling) is a class of linear and non-linear regression models that exploits the use of higher frequency information (herein monthly) in lower frequency settings (herein quarterly). Their use is particularly useful when forecast updating is important as new information arrives from higher frequency variables (*e.g.* monthly-sampled variables such as retail sales and industrial production) before the release of lower frequency variables (*e.g.* quarterly-sampled GDP data). The linear class of MIDAS models also comes under the name of *Bridge* models, in the sense that they connect information from two different frequencies and thus «bridge» the gap between lower frequency data releases with the use of higher frequency variables. After aligning the data[1] and accounting for publication lags, we select how to structure our model in terms of: explanatory monthly variables (usually, contemporaneous and lagged values of these variables pertaining to the particular quarter for which we want to forecast GDP), lags of the dependent quarterly variable (herein GDP) and/or other quarterly variables. This set of lags and concurrent values makes up the «design» matrix used in our estimation. For model specifications that include many monthly variables and their lags one can resort to non-linear MIDAS models, which constrain the number of parameters to be estimated. In the particular exercise presented herein, this is not necessary as the number of significant variables per model tends not to exceed 2, excluding lags of GDP growth. Finally, our models pass all usual diagnostic tests before they are used to forecast future real GDP growth.

In the particular exercise presented in this note, we use the same universe of variables used in our NOWcasting model (see *Appendix*). We next augment our set of forecasts/nowcasts with an alternative methodology based on MIDAS/Bridge-type models. Our forecasts are based on a number of alternative specifications that include both a dynamic component of past quarterly real GDP as well as concurrent and lagged values of higher frequency (*i.e.,* monthly) variables. The latter include retail sales volume, retail sales turnover, industrial production, consumer sentiment and economic sentiment.

Figure 1.1 – Greece's real GDP growth %, YoY (last observation corresponds to Q2 2015)

Evolution of real GDP growth

As depicted in Figure 1.1, the strong rebound of year-on-year real GDP growth after 2011 has generated a strong (upward) local trend. Inevitably, this trend affects the direction of forecasts and, by the presence of hysteresis in both data collection and economic response, alleviates the problem of short-term negative fluctuations in the monthly variables. However, with the exception of the industrial production, the high frequency indicators depicted in Figure 1.2 have exhibited a considerable deterioration over the past 2-3 months of sample availability, with their year-on-year growth turning sharply negative (monthly data end in August).

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[1] Data alignment is an important step as publication lags imply that when, for example, a quarterly series is updated we cannot align it with monthly variables in the same month or even a month before.
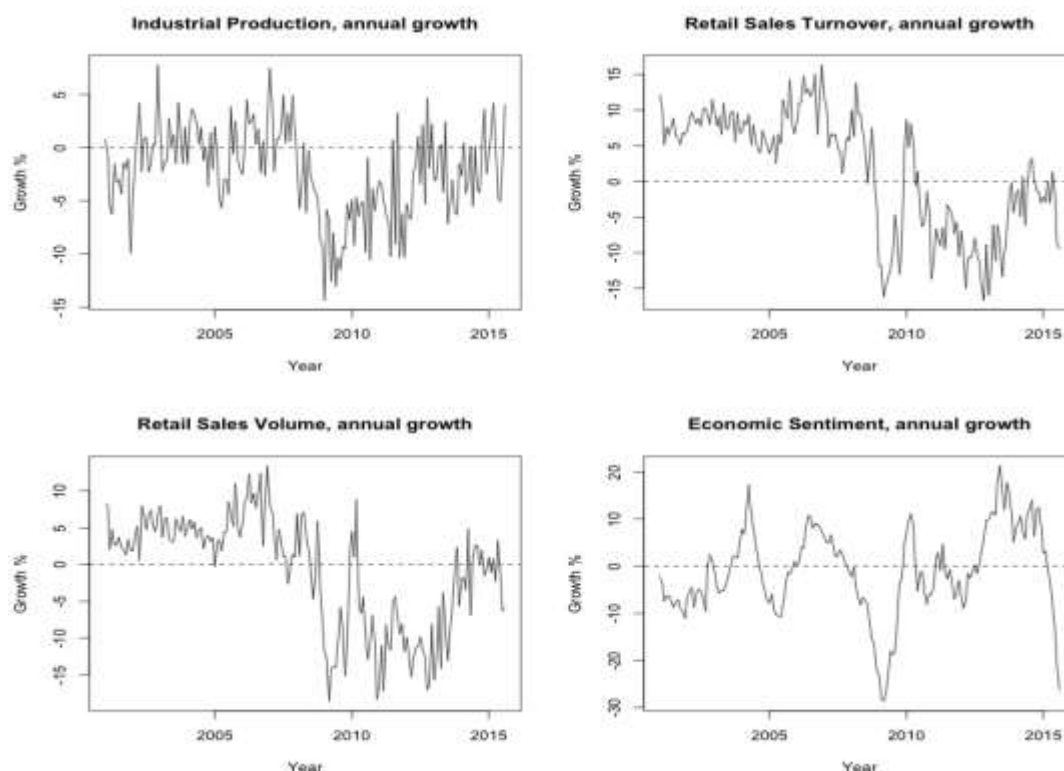
Figure 1.2 – Monthly indicators, % YoY

Table 1 below summarizes the results of our MIDAS models under two forecasting scenarios. In the *first* scenario (models A-E), we derive our forecasts by using the dynamic (*i.e.,* lagged) component of real GDP growth as well as the contemporaneous and dynamic (*i.e.,* lagged) effects of the monthly variables (save model A, which only contains GDP's own history). For each model pertaining to the first scenario, Table 1 depicts the monthly variable(s) being used in forecasting year-on-year GDP growth in Q3 2015. Results are given as ranges across different projections from the same model, coming from different timing applications (number of lags) of the observed values of the monthly variables. In the *second* scenario (models F-I), we drop the dynamic component of real GDP growth and examine only the impact of the higher frequency (monthly) variables.

As depicted in *Table 1*, most of our results point to deteriorating real GDP growth dynamics in Q3, 2015.[2] For the first scenario under examination (models A-E), note that models that use retail sales volume and consumer sentiment produce estimates/nowcasts for Q3 GDP growth that consistently fall into negative territory, while models that use as explanatory variables industrial production and retail sales turnover tend to have a lower bound of zero percent growth. On the other hand, all estimates/nowcasts fall into negative territory when the second scenario is considered (models F-I), with the most negative effects again coming from retail sales volume and economic sentiment. This implies in turn that in the absence of the positive YoY GDP growth trajectory witnessed in the first half of the year, the negative impact of the most recent readings in the monthly variables under consideration would be even more pronounced.

As shown in the results presented below, the full range of forecasts for real YoY GDP growth in Q3, 2015 fall between -2.1% and 1.2%. Both mean and median forecasts across all estimated models indicate a mildly negative growth outcome. The 95% confidence interval for the mean forecast probably provides the best evaluation for the uncertainty of model forecasts giving us a range of -1% to 0.3%; as the interval is clearly skewed to negative territory, and given the most recent declines in monthly variables, we tend to support the case for a negative YoY GDP growth realization in Q3, which may prove to be milder than expected earlier.

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[2] Even for model A, our point forecast is slightly positive, but lower than the last published value (*i.e.,* real GDP growth 1.6% YoY in Q2, 2015).

Table 1 – MIDAS/Bridge model forecasts for Greece's YoY real GDP growth in Q3, 2015

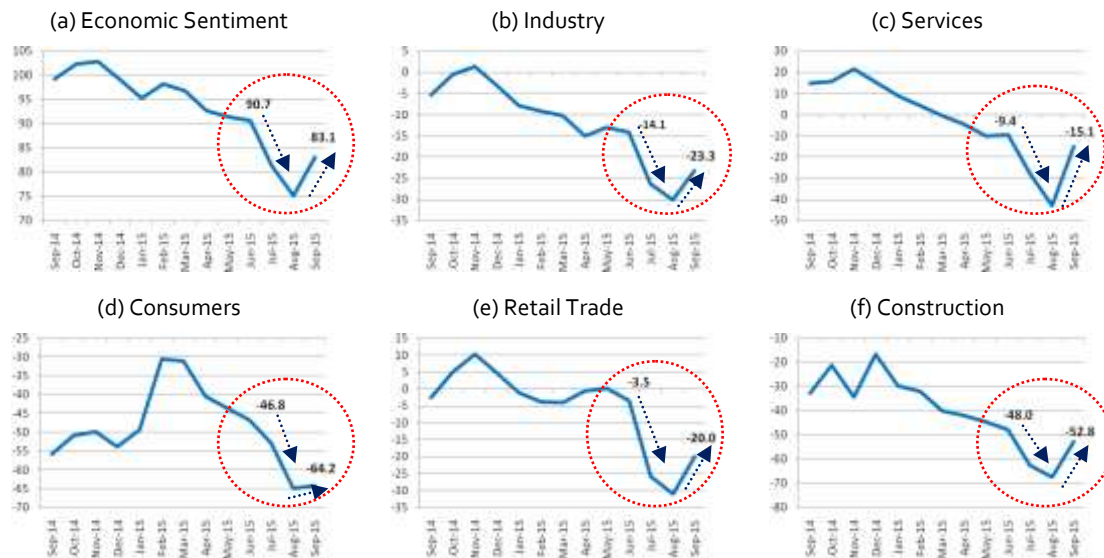| Q3 2015 – MIDAS/Bridge Models |
|---|
| A - Benchmark (no economics): 0.8% |
| B - Retail sales volume & economic sentiment: -0.5% to -1.4% |
| C - Retail sales volume & consumer sentiment: -0.4% to 0% |
| D - Industrial production only: 0.0% to 1.2% |
| E - Retail sales turnover only: 0% to 0.1% |
| F - B assuming zero YoY GDP growth in Q2: -1.2% to -2.1% |
| G - C assuming zero YoY GDP growth in Q2: -0.6% to -1% |
| H - D assuming zero YoY GDP growth in Q2: -0.5% to 0.5% |
| I - E assuming zero YoY GDP growth in Q2: -0.8% to 0.1% |

Summary of forecasts: Models A to I
Mean = -0.7% to 0%
Median =-0.7% to 0%
Std. Dev. = 0.6%
Full range = -2.1% to 1.2%
95% confidence interval for mean forecast = -1% to 0.3%

Focus: a look at the evolution of a number of high frequency indicators in Q3, 2015

The economic sentiment indicator for Greece recorded steep declines in July and August 2015. More specifically, in August 2015, it reached its lowest value since April 2009 (75.2 index units). In what concerns its five subcomponents, the highest declines over the July-August period were recorded in services and in retail trade (-33.4 and -27.5 index units respectively) followed by construction (-19.5 index units), consumers (-18.0 index units) and industry (-16.1 index units). To a large extent, the abrupt deterioration in economic sentiment can be attributed to the announcement in late June of a short-term bank holiday and the imposition of capital controls. However, the latest available data (Sept. 2015) reveal a reversal in the aforementioned declining path (Figure 2.1). The economic sentiment indicator improved by 7.9 index units in September, with the services and construction sub-indices recording the highest increase (27.7 and 14.7 index units respectively). This amelioration in economic climate probably reflects the positive spillover effects from the new agreement (the 3rd economic adjustment programme) reached between Greece and its official creditors in mid-August. A further recovery in Greece's economic sentiment indicator and its sub-components should be expected in the months ahead, provided that the 1st review of the new programme is successfully completed without encountering major delays.

Separately, a look at the most recent readings in a number of key real activity indicators reveals a broadly similar story. Among others, industrial production recorded a strong rebound in August after declining in three consecutive months, while the trade balance improved lately (though, mainly due to a sharp decline in imports). On a less encouraging note, retail trade recorded a big decline in July and it will be important to see how this important indicator (which is highly correlated (+) with GDP) evolved in August and September.

Figure 2.1: Economic Sentiment Indicator - Subcomponents

(a) Economic Sentiment   (b) Industry   (c) Services

(d) Consumers   (e) Retail Trade   (f) Construction

Source: (a) European Commission, (b) Eurobank Research.

Note: (a) the data are seasonally adjusted time series.

Figure 2.2: Industrial Production and Retail Trade (Volume) Indices

(a) Industrial Production Index   (b) Retail Trade (Volume) Index

Source: (a) Hellenic Statistical Authority (EL.STAT.), (b) Eurobank Research.

Note: (a) the data are seasonally adjusted time series.

Figure 2.3: Exports, Imports and Trade Balance of Goods

(a) Exports and Imports of Goods   (b) Trade Balance

Source: (a) Hellenic Statistical Authority (EL.STAT.), (b) Eurobank Research.

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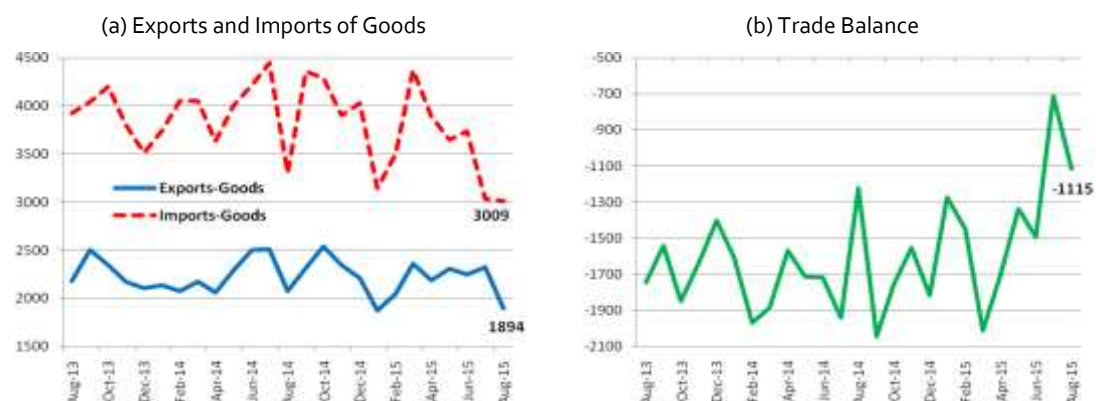"Bridge models to forecast the Euro area GDP", *International Journal of Forecasting*, 20, 447-460, 2004.

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Appendix – High frequency indicators used in Nowcasting Greek GDP

Table A. Data series used in our empirical study (*)

Data series	Source	Full-sample period	Data collection period/ reporting frequency	Number of observations with reporting lag of zero (0) months or quarters	Number of observations with reporting lag of 1 month or quarter	Number of observations with reporting lag of 2 months	Number of observations with reporting lag of 3 months	Number of observations with reporting lag of 4 months
GDP (constant prices)	ELSTAT	3Q 2005-3Q2013	Quarterly	0	35	0	0	0
Retail sales index (volume)	ELSTAT	Mar 2005-Oct 2013	Monhtly	0	0	89	13	0
Road motor vehicles put into circulation for the 1st time	ELSTAT	Mar 2005-Oct 2013	Monhtly	0	98	2	2	0
Unemployment rate	ELSTAT	Apr 2007-Oct 2013	Monhtly	0	0	0	78	0
Number of employed	ELSTAT	Apr 2007-Oct 2014	Monhtly	0	0	0	78	0
New Primate Sector Hirings	Ministry of Labour, Social Security & Welfare	Jan 2006-Oct 2013	Monhtly	0	92	0	0	0
CPI	ELSTAT	Mar 2005-Oct 2013	Monhtly	0	103	0	0	0
Building permits	ELSTAT	Jan 2008-Oct 2013	Monhtly	0	0	0	67	11
Industrial production index	ELSTAT	Mar 2005-Oct 2013	Monhtly	0	0	102	0	0
Manufacturing production index	ELSTAT	Mar 2005-Oct 2013	Monhtly	0	0	102	0	0
Current account balance	BoG	Mar 2005-Oct 2013	Monhtly	0	0	102	0	0
Turnover index in retail trade	ELSTAT	Jul 2007-Oct 2013	Quarterly	0	0	0	28	1
Index of new orders in industry	ELSTAT	Mar 2006-Oct 2013	Monhtly	0	0	83	2	9
Turnover index in industry	ELSTAT	Oct 2006-Oct 2013	Monhtly	0	0	83	1	0
MFI credit to domestic businesses and households	BoG	Oct 2008-Oct 2013	Monhtly	0	46	13	0	0
Domestic private sector bank deposits	BoG	Mar 2005-Oct 2013	Monhtly	0	101	1	0	0
CPI-based REER	ECB	Mar 2005-Oct 2013	Monhtly	0	102	0	0	0
ULC-based REER	ECB	Mar 2005-Oct 2013	Quarterly	0	0	0	0	35
Central gvnt revenue	FinMin	Mar 2005-Oct 2013	Monhtly	0	102	0	0	0
Central gvnt expenditure	FinMin	Mar 2005-Oct 2015	Monhtly	0	102	0	0	0
Economic Climate Index	IOBE	Mar 2005-Oct 2013	Monhtly	102	0	0	0	0
Athens Stock Exchange (ASE) index	Bloomberg	Mar 2005-Oct 2013	Monhtly	103	0	0	0	0
ASE Volatility	Bloomberg	Mar 2005-Oct 2013	Monhtly	103	0	0	0	0
EONIA	Bloomberg	Mar 2005-Oct 2013	Monhtly	103	0	0	0	0
VIX	Bloomberg	Mar 2005-Oct 2015	Monhtly	103	0	0	0	0

Source: ECB, ELSTAT, EC, Bloomberg, Ministry of Labour, Social Security & Welfare, Eurobank Global Markets Research

(*) Our data base has been properly updated to include all respective data releases up to October, 2015.

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