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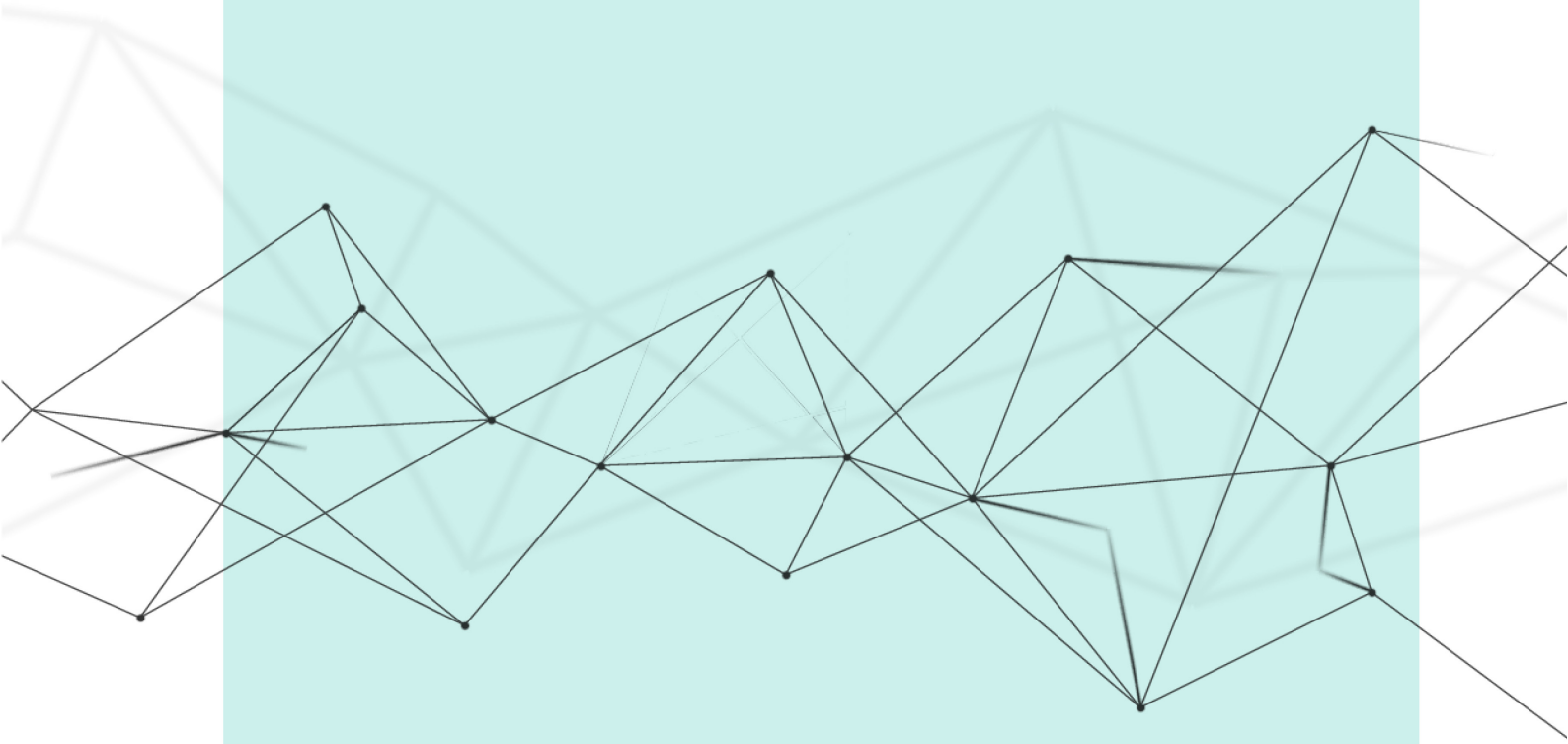
An Evaluation of Business Cycle Indicators for the Swiss Economy



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Eine Auswertung von Konjunkturindikatoren für die Schweizer Volkswirtschaft

Zusammenfassung

Diese Studie bewertet die Fähigkeit von Stimmungs- und Sammelindikatoren, zyklische Schwankungen der Schweizer Wirtschaft frühzeitig zu erkennen. Zu diesem Zweck werden unterschiedliche Methoden und Referenzreihen, wie das BIP, die Wertschöpfung des verarbeitenden Gewerbes, die Wertschöpfung des Dienstleistungssektors oder die Wertschöpfung des privaten Sektors insgesamt, eingesetzt.

Wir stellen fest, dass fast alle betrachteten Indikatoren eine vergleichsweise hohe kontemporäre Korrelation mit dem BIP aufweisen. Unter Berücksichtigung von Datenrevisionen ergibt sich ein spürbarer Rückgang in der Stärke des Zusammenhangs. Außerdem schwinden Korrelationen jenseits einer Leadlänge von einem Quartal recht schnell. Ähnliches ergibt sich für die Wertschöpfung des verarbeitenden Gewerbes und des gesamten privaten Sektors. Für den Dienstleistungssektor zeigt sich, dass die speziell für den Sektor entwickelten Indikatoren schlecht abschneiden.

Schließlich finden wir Hinweise auf zeitliche Instabilitäten in der Beziehung zwischen den Indikatoren und den Referenzreihen. Dies gilt für alle, insbesondere aber für die ausländischen Indikatoren. Es scheint kein spezifisches Muster für die Veränderung des Gleichlaufs in der Bewegung von Konjunkturindikatoren und den Referenzreihen über verschiedene Zeitepisoden hinweg zu geben.

Hervorzuheben ist, dass kein Indikator die anderen deutlich übertrifft. Es erscheint daher sinnvoll, alle Indikatoren gleichzeitig zu verwenden, trotz des Risikos widersprüchlicher Signale zu den zugrunde liegenden makroökonomischen Reihen oder einer Änderung des Informationsgehalts einiger Indikatoren im Laufe der Zeit. Dennoch bleiben Stimmungsindikatoren ein nützliches Instrument zur Konjunkturanalyse. Sie können die Unsicherheit über die kurzfristige Entwicklung einer Volkswirtschaft verringern, jedoch nicht beseitigen. Dies spricht wiederum für ihre Einbindung in ein breiteres Spektrum von Variablen.

Évaluation des indicateurs conjoncturels analysant l'économie suisse

Résumé

L'étude évalue la capacité des indicateurs composites et de climat à identifier de manière précoce les fluctuations cycliques de l'économie suisse. Différentes méthodes et séries de référence comme le PIB, la valeur ajoutée des industries manufacturières, celle des services et la valeur ajoutée totale du secteur privé sont utilisées à cette fin.

Il apparaît que la corrélation contemporaine avec le PIB de la quasi-totalité des indicateurs considérés est comparativement élevée. En tenant compte des données révisées, on constate un recul sensible de la force de la corrélation. En outre, les corrélations au-delà du trimestre suivant diminuent assez rapidement. Il en va de même pour la valeur ajoutée des industries manufacturières et du secteur privé dans son ensemble. Quant au secteur des services, il apparaît que les indicateurs développés spécifiquement pour lui obtiennent de mauvais résultats.

Pour terminer, nous nous observons une instabilité temporelle des indices d'instabilité temporelle dans la relation entre les indicateurs et les séries de référence. Le constat est général, mais vaut en particulier pour les indicateurs étrangers. Il ne semble pas y avoir de schéma spécifique concernant les écarts dans l'évolution des indicateurs conjoncturels et des séries de référence au-delà des différents épisodes temporels.

Il convient de souligner qu'aucun indicateur ne surclasse nettement les autres. Il paraît dès lors judicieux de les utiliser tous simultanément malgré le risque de signaux contradictoires par rapport aux séries macroéconomiques sous-jacentes ou d'une modification du contenu informatif de certains indicateurs dans le temps. Les indicateurs de climat restent toutefois un instrument utile pour l'analyse conjoncturelle. S'ils diminuent les incertitudes quant au développement à court terme d'une économie, ils ne peuvent les écarter totalement, ce qui plaide en faveur de leur intégration dans un éventail plus large de variables.

Indicatori congiunturali ed economia svizzera: una valutazione

Riassunto

Questo studio valuta la capacità degli indicatori di fiducia e degli indicatori compositi di identificare tempestivamente le fluttuazioni cicliche dell'economia svizzera. A tale scopo vengono impiegati diversi metodi e dati di riferimento tra cui il PIL, il valore aggiunto dell'industria manifatturiera, del settore dei servizi e di quello dell'intero settore privato.

Si constata che la maggior parte degli indicatori ha una correlazione contemporanea relativamente alta con il PIL. Se si tiene conto delle revisioni dei dati si nota tuttavia un notevole indebolimento della correlazione. Inoltre, le correlazioni al di là del trimestre seguente svaniscono piuttosto rapidamente. Lo stesso vale anche per quanto riguarda la creazione di valore da parte dell'industria manifatturiera e di tutto il settore privato ma non per i servizi, dove i risultati ottenuti utilizzando indicatori specifici si dimostrano deludenti.

Lo studio riscontra inoltre una presenza generale di instabilità temporali nelle correlazioni tra indicatori (soprattutto esteri) e dati di riferimento. L'evoluzione nel tempo della correlazione tra indicatori congiunturali e dati di referenza non sembra seguire un modello uniforme.

È importante sottolineare che non esiste un indicatore nettamente migliore di tutti gli altri. Per questo motivo si consiglia di utilizzarli tutti contemporaneamente nonostante il caveat di eventuali segnali contraddittori sui dati di riferimento e il rischio che il contenuto informativo di alcuni indicatori si modifichi nel tempo. Ciò nonostante gli indicatori congiunturali rappresentano uno strumento utile per l'analisi congiunturale. Tuttavia, se da un lato permettono di ridurre l'incertezza sull'evoluzione a breve termine dell'economia, non possono eliminarla. Ecco perché è bene utilizzarli all'interno di un ampio insieme di variabili.

An Evaluation of Business Cycle Indicators for the Swiss Economy

Summary

This study assesses the ability of sentiment indicators and composite indicators in identifying cyclical fluctuations in the Swiss economy at an early stage. For this, we utilize various methodologies and different reference series, as for instance, GDP, the value added of the manufacturing sector, the value added of the service sector, or the value added of the private sector as a whole.

We find that nearly all indicators considered have a comparably high contemporaneous correlation with GDP. A noticeable decrease in the strength of the relation occurs once taking data revisions into account. Moreover, correlations beyond a lead of one quarter vanish rather quickly. The results are similar for the value added of the manufacturing sector and the private sector as a whole. Regarding the service sector, we find that the indicators specifically designed for this sector perform poorly.

Finally, we find evidence of temporal instabilities in the relation between the indicators and the reference series. This applies to all indicators, but especially to foreign business cycle indicators. There seems to be no specific pattern regarding the change in the co-movement of business cycle indicators and the reference series across different time episodes.

We emphasize that no business cycle indicator clearly outperforms the others. It therefore seems reasonable to use all indicators simultaneously, despite the caveat of possibly receiving contradictory signals on the underlying macroeconomic series and the risk of the informational content of some indicators changing over time. Nevertheless, business cycle indicators remain a useful instrument for business cycle analysis. They can diminish the uncertainty surrounding the short-term evolution of the economy, though they cannot remove it, which in turn calls for their inclusion in a broader set of variables.

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1 Introduction

For economic agents being exposed to cycles of prosperity and depression, the prospect of a set of indicators that could offer advance guidance of economic fluctuations is tempting. There is no doubt that, as a measure of the aggregate state of an economy, real GDP is one of the most important coincident business cycle indicators (BCI), however, the obvious publication lag of GDP statistics, the mere circumstance that its figures are only available on a quarterly basis and the fact that they are subject to sizeable revisions, render GDP less useful to early assess business cycle developments. There is yet one further important aspect that weighs on the usefulness of GDP figures in identifying business cycle fluctuations. In fact, GDP also includes elements that are not linked to the business cycle at all: Examples of such elements involve non-cyclical GDP components such as the value added of the public sector, or value added of sectors that are repeatedly exposed to idiosyncratic events (weather effects, etc.). Against this background, GDP (and its various transformations) should not be considered as synonymous to the business cycle, though GDP can, among other variables, be perceived as a variable containing valuable information on the business cycle. Economists have tried to compensate for these drawbacks by drawing more attention to other business cycle indicators from either surveys or hard data (see, for instance, Diebold and Rudebusch, 1989; Veloce, 1996; Zanetti and Wey, 2005 to mention a few), which are designed to offer an accurate picture of current and near-term developments of an economy. Their usefulness relies on their ability to anticipate the cyclical behaviour of some reference series, usually GDP growth. The ideal business cycle indicator is characterised by the following features:[1]

- Correlation: A good business cycle indicator should have a high correlation with the variables of interest (*reference series*).
- Lead: A good business cycle indicator should have a lead relative to the variables of interest.
- Timeliness: A good business cycle indicator should be readily available.
- Robustness: A good business cycle indicator should be characterized by a stable correlation and a stable lead property with the variables of interest.

[1]In general, measures of economic activity (for instance, industrial production) tend to be strong on correlation and weak on timeliness (long publication lag) and stability (industrial production, among others, is revised frequently). In contrast to that, financial market indicators (implied volatility measures, equity prices, bond spreads, etc.) are weaker on correlation but strong on the following properties: timeliness, lead, and robustness.

- Stability: A good business cycle indicator should not be subject to any major revisions (this is crucial in determining the actual usefulness of the real-time informational content at the most recent observations).
- Reliability: Indicators should be regularly and reliably available.
- Credibility: The quality of survey based indicators depends, among others, on the response rate, on the extent to which the questions are replied truthfully and on the methodology applied to construct an index from qualitative data.
- Length: Not least, the practical usefulness of business cycle indicators rests upon the time span they cover.

Against this background, the aim of this study is to identify a set of indicators which have the most favourable characteristics for the early recognition of the business cycle of the Swiss economy. These characteristics include (i) a high contemporary or leading correlation with the reference series (i.e. GDP or parts thereof), (ii) timely availability, (iii) temporal stability, and (iv) a low proneness to revisions. To this end, the study focuses on *economic sentiment indicators* and *composite indicators* which comprise a particular subset of the more broader set of business cycle indicators.

The usefulness of a business cycle indicator can be evaluated only in the context of a given method of prediction; it is for this reason that we utilise various methodologies to assess the informational content of the business cycle indicators with regard to the reference series. First, for several business cycle indicators, we present general information on their frequency, publication schedule, descriptive statistics, and a general assessment concerning the dynamic cross-correlation of the business cycle indicators with the reference series (among others GDP, value added of the manufacturing industries, value added of the service industries, total value added of the private sector). The basic questions posed in this regard are: Does the performance of the business cycle indicators warrant all attention they receive in policy making institutions, the media, etc.? To what extent can indicators be trusted to provide reliable information for the Swiss business cycle? The analysis also considers an assessment of the degree of lead property in this context and addresses robustness checks along various dimensions.

The dynamic cross-correlation analysis helps to (i) judge the extent of lead-lag relationships between some reference series and the business cycle indicators and (ii) to assess if an indicator is pro-cyclical or countercyclical. The correlation analysis, though useful, has, however, only a small ability to assess the robustness of an indicator. What is important in this respect is the stability of the correlation pattern of business cycle

indicators with their reference series over time. The second part of the analysis therefore addresses the temporal stability of the relation between business cycle indicators and the reference series. We use time-varying parameter models to assess the temporal variation of the interdependency of business cycle indicators and the reference series. To this end, we use *dynamic model averaging* (DMA). This approach provides an evaluation of the time-variation and gives an assessment of the business cycle indicators being most useful in forecasting the reference series.

The third part considers forecasting. A general problem occurs when dealing with business cycle indicators on the one hand and National Account Statistics on the other: mixed frequencies. Most business cycle indicators are collected and published on a monthly basis; GDP statistics in turn are only available on a quarterly basis. The problem of jointly using time series of different frequencies (e.g. monthly indicators from business surveys and quarterly national accounts data) is usually solved by aggregating monthly series into quarterly series. This allows the use of traditional techniques but entails information losses. Thus, the observed dynamics within a quarter are not taken into account. Moreover, monthly data at the end of the sample are only included if these monthly values are available for a complete quarter. Information that is only available up to the first or second month of the current quarter cannot be used. The quality of short-term forecasts, however, is mainly determined by the current information. Against this background, we evaluate the forecasting performance of the business cycle indicators for predicting the reference series, utilizing econometric models that allow for mixed frequencies. In principle, DMA could also be used for forecasting; however, to the extent that it is based on time-varying parameter models limits its ability for forecasting as it cannot account for mixed frequencies and/or missing observations. For this reason we apply a mixed-data-sampling (MIDAS) approach for assessing the usefulness of the business cycle indicators in forecasting the references series.

The report is structured as follows: Section 2 in conjunction with Table 31 provides an overview on the business cycle indicators used in the study. We carry out the dynamic cross-correlation analysis in Section 3. The section is extended by various robustness checks including, among others, evidence for the correlation structure once the data are pre-whitened, and a parametric approach to determining the correlations. Section 4 evaluates the temporal stability of the relationship between the business cycle indicators and the reference series. To this end, we first briefly explain the econometric methodology utilized and then apply it to the variables analysed in Section 3. Section 5 considers the application of MIDAS for forecasting the reference series. In this context we again use the business cycle indicators of Section 3, now assessing their usefulness in forecasting.

Section 6 concludes.

2 Swiss business cycle indicators and the reference series – an overview

Table 31 lists all the indicators used for the analysis. The table displays the acronym used for each indicator in the subsequent analysis; apart from that, the table also offers additional information concerning the time horizon each indicator spans, the frequency (monthly or quarterly) and the publication delay.

The business cycle indicators considered here vary along different dimensions. (i) Differences in the frequency: some indicators listed in Table 31 are observed at a quarterly, others at a monthly frequency. Of course, the usefulness of any indicator increases with the frequency of observation. (ii) The set of indicators captures both domestic and foreign economic developments. This aspect is particularly important in case of a small open economy, which applies to the Swiss economy. (iii) The set of indicators involves measures targeted for distinct sectors; the most noteworthy distinction here addresses the manufacturing and the service industry.

We relate the business cycle indicators to various real macroeconomic variables. We refer to the latter as *reference series*. All reference series (chain linked volumes, 2010 CHF, seasonally and calendar adjusted) are taken and constructed from the National Account Statistics.

At the beginning of the 2000s, many countries switched the calculations of volume estimates in national accounts from a fixed base year to calculations at previous year prices. In Switzerland the transition from volumes measured at constant prices to the chain-linking method occurred by the end of 2003 for the yearly series. The Quarterly National Account Statistics were adjusted to these yearly aggregates in early 2004 but experienced further revisions in the course of 2004 and 2005 (Indergand and Leist, 2014)

A price adjustment based on average prices of the previous year allows to calculate growth rates in real terms, but not absolute values. In order to obtain time series of absolute values for volume estimates, chain-linking of growth rates is necessary. Unlike constant price estimates, chain indices are not generally additive.

The following procedure is therefore used to calculate aggregates from single real components: The individual real time series are again converted into average prices of the previous year (de-chained). These values are now additive, i.e. the desired aggregates can be calculated. Both quarterly values at current prices and at average prices of the previous year, sum up to the respective annual figures. Using these two series, the annual-

Table 1: Reference series used - An overview

Acronym	Series (volume, sca)	Sector Classification
gdp	GDP (i) pre- vs. (ii) post-global financial crisis episode; (iii) first release and (iv) final release data	[all]
gdp-nosports	GDP excluding sport related components/events	[¬ all]
va-manu	Value added of the core manufacturing industry	C
va-indu	Value added of the extended manufacturing industry	B—E
va-second	Value added of the secondary sector	B—F
va-serv-priv	Value added of private service industry	G—N & R—S
va-tert	Value added of the tertiary sector	G—T
va-priv	Value added of the whole private sector (excludes public sector, O—Q)	A—N & R—T

overlap technique is applied to calculate growth rates. These growth rates compare to the respective quarter with the average of the previous year's values at current prices and are chained accordingly in order to construct an index at constant prices. This index is re-based using the year 2010 as a reference to calculate absolute values (Bierbaumer-Polly and Bilek-Steindl, 2017).

3 Dynamic cross-correlation analysis

In this section we utilize dynamic cross-correlation analysis to (i) judge the extent of lead-lag relationship between a reference series and the business cycle indicators and (ii) to assess if an indicator is pro-cyclical or countercyclical.[2] Our analysis considers various dimensions in this respect. First, we use several distinct macroeconomic aggregates as reference series. By this we can then categorize the various business cycle indicators into

[2]Most indicators are pro-cyclical: industrial production, employment, etc., to name a few. The most common countercyclical indicators are, for instance, implied stock market volatility indices and unemployment.

groups most relevant for the reference series. Secondly, we consider different growth rates of the reference series. The motivation for that is due to the following: some business cycle indicators are constructed to having a high correlation with quarter-over-quarter (q-q) growth rates of GDP while others with year-over-year (y-y) growth rates of GDP. In order to assess the target growth rate, we hence consider dynamic correlations for both q-q and y-y growth rates of the reference series. Thirdly, as our sample comprises several decades, it is likely that the stability of the relation of some business cycle indicator with the reference series changes over time. In order to assess time-variation, we hence split the sample into a pre- and a post-crisis period where the global financial crisis marks the period of the split (Q3:2008 to Q4:2009). Though frequently done, this is, however, a fairly simple approach for judging time variation; Section 4 will focus on that in more detail. Finally, as far as possible we take into account data revisions of the reference series. All our reference series stem from or are calculated on the basis of National Accounts Statistics provided by SECO. These figures are usually characterized by revisions. In general, data revisions matter for most at the end of the sample as this receives most attention. In order to check the sensitivity of the dynamic correlations to data revisions, we hence assess dynamic correlations also for the first release of the data and compare it to the results with the final data releases. Differences therein provide evidence of the relevance of data revisions.

The dynamic correlation analysis helps to rank different business cycle indicators according to their relevance for the reference series. The contemporaneous correlation is one piece of information, however, we are interested in judging the extent of lead of business cycle indicators with respect to reference series. To this end, we evaluate the correlation between the reference series and the business cycle indicators not only contemporaneously, but also intertemporally. We rely on the simple dynamic cross-correlation coefficient. The dynamic cross-correlation $\rho_{XY}(\tau)$ is a measure of similarity of two series X and Y as a function of the temporal displacement τ of one relative to the other, that is, it extends the concept of correlation to the timing of two indicators. Technical details are provided in Appendix A. The dynamic cross-correlation function is specified such that if a business cycle indicator has a high correlation with a reference series at $\tau > 0$, then this indicator is considered as a leading indicator.In contrast to that, if a business cycle indicator has a high correlation with a reference series at $\tau < 0$, then this indicator is classified as a lagging indicator rendering this indicator less useful for forecasting.

We use the concept of the dynamic cross-correlation coefficient to rank the indicators according to (i) the degree of correlation with the reference series and (ii) with respect to the size of lead. An ideal business cycle indicator is characterised by a high correlation

$\rho_{XY}(\tau)$ and a high lead $\tau > 0$. We focus on these two aspects in order to rank the business cycle indicators. This, though, introduces some difficulties. For instance, consider the hypothetical correlation of two arbitrary business cycle indicators $x^{(1)}$ and $x^{(2)}$ and assume that $x^{(1)}$ has a correlation with a reference series at $\tau = 1$ of 0.9 and zero elsewhere, whereas the indicator $x^{(2)}$ has a correlation with the same reference series at $\tau = 4$ of only 0.6 and zero elsewhere. Clearly $x^{(1)}$ has a higher correlation with the reference series, however, $x^{(2)}$ has a higher lead over the reference series despite a slightly lower correlation. It is difficult to discriminate between these two indicators in terms of their usefulness in tracking changes in the references series. $x^{(1)}$ gives more precise signals for the expected changes in the reference series, though only one period in advance; $x^{(2)}$ gives less reliable signals on the expected changes in the references series, though with a much higher lead. Ranking of the indicators is done by applying the following formula:

$$\sum_{j=1}^{9} j^2 \cdot \rho_{XY}(\tau = j - 5) \tag{1}$$

where $j \in [1, 9]$ captures the weight of each cross-correlation coefficient and its temporal displacement. For instance, cross-correlations at lags ($\tau < 0$ which applies $\forall\ j \in \{1, ..., 4\}$), are weighted excessively low compared to leads ($\tau > 0$ which applies $\forall\ j \in \{6, ..., 9\}$), which is due to the quadratic term (j^2) in equation (1). In other words, in equation (1) we explicitly take into account that our analysis focuses on leads and lags in the range of $\tau \in [-4, 4]$ where $\tau > 0$ can be associated with a lead of a business cycle indicator with respect to the reference series ($\tau > 0$ hence classifies truly leading indicators) and $\tau < 0$ in turn implies that a business cycle indicator follows the reference series with a lag. High values of the correlation coefficient at leads ($\tau > 0$) increase the ranking statistic, whereas higher values of the correlation coefficient at lags reduce it. The correlation coefficients are weighted linearly depending on the extent of their lead or lag.

Finally, the dynamic cross-correlation analysis requires all variables to be adjusted to the same frequency. Our references series are all based on quarterly data, however, most of the business cycle indicators are in turn monthly data. We adjust monthly data to a quarterly frequency so that the dynamic cross-correlation can be carried out. This is done by calculating 3-month averages in order to establish quarterly values. Section 3.2.2 assesses the sensitivity of the aggregation method by considering several alternative aggregation approaches.

3.1 Results of the dynamic cross-correlation analysis

Figures 1-8 show the results of the dynamic cross-correlation analysis for the business cycle indicators with respect to the various reference series which are explained in detail in Table 1. The pattern of the correlations tells us a lot about the timing of movements of the business cycle indicators relative to the reference series. Considering for instance Figure 1, positive values of τ indicate correlations of the business cycle indicators with future q-q growth rates of GDP; we would say that they reflect the tendency of business cycle indicators to *lead* output.

3.1.1 The evidence for GDP

Figure 1 shows the results of the dynamic cross-correlation analysis for GDP. We implement the correlation analysis for both quarter-over-quarter (q-q) and year-over-year (y-y) GDP growth rates across all business cycle indicators listed in Table 31. We do so for the purpose of identifying the particular target growth rate of the various business cycle indicators.

Considering first the evidence for the q-q growth rates, we find that the only truly business cycle indicator is *cs-econ-expect* (economic expectations obtained from an economic sentiment surveys carried out by Credit Suisse); this indicator has its highest correlation with the q-q GDP growth rate at a lead of one quarter ($\rho(\tau = 1) = 0.57$); its contemporaneous and lagged correlations with GDP are all noticeably smaller. *cs-econ-expect* is the only indicator with this characteristic; all remaining indicators are either coincident or lagging indicators – at least from a quarterly perspective. *kof-econ-bar* (KOF Konjunkturbarometer - business cycle indicator of the KOF-Swiss Economic Institute at the ETH Zurich), *kn-bci* (composite business cycle indicator of Kühne+Nagel (KN)), *seco-dfm* (composite business cycle indicator of the Swiss State Secretariat for Economic Affairs (SECO)) and *snb-bci* (composite business cycle indicator of the Swiss National Bank (SNB)) have a correlation with the q-q growth rate of GDP at one lead of similar size as *cs-econ-expect*, though the contemporaneous correlation is highest. Moreover, all the these indicators have a correlation with the q-q growth rate of GDP at a lead of one quarter ($\tau = 1$) larger than 0.5. Against this background, the five aforementioned indicators are the ones with the highest lead-correlation as well as contemporaneous correlation, rendering them useful in an application of nowcasting GDP growth rates. For convenience and later use, we refer to these indicators (*cs-econ-expect*, *kof-econ-bar*, *kn-bci*, *seco-dfm*, and *snb-bci*) as *group-1-indicators*.

There are, though, several other indicators with at least a decent contemporaneous correlation; these are: *sentix-econ-expect*, *kof-ind-no3m*, *snb-foreign-pmi*, *cs-ind-pmi-bo*,

cs-ind-pmi-prod, and *kof-ind-nopm*. Their contemporaneous correlation compares in size with the one of the previous group of business cycle indicators, their correlation at leads is though noticeably smaller. Again, for convenience and later use, we refer to this set of indicators (*sentix-econ-expect*, *kof-ind-no3m*, *snb-foreign-pmi*, *cs-ind-pmi-bo*, *cs-ind-pmi-prod*, and *kof-ind-nopm*) as *group-2-indicators*.

Apart from that, our ranking formula places high *cs-serv-pmi*. This is due to the fact that this indicator has the highest correlation across all leads among all business cycle indicators, however, the exceptionally short time span covered by this indicator limits its practical usefulness.

When considering the evidence for the y-y growth rates, we observe two noteworthy patterns. First, the business cycle indicators are now all characterised by a higher correlation at any lead ($\tau > 0$). This is due to the fact that the computation of y-y growth rates ($\Delta^{(4)} = 1 - L^4$, L is the lag operator) triggers a higher phase shift in the time series of the GDP growth rates compared to q-q growth rates which simply require the first difference ($\Delta^{(1)} = 1 - L$). As a matter of fact, the y-y growth rates of GDP are shifted further to the past which in turn induces a higher lead of the business cycle indicators. Hence the higher lead of the business cycle indicators in the case of the y-y growth rates relative to the q-q growth rates, is caused simply by construction. Secondly, across all leads and lags, the correlations are now higher. This is basically due to the fact that the gain function of the filter $\Delta^{(4)}$ implies less high-frequency oscillations – or in other words, oscillations with a longer periodicity – than in the case of $\Delta^{(1)}$ (see for instance Sargent, 1979, Chapter XI).

The implication of these technical considerations is that the evidence for the correlations for the y-y growth rates is essentially the same compared to the case of the q-q growth rates, except for the fact that (i) correlations are now on average higher and (ii) all business cycle indicators are now showing a higher lead property. Across all indicators, we again find that *cs-econ-expect* has the highest lead ($\rho(\tau = 3) = 0.71$); we ignore *cs-serv-pmi* as this indicator covers a short time span; moreover, the *group-1-indicators* show again the highest correlation with GDP $\forall \tau \geq 0$, rendering them equally useful for y-y GDP growth rates as for q-q GDP growth rates. The same applies also to the *group-2-indicators*.

Figure 2 shows the evidence for the dynamic cross-correlations for GDP adjusted for sport related components. We observe that there are no noteworthy differences neither for the q-q growth rates nor for the y-y growth rates compared to the evidence depicted in Figure 1. Hence the informational content of the business cycle indicators listed in Table 31 is fairly unrelated to the sport related components. In other words, from a pure

business cycle perspective it does not matter whether one considers sport-event adjusted GDP or total GDP.

The evidence presented in Figures 1 and 2 is based on the final vintage of the GDP data (available on September, 6th 2018). The fact that GDP data are revised regularly, implies that there could be the possibility that the adequacy of the indicators listed in Table 31 in acting as business cycle indicators might be different once revisions of GDP data are taken into account. To this purpose, we carry out the same analysis as done in Figure 1, however, now with the first release of GDP data; the results are shown in Figure 9. The dynamic cross-correlations depicted in Figure 9 are across all business cycle indicators on average smaller than the ones of Figure 1. This is essentially for two reasons; first of all, first release data for GDP are only available from Q3:2002 onwards which implies that the time span available for computing the cross-correlations is now significantly smaller than the one available for the correlations shown in Figure 1. Secondly, as highlighted in Aruoba (2008) data revisions are news. Hence this adds a component to the first release GDP growth rates which is white noise; to the extent that this component is unrelated to the indicators of Table 31, the correlations of the business cycle indicators with the first release GDP growth rates (both q-q and y-y rates) are now consequently smaller. Apart from that, however, we observe that the adequacy of the *group-1-indicators* and *group-2-indicators* still applies, though, now their correlation with q-q and y-y GDP growth rates is smaller $\forall\ \tau \in [-4, 4]$. We interpret this in favour of the stability of these indicators with respect to the problem of data revisions.

3.1.2 The evidence for the manufacturing industries

Figures 3-5 show the evidence for the various measures for the manufacturing industry. In this regard we consider a core measure involving only the sector C from the NACE Rev.2 classification; an extended measure for the manufacturing industry involving sectors B—E, and finally the secondary sector as a whole involving sectors B—F (consider also Table 1). We again assess the usefulness of all indicators listed in Table 31 for each of the three reference series for the manufacturing industries.

Considering first the q-q growth rates of *va-manu*, *va-indu* and *va-second*, we observe that the evidence for the dynamic cross-correlations resembles the one of GDP to a large extent. However, across all indicators, we observe that their correlation with any of the three references series is noticeably smaller than for the q-q GDP growth rates. Apart from that, for all three series, the *group-1-indicators* again have – on average – the highest correlation at leads and contemporaneously. Again, *cs-econ-expect* is the only true lead-indicator in a classical sense since this indicators' correlation with the three measures for

the manufacturing industries is highest at a lead of one quarter.

Among the *group-2-indicators* we again observe a decent correlation contemporaneously across the three reference series; moreover, it turns out to be highest in relation to the correlation of any lead or lag (*kof-ind-nopm* is an exception to this as the correlation at the first lagged quarter is – on average – larger than the contemporaneous one.

The evidence for the y-y growth rates of the three reference series is slightly different to the one of the q-q growth rates. The *kn-bci* shows the highest correlation with all of the three reference series; the correlation is highest at a lead of two quarters, exceeding even the correlation with the y-y GDP growth rate. The latter characteristic also applies to *cs-econ-expect*, especially for high leads of the indicator relative to the reference series. The remaining indicators among the *group-1-indicators* show a slightly lower correlation compared to y-y GDP growth rates.

The evidence for the correlation pattern of the *group-2-indicators* is similar as for the y-y GDP growth rate, though now their correlation is – on average – lower. Moreover, the correlation of the indicators is fairly similar across the three reference series for the manufacturing industry.

All in all, we again consider the *group-1-indicators* and *group-2-indicators* to be helpful in detecting movements in the three reference series of the manufacturing industries at an early stage.

3.1.3 The evidence for the service industries

Figures 6-7 show the evidence for the various measures for the service industries. In this regard we consider a measure comprising private sector related service industries (*va-serv-priv*) involving only sectors G—N and R—S from the NACE classification; and in an extension to this, the tertiary sector as a whole (*va-tert*) involving sectors G—T (consider also Table 1). We again assess the usefulness of all indicators listed in Table 31 for each of the two reference series.

The results can be summarised as follows: First of all, the correlation of the business cycle indicators with the two reference series is fairly low compared to the evidence for GDP. This applies both to q-q and y-y growth rates alike. Secondly, the *group-1-indicators* and the *group-2-indicators* show again the highest correlation with the two reference series; this can be observed for leads and contemporaneously. Thirdly, the results offer a quite mixed evidence for the five service-industry related indicators (*ism-us-pmi-serv*, *cs-serv-pmi*, *ec-ea-serv-conf*, *ec-at-serv-dem3m* and *ec-at-serv-sit*). The *ism-us-pmi-serv* indicator shows a decent correlation with both reference series across leads and lags of up to 0.5 (contemporaneously) with *va-serv-priv* and 0.48 (contemporaneously) with *va-tert*

(q-q growth rates in each case). The *ec-ea-serv-conf* indicator in turn has the highest correlation with the q-q growth rates of the two reference series at lags, rendering this indicator less useful in detecting movements in the two reference series of the service industries at an early stage. The same applies to those business cycle indicators targeted to the Austrian economy. These indicators are though not intended to capture the Swiss service industries. The *cs-serv-pmi* indicator is in turn constructed so as to capture the Swiss service industry. This indicator has a discouraging low correlation with the two reference series (both for q-q and y-y growth rates). Even worse, the highest correlation is at a lag of four and it is negative; moreover, as regards the y-y growth rates, we even observe a negative correlation contemporaneously. Obviously, this indicator only starts in 2014, which might explain the perceptibly unfortunate correlation pattern at least to some extent.

All in all, the *group-1-indicators* and *group-2-indicators* indicators are again the most adequate indicators in providing early guidance as regards the expected movements in the two reference series for the service industries; however, less so as in the case for the manufacturing industries and GDP as a whole. Among the five indicators that have been constructed to capture the service industry, only the *ism-us-pmi-serv* indicator from the US is likely to be useful.

3.1.4 The evidence for the value added of the whole private sector

Figure 8 provides the evidence of the dynamic cross-correlation analysis for the private sector as a whole. Again the analysis is done for both q-q and y-y growth rates. For both definitions of the growth rates, we observe that the evidence for the dynamic correlations resembles the pattern of GDP to a large extent. In particular, as regards the q-q growth rates (left panel in Figure 8), we again find that *cs-econ-expect* tends to be the only real leading indicator as this indicators' correlation with the reference series is highest at a lead of one quarter. The remaining indicators of the *group-1-indicators* are again among the best performing indicators, moreover, their correlation is on average as high as with the q-q growth rate of GDP. The same applies also to the *group-2-indicators*.

The correlation pattern with the y-y growth rates of the private sector is shown on the right panel in Figure 8. We observe across all business cycle indicators that the correlations are again (i) on average noticeably higher and (ii) the lead property is more pronounced. Moreover, the usefulness of the *group-1-indicators* and *group-2-indicators* is more or less unchanged in comparison to the correlation pattern of the y-y growth rates of GDP.

3.2 Robustness of the results

In this section we evaluate the robustness of the results of the previous section. For this we consider various extensions: (i) we assess the temporal stability of the correlations by means of splitting the sample into a pre and post global financial crisis episode; (ii) we address the issue of aggregating monthly indicators into quarterly data; and finally (iii) we consider the issue of pre-whitening the data, in particular, by smoothing the reference-series using an ARIMA filter. In an extension, we check the robustness of the results utilising a parametric approach for estimating the dynamic cross-correlations (Section 3.2.4).

3.2.1 Temporal stability of the business cycle indicators – pre and post global financial crisis

We evaluate the extent to which sub-sample instabilities matter, which addresses the robustness-feature mentioned in Section 1. This comprises an important aspect, especially in light of the global financial and economic crisis of 2008/2009 which is generally referred to as a form of non-linearity in the data, rendering previous correlation patterns less reliable. We assess the temporal stability in detail in Section 4 where we use the technique of *dynamic model averaging* (DMA). For now we only consider a sample split in order to detect possible temporal instabilities across sub-samples. We do so by again utilising the concept of the dynamic cross-correlation coefficient, but now we separate the sample into two parts; we consider a pre-crisis and a post-crisis sample. The pre-crisis sample lasts until the third quarter of the year 2008, while the post-crisis sample starts in the fourth quarter of 2009. We compute dynamic cross-correlations for each sub-sample separately. Again, we do so for all reference series listed in Table 1; however, only for a subset of the business cycle indicators listed in Table 31. The reason for the latter is that many business cycle indicators comprise a comparably short time span rendering a sample split less useful for the analysis (we use only those indicators that start in Q1:1995 or earlier). Tables 3-16 depict the results. In each table we consider the difference between the correlation of the pre-crisis relative to the post-crisis episode.

The results imply several noteworthy details. First of all, the contemporaneous cross-correlations are on average higher for the pre-crisis period; this evidence has also been documented for other countries (compare European Commission 2011, 2016). The higher correlation within the pre-crisis period is pronounced as regards GDP, the service sector (*va-serv-priv* and *va-tert*) and the private sector as a whole (*va-priv*); however, it does not apply to the measures for the manufacturing sector (*va-manu*, *va-indu*, *va-second*).

Secondly, the difference in the pre- and post crisis cross correlations is especially large

once foreign business cycle indicators are considered. This applies in particular to *ec-ea-ind-conf*, *ec-ea-sent*, *ism-us-pmi-manu* and *ifo-de-climate*. This finding can be explained with the decoupling of the the Swiss business cycle to the one of the German economy and/or the cycle of EU countries in general that occurred once the European debt crisis emerged.

Thirdly, the difference between the pre- and post crisis cross-correlations are large in size and in most cases also significantly different from zero. The highest differences can be observed within the measures for the service sector (*va-serv-priv* and *va-tert*) ranging up to 0.82 as regards the contemporaneous correlation and up to 0.9 for $\tau \neq 0$ (*ifo-de-climate*).

Against this background, we point out that the global financial crisis seems to have marked a break in the correlation pattern of the business cycle indicators with the reference series, though this evidence has to be taken with care. It is difficult to assess the extent to which the change in the correlation pattern is triggered by a structural break in the relation between *hard* and *soft* indicators or in turn by the classical bias due to selection effects (sample selection bias). Within the current application the selection bias is primarily driven by the unequal length of the two sub-samples.

To summarise, we find evidence of temporal instabilities as regards the cross-correlations between business cycle indicators and the reference series. This applies not only to the contemporaneous correlation, though especially to the correlation at leads and lags. This, however, implies that the dynamic co-movement of the business cycle indicators changes at times. In other words, if at some point a particular business cycle indicator has been identified as an appropriate leading indicator, the results of this section point towards the possibility that this characteristic might change over time, rendering the same business cycle indicator now a contemporaneous or even lagging indicator. This aspect will be dealt with in more detail in Section 4.

3.2.2 Different aggregation methods

The results of Sections 3.1.1-3.1.4 require the same frequency of the data. For this, the monthly data were aggregated to quarterly so that the dynamic cross-correlation could be carried out. This was done by calculating 3-month averages in order to establish quarterly values. In this context, the results could in principle depend on the way monthly variables are aggregated to quarterly data. For this reason, we consider three alternative aggregation methods in order to assess the robustness of the correlation patterns described in the previous Sections.

We consider an aggregation to quarterly values based on using (i) the value of the first

month of each quarter (referred to $m1$), (ii) the value of the second month of each quarter (referred to $m2$), and finally (iii) the value of the third month of each quarter (referred to $m3$). The results are depicted in the tables in Appendix G. The tables show the difference between the results established in Section 3.1.1 which we refer to as *average*, relative to the new aggregation methods motivated in this section. We only consider the q-q and y-y growth rates of GDP in this respect. In most cases, the difference in the cross-correlation coefficients is smaller than 0.1. There are, though, some noteworthy exceptions, as for instance with regard to *cs-serv-pmi*; the rather large difference in this case occurs for two reasons: this variable (i) comprises a rather short time span, and (ii) it displays a rather non-stationary behaviour throughout. These two deficiencies do not occur within the other variables nor do the differences in the correlations have the tendency to be large in size. Against this background, we conclude that the particular aggregation method applied is negligible for assessing the relationship between business cycle indicators and the references series.

3.2.3 Cross correlation analysis and pre-whitening the data

In the natural sciences, dynamic cross correlation analysis is commonly accompanied by a pre-whitening of the data (see for instance Probst et al., 2012; Bayazit and Önöz, 2009; Yue and Wang, 2002 and the references therein). In this context, pre-whitening is done for at least three reasons: (i) eliminating outliers of the data which, in case not done, might lead to a bias in the correlations, (ii) pre-whitening to eliminate the influence of serial correlation (autocorrelation), and finally (iii) to transform non-stationary data into $I(0)$-series.

The study of Probst et al. (2012) provides some theoretical examples on the implications of non-pre-whitened and pre-whitened cross-correlations and exemplifies the use of pre-whitened cross-correlations to compare the relationship between two indicators. In this context, correlations between two indicators can be masked by overlaying trends in both time series and sophisticated statistical models are required to separate autocorrelations within a single time series from cross-correlations with another. Against this background, Cryer and Chan (2008), Gröger et al. (2010), Gröger and Fogarty (2011) and Shumway and Stoffer (2011) among others, argue that the cross-correlation of time series requires the time series to be pre-whitened. Pre-whitening removes spurious correlations based on temporal dependencies between adjacent values of the input time series and removes these influences from the output time series. Hence the outcome between pre-whitened and non-pre-whitened cross-correlations can be quite different. Dominant long-term trends in the input time series (business cycle indicators in our case) may hide

the correlation between short-term fluctuations of the input and the output time series (in our case the reference series). Alternatively, coinciding long-term trends in the input and the output time series may suggest a significant cross-correlation, which, however, is not present in short-term fluctuations after pre-whitening. Technically, pre-whitening is achieved by fitting an ARIMA model to the input time series and applying the same model to the output time series.

Bayazit and Önöz (2009) conclude that pre-whitening should be avoided when, among other aspects, the sample size is low (less than 70 observations). This problem arises in our case with respect to several business cycle indicators. In order to ensure a reasonable comparison of all indicators, we consider it essential to always use the same procedure, as otherwise the correlation pattern could change simply due to a different methodology. In view of the fact that an important prerequisite – sample size – for the application of this methodology is not fulfilled, we use pre-whitening only in the context of a robustness analysis. We do so for all reference series – both q-q and y-y growth rates – and the business cycle indicators listed in Table 31.

The basic idea that we are considering in the context of pre-whitening is the construction of a lagged regression in which we predict a y-variable (in our case the reference series) at the present time using lags of an x-variable (in our case the business cycle indicators) and lags of the y-variable. The procedure works as follows:

1. Specify a time series model – an ARIMA model – for the x-variable and save the residuals from this model.

2. Apply the time series model of the x-variable to filter the y-variable by using the estimated coefficients from step (1). By this we can identify differences between observed y-values and 'estimated' y-values based on the x-variable model.

3. Determine the cross-correlation between the residuals from Step (1) and the filtered y-values from Step (2). This cross-correlation can be used to identify a possible lead/lag relationship between the x- and y-variable.

We estimate ARIMA models for all business cycle indicators. The specific ARIMA structure is selected by relying on the Bayesian (Schwartz) information criterion. In a second step, the resulting ARIMA model is then applied to the reference series. Finally, we compute cross-correlations based on the residuals from each separate ARIMA model. The results for the dynamic cross-correlation analysis utilizing a pre-whitening approach of the data in the first place are provided in Figures 10-17; they are to be compared with Figures 1-8 that are based on non-pre-whitened data.

We start with considering the evidence for the q-q growth rate of GDP with the indicators. We observe that the correlations are noticeably smaller; in particular, among the *group-1-indicators* only *cs-econ-expect* and *snb-bci* show correlations which are significantly different from zero (5% significance level) – in each case this applies only to the contemporaneous correlation. Among the *group-2-indicators* only *snb-foreign-pmi*, *cs-ind-pmi-bo* and *cs-ind-pmi-prod* have correlations statistically different from zero (5% significance level).[3]

The evidence is similar for the y-y growth rates of GDP with the indicators. Again, the correlations are noticeably smaller across all indicators for both leads and lags of the dynamic cross-correlations. Moreover, we find that among the *group-1-indicators* again only *cs-econ-expect* and *snb-bci* show correlations which are significantly different from zero (5% significance level). Among the *group-2-indicators* in turn only *snb-foreign-pmi*, *cs-ind-pmi-bo*, *kof-ind-no3m* and *cs-ind-pmi-prod* have correlations statistically different from zero (5% significance level).

Against this background, a subset of the previously motivated *group-1-indicators* and *group-2-indicators* is confirmed as good business cycle indicators once pre-whitening to the data is applied; however, on the other hand pre-whitening renders some of the indicators less useful.

The results of the q-q and y-y growth rates of GDP are replicated more or less across the remaining reference series. Apart from the fact that the degree of correlation is comparably small, in most cases it is not statistically different from zero. Hence the correlations of the pre-whitened data are rather distinct to those of the non-pre-whitened counterparts and the evidence in the case of pre-whitened data is at best mixed. This raises the question of whether or not the properties of the pre-whitened series still carry the important information of interest embedded in the respective original time series, including signals at a range of frequencies (or time scales). In this context, Razavi and Vogel (2018) investigated how pre-whitening changes the properties of a time series in ways other than short-term persistence (i.e., the intended change). They assess the implications of pre-whitening for inferences on variability of time series across a range of time scales, which relates to the magnitude and significance of trends and cycles at different frequencies. They conclude that pre-whitening time series can cause misleading results, because it leads to a loss of important information contained in the original time series. They document that pre-whitened time series will generally not carry important stochastic properties embedded in respective original time series and thus cannot preserve

[3]Note: care has to be taken here as the critical value for the 5% significance level depends on the number of observations; to the extent that the number of observations varies across the indicators, the critical value hence varies too.

the structure of variability across time scales. This implies that the resulting statistical inferences may not be credible and/or should be interpreted with caution.

3.2.4 Parametric estimation of cross-correlation

As an alternative to determine the cross-correlations, we propose a multivariate methodology. Section 3.1.1-3.2.3 presented results based on a non-parametric approach. An interesting alternative to that is a parametric estimation. In this respect, we consider bivariate vector autoregressive (VAR) models. These models are used to capture the linear interdependencies among multiple time series. All variables in a VAR enter the model in the same way: each variable has an equation explaining its evolution based on its own lagged values, the lagged values of the other model variables, some exogenous variables (constant term, time-trend and some other truly exogenous variables) and an error term.

We consider the following VAR(p) model stacked into a VAR(1) model:

$$\boldsymbol{y}_t - \boldsymbol{\mu} = \boldsymbol{F}\left(\boldsymbol{y}_{t-1} - \boldsymbol{\mu}\right) + \boldsymbol{e}_t \quad \text{with} \quad \boldsymbol{e}_t \sim N(\boldsymbol{0}, \boldsymbol{Q}) \tag{2}$$

The autocovariance generating function is given by $E(\boldsymbol{y}_t - \boldsymbol{\mu})(\boldsymbol{y}_{t-\tau} - \boldsymbol{\mu})' := \boldsymbol{\Sigma}(\tau) = \boldsymbol{F}\boldsymbol{\Sigma}(\tau - 1) = \boldsymbol{F}^{\tau}\boldsymbol{\Sigma}$, where $E(\boldsymbol{y}_t - \boldsymbol{\mu})(\boldsymbol{y}_t - \boldsymbol{\mu})' := \boldsymbol{\Sigma}$ and $\text{vec}(\boldsymbol{\Sigma}) = (\boldsymbol{I} - \boldsymbol{F} \otimes \boldsymbol{F})^{-1}\text{vec}(\boldsymbol{Q})$ (see Hamilton, 1994, Chapter 10 for further details). Evidently, $\boldsymbol{\Sigma} = \boldsymbol{\Sigma}(0)$. From this, the dynamic cross-correlation function $\boldsymbol{P}(\tau)$ is given by:

$$\boldsymbol{P}(\tau) = (\text{diag}(\boldsymbol{\Sigma}))^{-\frac{1}{2}}\boldsymbol{\Sigma}(\tau)(\text{diag}(\boldsymbol{\Sigma}))^{-\frac{1}{2}} \tag{3}$$

We note for the dynamic cross-correlation for leads and lags of the variables in $\mathbf{y}_t$, that $\boldsymbol{\Sigma}(\tau) \neq \boldsymbol{\Sigma}(-\tau)$, because of lead-lag effects; but instead we have that $\boldsymbol{\Sigma}(\tau) = \boldsymbol{\Sigma}(-\tau)'$. Correspondingly, it holds that $\boldsymbol{P}(\tau) = \boldsymbol{P}(-\tau)'$; for this, one has to mind the ordering of the variables in the VAR(p) model.

We present the results of the parametric estimation of the dynamic cross-correlations for a selected set of indicators (starting in M1:1980) in Table 2. We consider the correlation pattern for the growth rate of GDP only, though we distinguish between q-q and y-y rates. Again, if some indicator X has a high positive correlation with GDP at $\tau > 0$, then this implies that this indicator has a lead relative to GDP, that is, it can be considered a leading indicator for GDP. We observe that the correlations from the parametric estimation are very similar to the ones of Section 3.1.1; in fact they are indistinguishable to each other. This applies to both the contemporaneous correlation, as well as to all lead and lag structures.

Against this background, the parametric estimation confirms the results of Section

Table 2: Dynamic cross-correlations—parametric estimation

τ	-4	-3	-2	-1	0	1	2	3	4
GDP q-q	lag τ of indicator X					lead τ of indicator X			
seco-dfm	0.35	0.46	0.60	0.76	0.78	0.56	0.43	0.33	0.25
kof-ind-nopm	0.50	0.56	0.63	0.69	0.66	0.50	0.42	0.36	0.32
kof-ind-prodpm	0.50	0.60	0.68	0.71	0.58	0.35	0.24	0.17	0.13
kof-ind-trend	0.52	0.61	0.67	0.65	0.47	0.26	0.15	0.09	0.06
kof-ind-no3m	0.40	0.46	0.53	0.60	0.61	0.45	0.35	0.29	0.25
kof-ind-prod3m	0.48	0.58	0.67	0.74	0.66	0.44	0.33	0.26	0.21
oecd-no	0.40	0.49	0.59	0.67	0.64	0.42	0.32	0.25	0.20
oecd-cli	0.47	0.57	0.66	0.71	0.61	0.39	0.28	0.21	0.16
oecd-cli-prod	0.43	0.54	0.65	0.72	0.62	0.38	0.25	0.17	0.12
oecd-cli-consconf	0.47	0.53	0.58	0.60	0.53	0.38	0.30	0.25	0.21
ism-us-pmi-manu	0.24	0.28	0.34	0.41	0.50	0.43	0.36	0.30	0.25
seco-consconf-outlook	0.35	0.43	0.52	0.58	0.51	0.40	0.31	0.25	0.20
seco-consconf	0.38	0.46	0.54	0.59	0.49	0.38	0.29	0.24	0.19
GDP y-y									
seco-dfm	0.16	0.26	0.40	0.58	0.80	0.89	0.82	0.69	0.54
kof-ind-nopm	0.09	0.23	0.40	0.58	0.78	0.84	0.83	0.77	0.68
kof-ind-prodpm	0.54	0.61	0.68	0.77	0.86	0.81	0.76	0.70	0.65
kof-ind-trend	0.71	0.78	0.84	0.88	0.87	0.74	0.61	0.50	0.41
kof-ind-no3m	-0.10	0.03	0.20	0.40	0.62	0.73	0.77	0.75	0.69
kof-ind-prod3m	0.38	0.47	0.58	0.70	0.84	0.84	0.81	0.76	0.69
oecd-no	-0.02	0.12	0.29	0.49	0.71	0.77	0.78	0.73	0.66
oecd-cli	0.29	0.39	0.51	0.65	0.80	0.80	0.76	0.71	0.65
oecd-cli-prod	0.24	0.35	0.47	0.61	0.78	0.78	0.75	0.70	0.63
oecd-cli-consconf	0.24	0.32	0.43	0.54	0.68	0.69	0.69	0.67	0.63
ism-us-pmi-manu	-0.37	-0.27	-0.12	0.09	0.35	0.52	0.61	0.64	0.61
seco-consconf-outlook	0.33	0.39	0.47	0.56	0.68	0.70	0.69	0.65	0.60
seco-consconf	0.42	0.48	0.54	0.62	0.70	0.68	0.63	0.58	0.53

3.1.1 and hence the calculations based on the non-parametric approach. Theoretically the analysis could be extended here to also considering the (log-)level of GDP; within the parametric estimation this is possible without any effort in manipulating the data before using them in the VAR model; the only thing that one might want to include is some form of a time trend (linear, quadratic, etc.). Finally we note that by means of the parametric approach to calculating dynamic cross-correlations, mixed frequencies could actually be dealt with easily. In case the previous bivariate VAR models were to be estimated using the Kalman filter, one could then utilise both quarterly National Account data jointly with monthly data on business cycle indicators within a mixed-frequency VAR model to determine the correlations without having to aggregate monthly data to a quarterly

frequency.

4 On the temporal stability of the relation between business cycle indicators and reference series

The previous section considered dynamic cross-correlation coefficients of the business cycle indicators with the reference series. As mentioned in the introduction, an important criterium for the usefulness of a particular business cycle indicator for forecasting is the stability of its temporal correlation with the reference series. In the previous section the temporal stability of the business cycle indicators with the reference series was judged in a rather trivial form – by considering the correlation pattern across two sub-samples (pre and post global financial crisis). Despite the fact that this is a valid approach, it still leaves open several questions as concerns the usefulness of the business cycle indicators for forecasting. Against this background, we now elaborate the adequacy of the business cycle indicators across time in more detail. This analysis is motivated by the observation that in many countries the relationship between hard and soft indicators is likely to have changed (see for instance Bruno et al., 2016, Rioust De Largentaye and Roucher, 2015; European Commission, 2011, 2016; and Ferrara, Guégan and Rakotomarolahy, 2010). Something similar might also be relevant for the Swiss economy.

The experience of the recession in Switzerland in 2008/2009 and the subsequent change in the monetary policy stance are likely to have prompted consumers and entrepreneurs to adjust their economic expectations to a more modest *new normality*. Analytically, this would imply a break in the relationship between qualitative (soft) and quantitative (hard) data before and after the crisis, which has traditionally been remarkably stable. The use of pre-crisis correlations of survey indicators and underlying real variables could then be misleading.

Three major arguments can be brought forward to explain the *new modesty* hypothesis for survey data. The first one is a technical argument related to the sampling of the surveys: it explains a positive bias in the surveys by the assumption that the businesses that survive the crises and keep responding to the surveys are doing better than the others. The second argument is of a psychological or cognitive nature: respondents' answers to survey questions are relative to a normal benchmark, or level of aspiration. For instance, the reference for businesses is generally what they planned to produce. In this case, their views on a 'normal' situation are necessarily subject to change. Finally, one further development that can be considered relevant in this context is the ongoing process of sectoral restructuring in favour of the tertiary sector. The constantly changing

composition of production at the expense of manufacturing and in favour of the service sector implies that traditional business cycle indicators – which usually focus on the manufacturing sector – lose their ability to explain future changes in output.

Against this background, we examine to what extent business cycle indicators for Switzerland support the *new modesty* hypothesis, using the concept of *dynamic model averaging* (DMA). This tool does not only provide an evaluation of the time-variation, it also gives an assessment of the business cycle indicators being most useful in forecasting.

Appendix B provides some technical details on the DMA methodology. The key element of the DMA methodology is the fact that it addresses two sources of uncertainty: if our set of models is defined by whether each of the K potential predictors is included or excluded, then we can have as high as $n = 2^K$ model combinations to consider, which raises substantive challenges for model selection. This aspect is referred to as *model uncertainty*, i.e., the uncertainty that a practitioner faces in choosing the correct combination of predictors.[4] In addition to model uncertainty, we also face uncertainty regarding the nature of time-variation in the regression coefficients, i.e., *parameter uncertainty*. If the amount of time-variation in the regression coefficients is captured inadequately then the model adapts either too slowly or too quickly to new data rendering either too rigid or too volatile its forecasts. The DMA methodology provides an appropriate way to deal with both of these sources of uncertainty.

The basis of the DMA methodology is the univariate time-varying parameter (TVP) model. However, dynamic model averaging (DMA) improves the TVP model by allowing the predictor sets – that is, the forecasting models – and their coefficients to change over time. In other words, DMA consists of many time-varying parameter regression models formed from all possible combinations of the predictors.

In what follows, we use the DMA methodology in order to assess the usefulness of the business cycle indicators listed in Table 31 to forecast the reference series. We do so by means of the (posterior) *inclusion probabilities*. The inclusion probabilities are a key element of the DMA methodology; they identify the importance of a single exogenous variable and how its relevance for forecasting the endogenous variable changes over time. The posterior inclusion probability of a variable at a given point in time is calculated by summing the posterior probabilities of the models that use that variable as a regressor. Thus they vary between zero and unity and give a measure of the importance of a regressor at the given point in time. In other words, the posterior inclusion probabilities identify

[4] Catania and Nonejad (2017) stress, that discarding model uncertainty can have severe consequences on out-of-sample results. This is due to the fact that, simply adding additional predictors in the model without designing an optimal model selection strategy, can deteriorate out-of-sample performance due to the bias-variance trade-off (the additional reduction in bias afforded by including additional predictors does not offset the increased forecast variance related to the more heavily parameterized model).

which were the most useful indicators and how this changed over time.

4.1 Results of the DMA analysis

The main set of results presented here from the DMA analysis concerns the inclusion probabilities of each regressor and their evolution over time. We show the posterior inclusion probabilities in Figures 18-30 for all reference series listed in Table 1 (except GDP adjusted for sport events as the results for this GDP measure are indistinguishable from those of un-adjusted GDP); again we analyse the reference series by using q-q and y-y growth rates. We only consider a subset of the business cycle indicators listed in Table 31, that is, we only use those indicators which are available from Q1/M1:1980 onwards. This is basically due to the fact that DMA is based upon TVP-models; these models require a decent number of observations and no missing observations. As regards the univariate regression equation (equation (9) in Appendix B), the reference series are considered as endogenous variables (y_t), each at a time, and the vector of exogenous variables (x_t) includes all business cycle indicators of Table 31 that start as early as Q1/M1:1980, with $x_t^{(k)} \subseteq x_t \quad \forall\ k = 1, 2, ..., K$. In our case, $K = 13$. Additionally, x_t contains two lags of the endogenous variable and a constant term. The inclusion probabilities are shown from Q1:2000 onwards; the time period before is used in order to parametrise the prior densities by means of burn-ins.

Figures 18 and 19 present the results for GDP (both q-q and y-y growth rates). The results highlight several noteworthy aspects. First of all, the inclusion probabilities display a significant variation over time. For instance the inclusion probability for the indicator *kof-ind-no3m* varies from a low of around 0.12 in the year 2003 up to a peak of around 0.78 in the year 2011. This shows the varying importance of this particular business cycle indicator in providing information relevant for forecasting the q-q growth rate of GDP. The DMA analysis identifies *kof-ind-prodpm*, *kof-ind-trend*, *oecd-cli*, *oecd-cli-prod* and *seco-consconf* as those variables with the lowest inclusion probability, rendering these variables less useful in forecasting. The evidence for the remaining variables is mixed. The indicators *kof-ind-no3m*, *seco-consconf-outlook*, *seco-dfm* and *kof-ind-nopm* tend to gain on importance in forecasting q-q GDP growth rates over time, while *oecd-cli-consconf* clearly lost on relevance especially from 2008 onwards. As regards the indicator *oecd-no* we find that its relevance for forecasting remains fairly constant over time.

The evidence for the y-y growth rates of GDP is distinct to the one of the q-q growth rates. The inclusion probabilities are noticeably higher for all business cycle indicators. This applies to *kof-ind-prodpm*, *kof-ind-trend*, *kof-ind-prodpm*, *oecd-cli*, *oecd-cli-prod* and *seco-consconf* rendering them useful for forecasting now. However, this also implies that

these indicators are constructed so as to being useful for forecasting the y-y growth rates, rather than the q-q rates. For four indicators (*kof-ind-prodpm*, *kof-ind-nopm*, *oecd-cli-consconf* and *oecd-cli*) we find that their importance in being used within forecasting declined noticeably since the Global Financial crisis.

Moving on to the value added in the private service sector (*va-serv-priv*), we find that the pattern of the inclusion probabilities for the q-q growth rates is similar to the one of GDP. Again we observe a strong variation of the usefulness of the indicators in forecasting the service industry over time. The time variation is even more pronounced once considering the y-y growth rates of the service industry. There is evidence for a significant loss of forecast ability for many indicators in the time surrounding the Global Financial crisis. While some of the indicators re-established their forecasting ability afterwards (for instance *kof-ind-prodpm* and *kof-ind-nopm*), others did not (*oecd-cli-consconf*). The business cycle indicators targeted for the service industry (for instance *cs-serv-pmi*) have been omitted from the analysis as their time horizon is too short.

Finally, as regards the value added of the manufacturing industry (*va-manu*) and the secondary sector (*va-second*) as a whole, we again find evidence for a strong time variation across the business cycle indicators. There are indicators that display a strong decline in their usefulness in forecasting (for instance *oecd-cli-prod* in the case of value added in the manufacturing industry (q-q growth rates)), while others experience a strong gain (for instance *seco-consconf-outlook*, *kof-ind-prodpm* and *kof-ind-no3m* in case of both reference series).

Against this background, the DMA analysis provides evidence of a strong variation as regards the usefulness of different business cycle indicators over time. There seems to be no specific pattern of the business cycle indicators for the references series across different time episodes. The results are in favour of time-varying parameter models being used for forecasting. This implication turns out particularly strong as regards the business cycle indicators considered here. A useful extension of this exercise would be to enlarge the set of indicators and include also *hard indicators*, as for instance, different price measures (oil prices and other important raw material prices, exchange rates, etc.), financial market variables (term structure, implied volatilities, etc.), and variables capturing foreign demand (GDP growth rates of important trading partners).

A natural complement to the results above is the average size of the coefficient of each variable and the variation of the coefficients over time. While inclusion probabilities provide important information about which variables should be included in the regressions at each point in time (as a significance test would do), they do not specify the size of their effect, and even a variable with a very high inclusion probability may have a small

overall impact on the endogenous variable.

5 Forecasting evaluation – a MIDAS approach

The main challenge within model-based projections consists of finding an appropriate statistical framework which allows to analyse jointly data of different sampling frequencies; in our case this applies to monthly business cycle indicators on the one hand and quarterly National Account figures on the other. The problem of mixed frequencies could be solved in a straightforward fashion by aggregating all monthly series to quarterly ones. This was done in Section 3 and 4 and allows standard estimation techniques, though this approach is associated with a considerable loss of information as the dynamics within a quarter are being left un-modelled. Furthermore, this approach does not solve the problem of how the latest available information from monthly business cycle indicators could be used if observations are available only until the first or second month within a quarter. The quality of short-term forecasts, however, is mainly determined by the current information.

The first attempt to address the problem of mixed frequencies was done by means of bridge equations. These have been used extensively to compute forecasts from mixed frequency data, as in Ingentino and Trehan (1996), Rünstler and Sedillot (2003), Baffigi, Golinelli, Parigi (2004) and Diron (2008). Bridge equation models are parsimonious, but usually require the user to estimate a potentially large number of parameters. To solve the problem of parameter proliferation while preserving some timing information Ghysels, Santa-Clara, and Valkanov (2004, 2007) propose the MIDAS model. This method allows for a quick update of any forecast to incorporate new information on the highest possible frequency; most importantly, this approach allows for mixed frequencies. Given a weighting function $b(L, K, \vartheta)$, the MIDAS model can be adapted to an h-month-ahead forecasting framework as follows

$$y_t^{(q)} = \varphi_0 + \varphi_1 \cdot b(L, K, \vartheta) \cdot x_t^{(m)} + \epsilon_t \tag{4}$$

where $y_t^{(q)}$ is the dependent variable, $x_t^{(m)}$ is the regressor, m and q denote the frequencies (q indicates quarterly and m monthly frequency), ϵ_τ is a serially uncorrelated disturbance and $b(L, K, \vartheta) = \sum_{j=0}^{K} b_j(\vartheta) L^j$ with L being the lag-operator. Accordingly, the forecasts are computed by estimating the model with quarterly data of $y_t^{(q)}$ and monthly data of the skip sampled indicator $x_{t-h}^{(m)}$. To overcome the parameter proliferation problem of bridge equations, the MIDAS framework constrains the polynomial lag structures with non-linear functional specifications for the weighting functions $b(L, K, \vartheta)$.

MIDAS models can be considered as alternatives to the Kalman filter when utilized

in the context of mixed frequency data. Bai, Ghysels and Wright (2013) examine the commonalities between MIDAS regression models and models based on the Kalman filter applied to data of mixed frequency. In general, the latter involve a system of equations, whereas MIDAS regressions only involve a univariate equation (but possibly many regressors, that is, $x_t^{(m)}$ can be a vector of variables). Bai, Ghysels and Wright (2010) argue that this implies that MIDAS regressions might be less efficient, however, in cases where the MIDAS regression is only an approximation, the approximation errors tend to be small.

In what follows, we focus on the finite lag polynomial $b(L, K, \vartheta)$, where the weights are based on the exponential Almon weighting function. Given this set-up, we assess the usefulness of the business cycle indicators listed in Table 31 to forecast the references series. We consider a horizon of (i) zero quarters, which implies that we are considering nowcasts and (ii) one quarter ahead, and carry out the forecast evaluation for both q-q and y-y growth rates of the reference series. Again we distinguish between a pre and post crisis analysis in order to assess a possible change in the ability of the business cycle indicators in forecasting the reference series. We use the root mean squared error (RMSE) in order to discriminate among the business cycle indicators. The results are depicted in Tables 23-30.

We start with the post-crisis results. They are based on the whole sample as otherwise the sample length would be to short. Moreover, we start our analysis in the first month/quarter of 1995 with the consequence that we omit business cycle indicators that start later.

We find that the business cycle indicators perform more or less equally well in nowcasting the q-q growth rates of GDP as well as of the remaining reference series. The RMSE varies between 0.012 and 0.015 for the two measures of GDP. When considering the one quarter ahead forecast, the RMSE is noticeably larger and the variation among the indicators is now higher. For both evaluations – nowcast and one quarter ahead forecast – we find that the *group-one-indicators* are useful in forecasting the reference series. Some indicators which performed poorly within the dynamic cross-correlation analysis are now to be classified at least as the *group-one-indicators* or *group-two-indicators*. This applies to some indicators published by the OECD (*oecd-no*, *oecd-cli*, *oecd-consconf*) and some KOF-indicators (*kof-ind-no3m*, *kof-ind-prod3m*). We again find that the foreign indicators perform on average worse than those targeted for the Swiss economy in particular.

Table 25 and26 show the results for the y-y growth rates. The RMSE of the three included *group-one-indicators* are again comparably small, though *oecd-cli* and *oecd-consconf* now have the smallest RMSE—this applies to GDP and most of the remaining reference series. As regards the usefulness of the business cycle indicators, we find no dif-

ference in the ranking between the nowcasts and the one-quarter forecasts. As before, the foreign indicators perform noticeably worse than those targeted for the Swiss economy.

We stress that there is no evident difference in the ability of the business cycle indicators in forecasting GDP, the different measures for the manufacturing sector, the private sector as a whole or the service sector. In other words, to the extent that, for instance, the *group-one-indicators* have a comparably small RMSE for GDP, the same applies to the two measures for the service sector (*va-serv-priv*, *va-tert*).

The previous results are based on estimates using the whole sample. We now turn to the pre-crisis sub-sample. The results of this exercise are depicted in Tables 27-30. We find that the variation of the RMSE across the business cycle indicators for each references series is now larger than it was for the whole sample. Moreover, *snb-bci* and *seco-dfm* now have noticeably smaller RMSEs than all of the remaining indicators. This applies to both q-q and y-y growth rates. Hence the results of the pre-crisis sample again support the hypothesis that the ability of the business cycle indicators has changed to some extent within the global financial crisis episode. For example, the RMSE of *oecd-cli* and *oecd-consconf* turned out to be comparably small when considering the whole sample. Within the pre-crisis sub-sample, their RMSEs are relatively high weighing on the usefulness of these variables in forecasting the references series within the pre-crisis episode. This shows, once more, the extent to which the ability of business cycle indicators in providing useful information for the references series is likely to change over time. Within the MIDAS results, this turns out particularly pronounced for the OECD indicators, though it also applies to the remaining indicators.

6 Conclusion

We identify a set of business cycle indicators which have the most favourable characteristics for the early recognition of the business cycle of the Swiss economy. As the usefulness of a business cycle indicator can be evaluated only in the context of a given method of prediction, we hence utilise various methods to assess the informational content of the business cycle indicators with regard to the reference series. Firstly, by means of dynamic cross-correlation coefficients, we assess the co-movement between business cycle indicators and the reference series. In terms of the contemporaneous correlations, we find that all business cycle indicators are pro-cyclical. Secondly, we rank different business cycle indicators according to their relevance for the reference series. We identify a set of indicators that have a high correlation with GDP contemporaneously and/or at leads. This set contains, among others, *kof-econ-bar* (KOF Konjunkturbarometer - business cycle indicator

of the KOF-Swiss Economic Institute at the ETH Zurich), *kn-bci* (composite business cycle indicator of Kühne+Nagel (KN)), *seco-dfm* (composite business cycle indicator of the Swiss State Secretariat for Economic Affairs (SECO)), *snb-bci* (composite business cycle indicator of the Swiss National Bank (SNB)) and *cs-econ-expect* (economic expectations obtained from an economic sentiment surveys carried out by Credit Suisse). The high values of the correlation also apply when excluding sport-related components from GDP, however, we observe a noticeably drop in the correlation for all indicators when taking into account data revisions of GDP. The latter finding highlights the importance of data revisions as a source for uncertainty.

The same indicators also turn out to have a high correlation with the value added of the manufacturing industry, various alternative measures of the manufacturing sector and the private sector as a whole. As regards the service sector we find that business cycle indicators targeted especially for the service sector perform poorly. Instead the aforementioned five business cycle indicators again turn out to be useful; though their correlation with the service sector is noticeably smaller than with GDP or the value added of the manufacturing sector.

Concerning the temporal displacement of business cycle indicators and the reference series, we find that their correlations are highest contemporaneously, rendering the indicators particularly useful for nowcasting. Our results are though disappointing as regards the lead property of the business cycle indicators. For the q-q growth rates, correlations beyond a lead of one quarter quickly turn negligibly small. This applies to all reference series. Hence the business cycle indicators' ability in forecasting beyond one quarter is limited as their informational content for a horizon of more than one quarter is small. We note that the lead property of the business cycle indicators to the reference series is high once the y-y growth rates are considered. However, this occurs as a result of the temporal displacement of the reference series once computing y-y growth rates which date further back than the q-q counterparts and hence comprises a statistical artefact.

An aspect that calls for caution on the use of business cycle indicators addresses the temporal stability. We find evidence of temporal instabilities as regards the relation between business cycle indicators and the references. This applies not only to the contemporaneous co-movement, though especially to the one at leads and lags. This, however, implies that the dynamic co-movement of the business cycle indicators changes at times. In other words, if at some point a particular business cycle indicator has been identified as an appropriate leading indicator, our results point towards the possibility that this characteristic might change over time, rendering the same business cycle indicator now a contemporaneous or even lagging indicator and by this less useful. There seems to be no

specific pattern as regards the change in the co-movement of the business cycle indicators and the references series across different time episodes. The results, though, are in favour of time-varying parameter models being used for forecasting. This implication turns out particularly strong as regards foreign business cycle indicators (US-PMI, ifo-climate, etc.), however, it applies also to domestic indicators. The results from the MIDAS analysis support this finding additionally. Moreover, the MIDAS results once more emphasize the usefulness of, among others, *kof-econ-bar*, *snb-bci* and *seco-dfm* for nowcasting and forecasting, though we stress that the MIDAS analysis also classifies yet other indicators as being useful.

To sum up, we note that no business cycle indicator clearly outperforms the others. Against this background, it seems reasonable to using all indicators simultaneously. Obviously, when doing so, one must be prepared to receiving possibly contradictory signals. The informational content of a particular business cycle indicator for some reference series can even change over time. Apart from that, business cycle indicators are undoubtedly a useful element for business cycle analysis. They offer qualitative informational content on the business cycle which is per se an unobserved element. Business cycle indicators at best diminish the uncertainty surrounding the short-term evolution of the economy, though they cannot remove it. This in turn calls for an inclusion of business cycle indicators into a broader set of variables.

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Appendix

A Dynamic cross-correlation coefficient

Let X_t, Y_t represent a pair of stochastic processes that are jointly wide-sense stationary. Then the dynamic cross-covariance and the dynamic cross-correlation are given by:

$$\varsigma_{XY}(\tau) = \mathrm{E}\left(X_t - \mu_X\right)\left(Y_{t-\tau} - \mu_Y\right) \quad (5)$$

$$\rho(\tau) = \frac{\varsigma_{XY}(\tau)}{\sigma_X \cdot \sigma_Y} \quad (6)$$

where μ_X and σ_X are the mean and standard deviation of the process X_t, which are constant over time due to stationarity; and similarly, for Y_t. E[$\cdot$] indicates the expectation operator. The measure τ captures the degree of lead or lag of a business cycle indicator Y relative to the reference series X. Specifically, consider the correlation between X at date t and Y at date $t - \tau$. If τ is negative, then we are talking about the correlation between X now and Y τ periods in the past. If τ is positive, we have the correlation between X now and Y τ periods in the future. By looking at the pattern of correlations, we can then identify indicators Y that tend to lead the reference series X. We refer to $\tau < 0$ as the lead of X vs. Y, but if $\tau > 0$ it refers to a lag of X vs. Y; in the latter case, the indicator Y would be classified as a *leading business cycle indicator* for X.

Finally, as regards the statistical significance of the cross-correlations, we use an approximate measure for the critical values. The variance of the cross-correlation coefficient under the null hypothesis of zero correlation is approximately $1/n$, where n is the length of the series. The coefficients are also asymptotically normal. So approximate critical values (at the 5% level) are $\pm 2/\sqrt{n}$.

B Dynamic model averaging

Most traditional time series forecasting models, such as multivariable regression or AR (auto-regression), are constant coefficient (CC) models. Despite their advantages of providing simple and easy estimation, their drawbacks are also obvious. To be specific, the regressor coefficients are fixed, and are not allowed to change over time. Hence the time-varying parameter (TVP) model has emerged to overcome the flaws of CC models. The TVP method allows the parameters of explanatory variables to change over time, incorporating the naturally time-varying relationship between dependent and independent variables. As noted by Primiceri (2005) and Koop et al. (2010), the ordinary TVP model

can be presented as follows:

$$y_t = x'_{t-1}\beta_t + \epsilon_t \quad (7)$$

$$\beta_t = \beta_{t-1} + \eta_t \quad (8)$$

where y_t is the dependent variable to be predicted, x_{t-1} is an K-dimensional vector of predictors and β_t is an K-dimensional vector of coefficients, and the error terms are distributed as $\epsilon_t \sim iidN(0, V_t)$, $\eta_t \sim iidN(0, W_t)$. This kind of TVP model can be estimated by means of the Kalman filter.

In the TVP model as defined by equations (7) and (8), it is assumed that the predictors in x_{t-1} are fixed throughout all of the points in time, which may lead to a substantial loss of forecasting precision and problems of over-parametrization. However, dynamic model averaging (DMA) improves the TVP model by allowing the predictor sets – that is, the forecasting models – and their coefficients to change over time. In other words, DMA consists of many time-varying coefficient regression models formed from all possible combinations of the predictors.

Therefore, following the novel work of Raftery et al. (2010) and Koop and Korobilis (2012), this project uses the DMA methodology to assess the adequacy of leading indicators for predicting, among others, Swiss real GDP growth. DMA seems ideally suited for the problem of forecasting since it allows for the forecasting model to change over time while, at the same time, allowing for coefficients in each model to evolve over time.

DMA involves only standard econometric methods for state space models such as the Kalman filter, but – via some empirically-sensible approximations – achieves vast gains in computational efficiency so as to allow DMA to be done in real time despite the computational problem described in the preceding paragraph. Despite all these positive aspects of DMA, it also comes with drawbacks. One is the computational complexity. In DMA, we consider a total of $k = 2^K - 1$; depending on K this can quickly pose a huge computational challenge. Secondly, DMA does not allow for missing observations. This is basically due to the fact that the underlying model is a TVP model. Normally the problem of mixed frequencies can be solved by considering it as a problem of missing observations, the DMA approach excludes this possibility due to its TVP model structure. The DMA method can be illustrated as follows:

$$y_t = \left(x_{t-1}^{(k)}\right)' \beta_t^{(k)} + \epsilon_t^{(k)} \quad (9)$$

$$\beta_t^{(k)} = \beta_{t-1}^{(k)} + \eta_t^{(k)} \quad (10)$$

where $x_t^{(k)} \subseteq x_t \quad \forall\ k = 1, 2, ..., K$ where k denotes a specific predictor set, and $\epsilon_t^{(k)} \sim$

$iidN(0, V_t^{(k)})$, $\eta_t^{(k)} \sim iidN(0, W_t^{(k)})$. If there are m predictors in x_t, the total number of possible combinations of these predictors (possible forecasting models) will be $K = 2^m$. DMA can then incorporate the uncertainty factors from these K models in a dynamic way:

$$\hat{y}_t^{DMA} = \sum_{k=1}^{K} \pi_{(t|t-1,k)} \left(x_{t-1}^{(k)}\right)' \beta_t^{(k)} \tag{11}$$

where the probability of model k is $\pi_{(t|t-1,k)} = Pr(L_t = k|Y^{t-1})$. The equation $L_t = k$ indicates that model k is selected at time t, and $Y^t = \{y_1, ..., y_{t-1}\}$. DMA obtains the forecasting result at any point in time by taking the average of all K models according to their historical forecasting performances, denoted by $\pi_{(t|t-1,k)}$. In this context, Raftery et al. (2010) propose a simplified estimation of DMA without losses of forecasting accuracy by using the Kalman filter method. The initial assumptions of this estimation are that $\beta_{t-1}^{(k)}$ is independent and identically distributed, and that $\beta_{t-1}^{(k)}$ can be determined separately only if $L_{t-1} = k$. As indicated in equation (10), a specification for $W_t^{(k)} \forall k = 1, ..., K$ has to be found. This, however, can quickly be unfeasible once K is large, as a particular specification has to be found for each $k \in (1, ..., K)$. DMA avoids the difficult task of specifying $W_t^{(k)}$ for each individual model by relying on a forgetting factor. This in turn simplifies the computations greatly as instead of working with many parameters, one only needs to worry about the forgetting factor λ. This parameter plays the most important role in the calculation of $\beta_{t-1}^{(k)}$, where j period gains λ^j weight from the starting period. λ also simplifies the covariance matrix of $\beta_{t-1}^{(k)}$; see for instance Catania and Nonejad (2017) for further details. Another forgetting factor is introduced for the $\pi_{(t|t-1,k)}$. If a transition matrix for the probabilities were to be used, then we must consider $K = 2^m$ model combinations with m predictors at each point in time. With m being large, it is not practicable to operate the Markov switching in the $K \times K$ matrix. Thus, a forgetting factor α is introduced to reduce calculation time and error. In this way, the probability in the forecasting model is determined as follows:

$$\pi_{(t|t-1,k)} = \frac{\left(\pi_{(t-1|t-1,k)}\right)^{\alpha}}{\sum_K^{j=1} \left(\pi_{(t-1|t-1,j)}\right)^{\alpha}} \tag{12}$$

and the updating equation is:

$$\pi_{(t|t,k)} = \frac{\pi_{(t|t-1,k)} f_k(y_t|Y^{t-1})}{\sum_{j=1}^{K} \pi_{(t|t-1,j)} f_j(y_t|Y^{t-1})} \tag{13}$$

where $f_k(y_t|Y^{t-1})$ is the predictive density of the k-th model at y_t, given the data from previous periods, and $\alpha \in [0, 1]$ is the forgetting factor. The term $\pi_{(t|t,k)}$ is called posterior

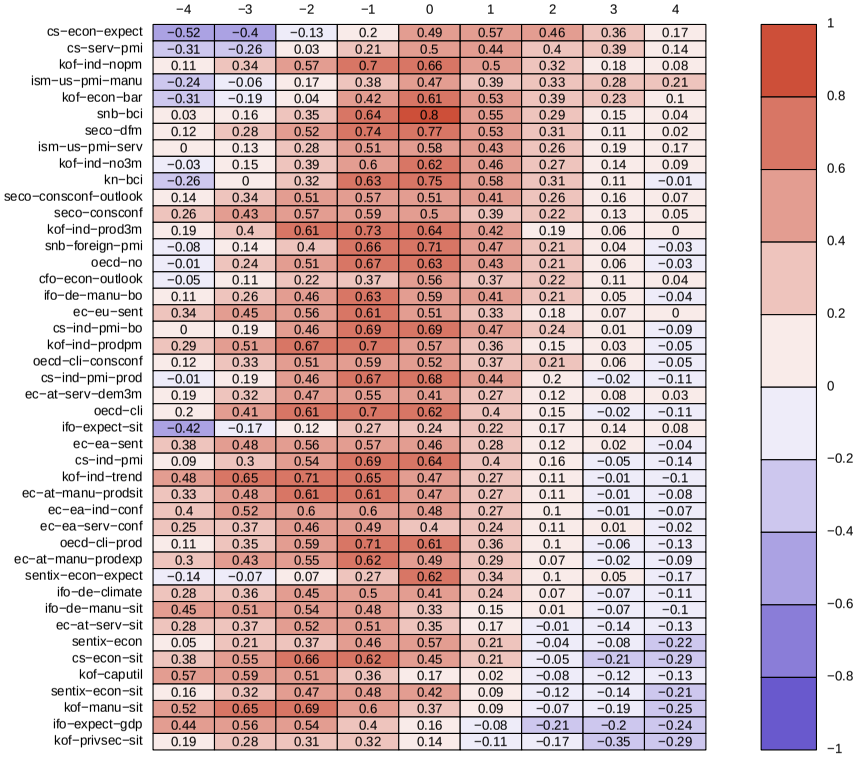
inclusion probabilities and $\pi_{(t|t-1,k)}$ is called posterior predictive probabilities.

It should be noticed that DMA allows for both the uncertainty of the model itself, as well as for the parameters of each model to change with time. Therefore, it is a significant extension of time-varying regression. In other words, the final DMA forecast is computed as a weighted average of the predictions from all possible K models, but the weights change in time in accordance with the predictive power of each regression model at the given moment of time.

C Figures: Dynamic cross-correlation analysis–Final release

Figure 1: GDP (q-q and y-y)

GDP final release Q−Q



GDP final release Y−Y

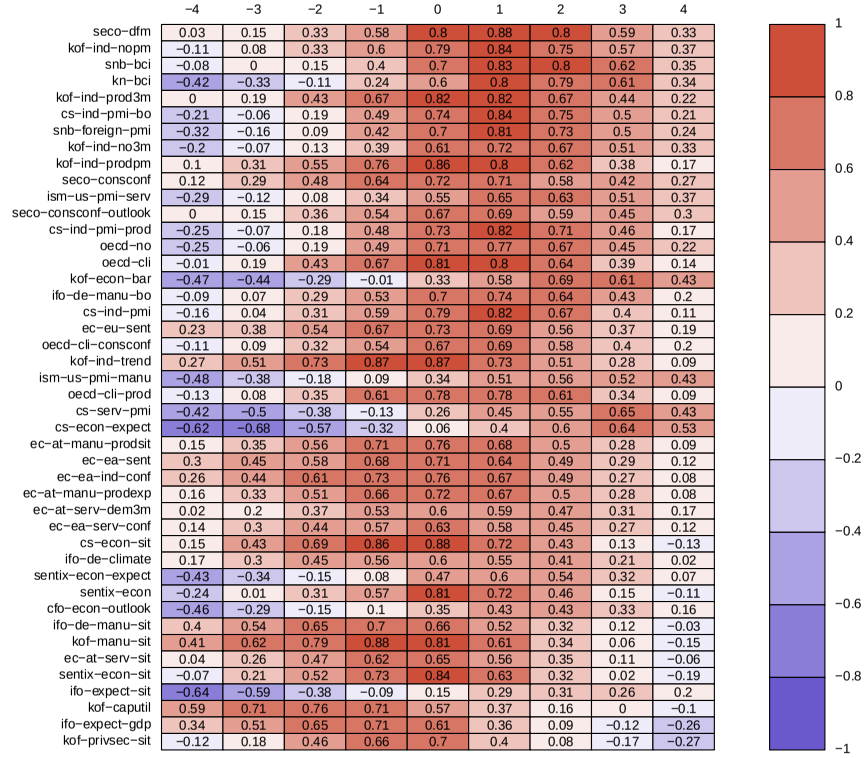
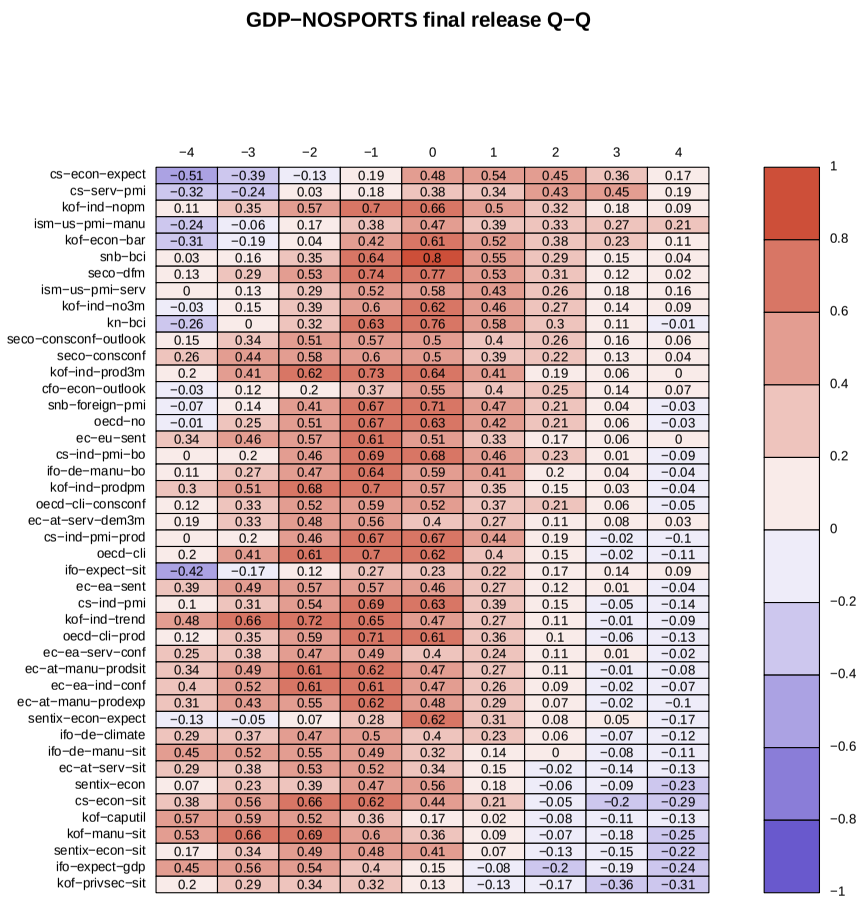


Figure 2: GDP-nosports (q-q and y-y)



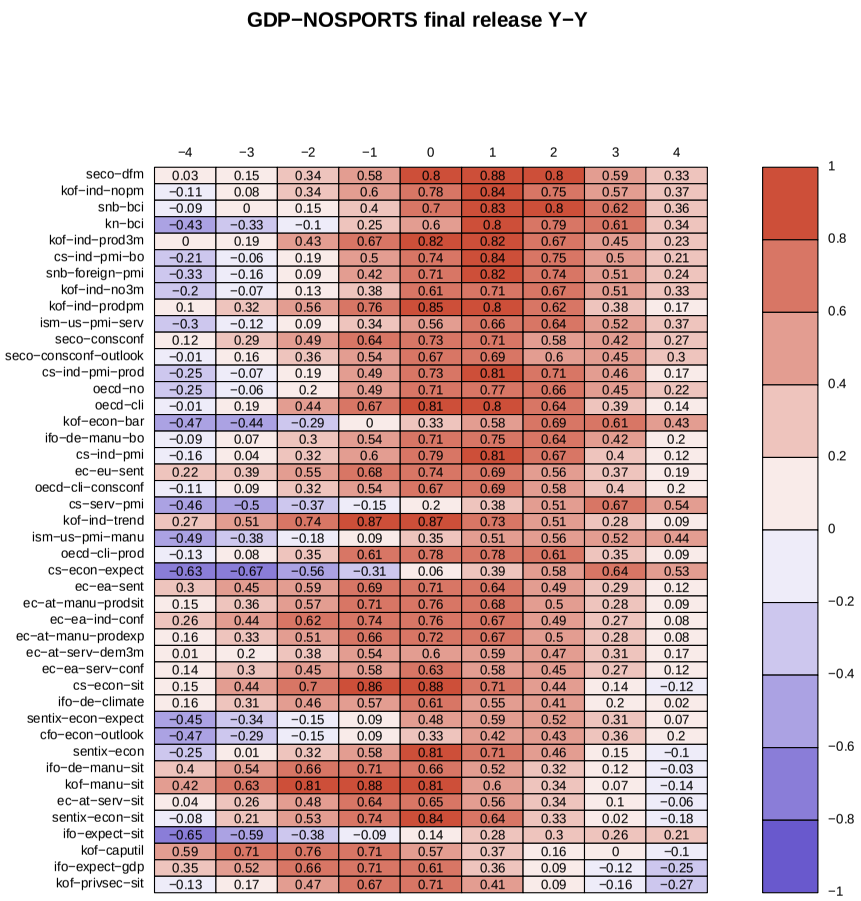
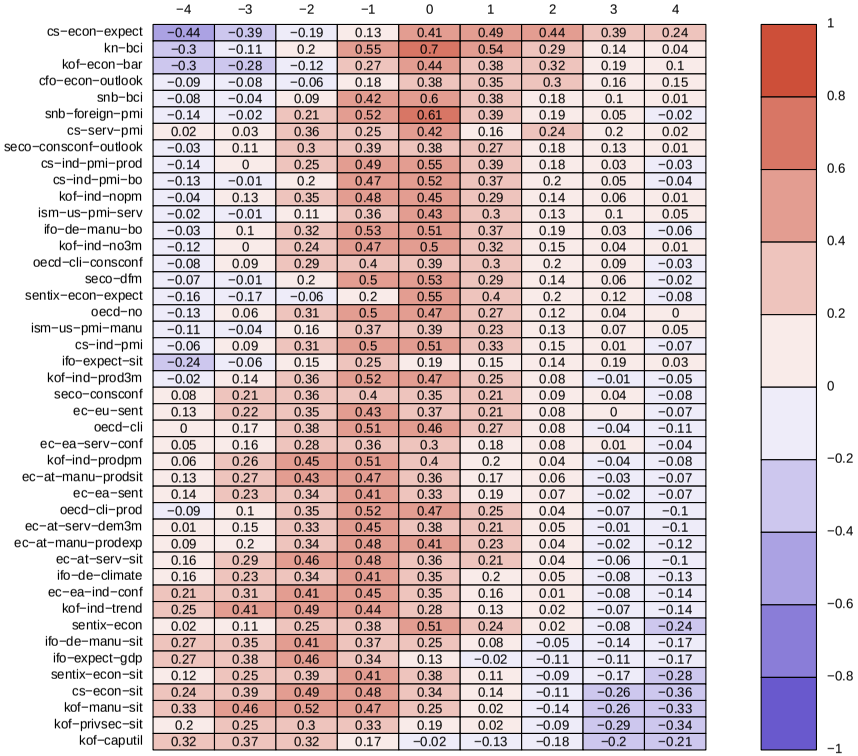


Figure 3: VA-Manu (q-q and y-y)

VA−MANU final release Q−Q



VA−MANU final release Y−Y

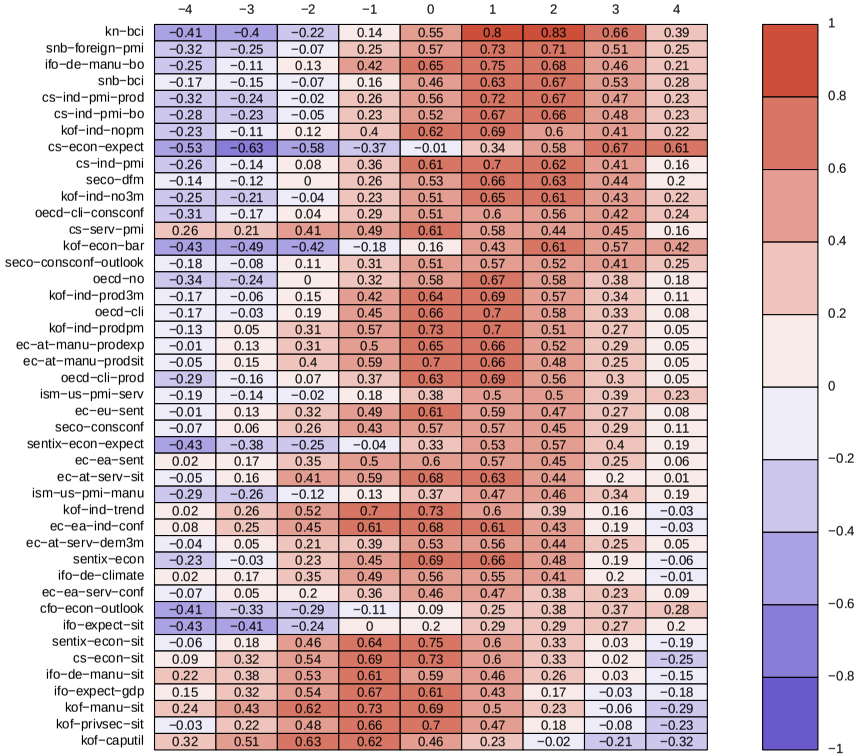
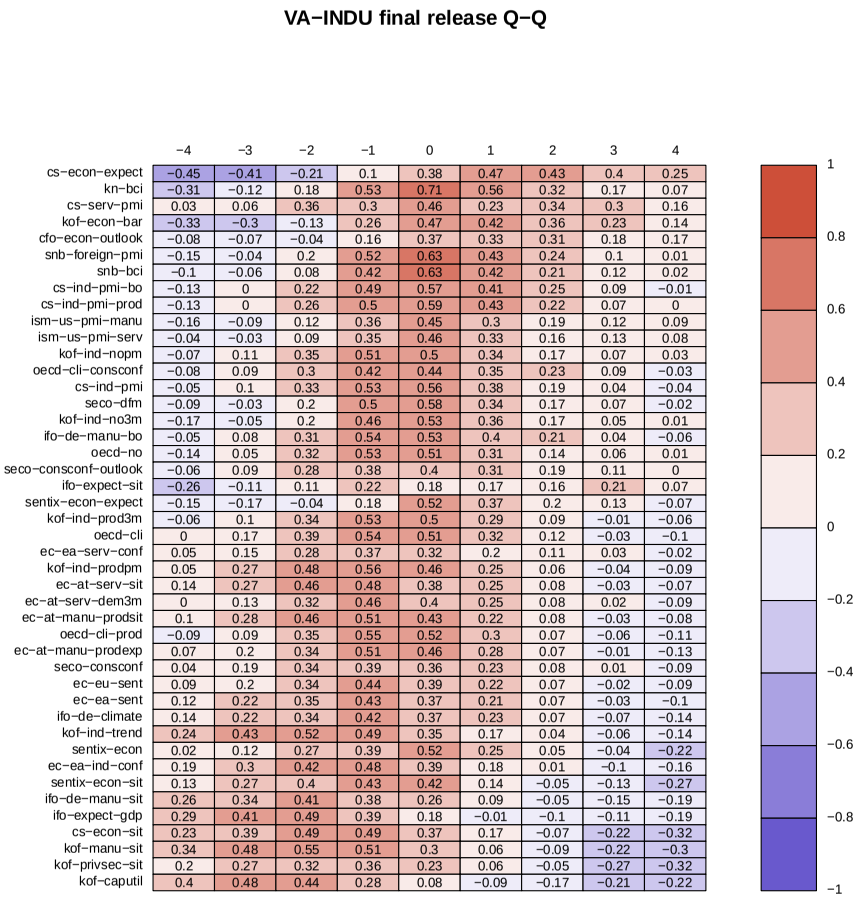


Figure 4: VA-Indu (q-q and y-y)



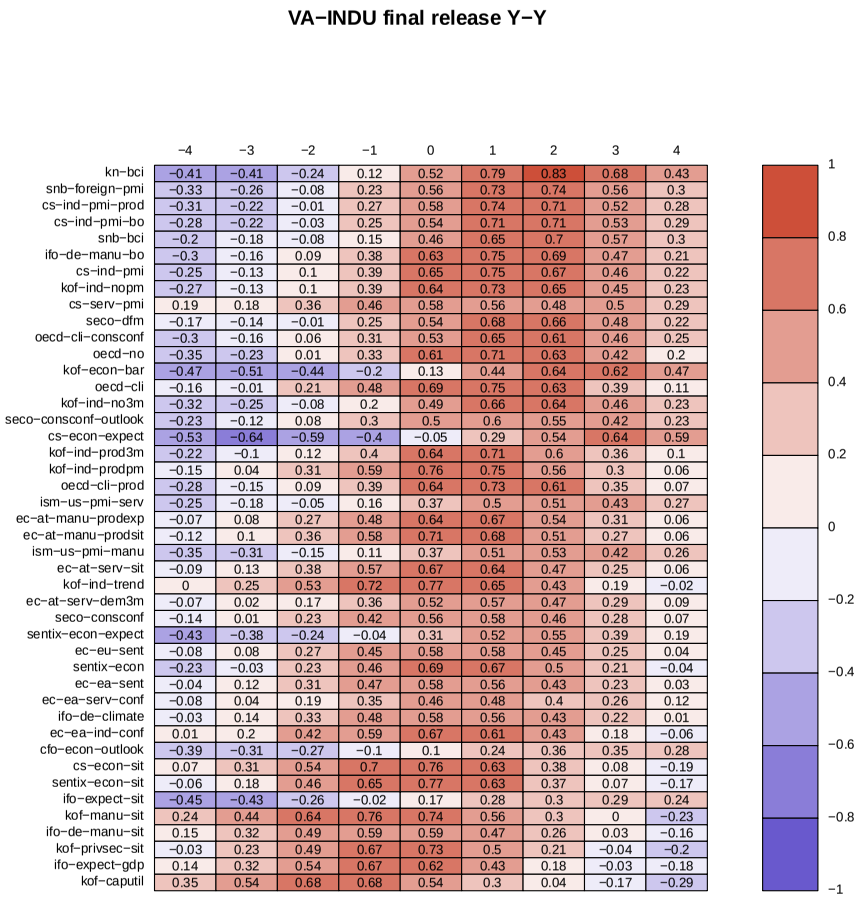
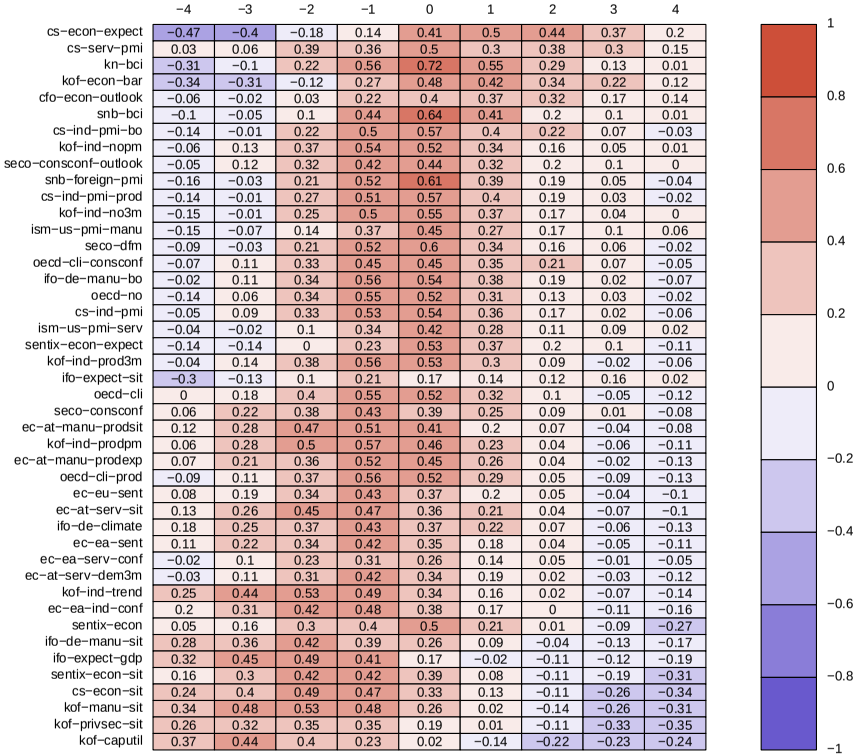


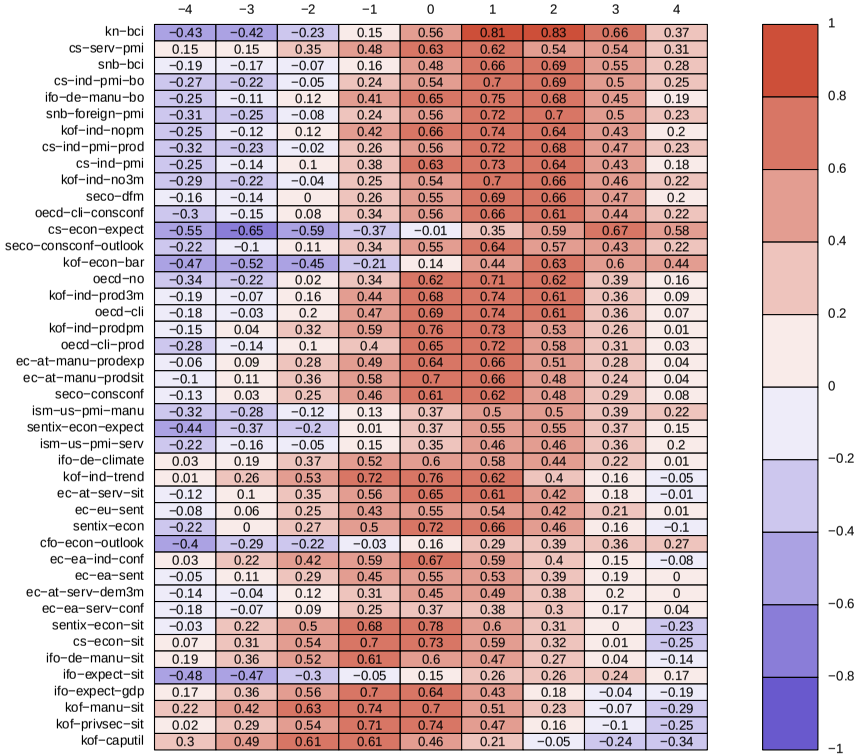
Figure 5: VA-Second (q-q and y-y)

VA−SECOND final release Q−Q



	−4	−3	−2	−1	0	1	2	3	4
cs−econ−expect	−0.47	−0.4	−0.18	0.14	0.41	0.5	0.44	0.37	0.2
cs−serv−pmi	0.03	0.06	0.39	0.36	0.5	0.3	0.38	0.3	0.15
kn−bci	−0.31	−0.1	0.22	0.56	0.72	0.55	0.29	0.13	0.01
kof−econ−bar	−0.34	−0.31	−0.12	0.27	0.48	0.42	0.34	0.22	0.12
cfo−econ−outlook	−0.06	−0.02	0.03	0.22	0.4	0.37	0.32	0.17	0.14
snb−bci	−0.1	−0.05	0.1	0.44	0.64	0.41	0.2	0.1	0.01
cs−ind−pmi−bo	−0.14	−0.01	0.22	0.5	0.57	0.4	0.22	0.07	−0.03
kof−ind−nopm	−0.06	0.13	0.37	0.54	0.52	0.34	0.16	0.05	0.01
seco−consconf−outlook	−0.05	0.12	0.32	0.42	0.44	0.32	0.2	0.1	0
snb−foreign−pmi	−0.16	−0.03	0.21	0.52	0.61	0.39	0.19	0.05	−0.04
cs−ind−pmi−prod	−0.14	−0.01	0.27	0.51	0.57	0.4	0.19	0.03	−0.02
kof−ind−no3m	−0.15	−0.01	0.25	0.5	0.55	0.37	0.17	0.04	0
ism−us−pmi−manu	−0.15	−0.07	0.14	0.37	0.45	0.27	0.17	0.1	0.06
seco−dfm	−0.09	−0.03	0.21	0.52	0.6	0.34	0.16	0.06	−0.02
oecd−cli−consconf	−0.07	0.11	0.33	0.45	0.45	0.35	0.21	0.07	−0.05
ifo−de−manu−bo	−0.02	0.11	0.34	0.56	0.54	0.38	0.19	0.02	−0.07
oecd−no	−0.14	0.06	0.34	0.55	0.52	0.31	0.13	0.03	−0.02
cs−ind−pmi	−0.05	0.09	0.33	0.53	0.54	0.36	0.17	0.02	−0.06
ism−us−pmi−serv	−0.04	−0.02	0.1	0.34	0.42	0.28	0.11	0.09	0.02
sentix−econ−expect	−0.14	−0.14	0	0.23	0.53	0.37	0.2	0.1	−0.11
kof−ind−prod3m	−0.04	0.14	0.38	0.56	0.53	0.3	0.09	−0.02	−0.06
ifo−expect−sit	−0.3	−0.13	0.1	0.21	0.17	0.14	0.12	0.16	0.02
oecd−cli	0	0.18	0.4	0.55	0.52	0.32	0.1	−0.05	−0.12
seco−consconf	0.06	0.22	0.38	0.43	0.39	0.25	0.09	0.01	−0.08
ec−at−manu−prodsit	0.12	0.28	0.47	0.51	0.41	0.2	0.07	−0.04	−0.08
kof−ind−prodpm	0.06	0.28	0.5	0.57	0.46	0.23	0.04	−0.06	−0.11
ec−at−manu−prodexp	0.07	0.21	0.36	0.52	0.45	0.26	0.04	−0.02	−0.13
oecd−cli−prod	−0.09	0.11	0.37	0.56	0.52	0.29	0.05	−0.09	−0.13
ec−eu−sent	0.08	0.19	0.34	0.43	0.37	0.2	0.05	−0.04	−0.1
ec−at−serv−sit	0.13	0.26	0.45	0.47	0.36	0.21	0.04	−0.07	−0.1
ifo−de−climate	0.18	0.25	0.37	0.43	0.37	0.22	0.07	−0.06	−0.13
ec−ea−sent	0.11	0.22	0.34	0.42	0.35	0.18	0.04	−0.05	−0.11
ec−ea−serv−conf	−0.02	0.1	0.23	0.31	0.26	0.14	0.05	−0.01	−0.05
ec−at−serv−dem3m	−0.03	0.11	0.31	0.42	0.34	0.19	0.02	−0.03	−0.12
kof−ind−trend	0.25	0.44	0.53	0.49	0.34	0.16	0.02	−0.07	−0.14
ec−ea−ind−conf	0.2	0.31	0.42	0.48	0.38	0.17	0	−0.11	−0.16
sentix−econ	0.05	0.16	0.3	0.4	0.5	0.21	0.01	−0.09	−0.27
ifo−de−manu−sit	0.28	0.36	0.42	0.39	0.26	0.09	−0.04	−0.13	−0.17
ifo−expect−gdp	0.32	0.45	0.49	0.41	0.17	−0.02	−0.11	−0.12	−0.19
sentix−econ−sit	0.16	0.3	0.42	0.42	0.39	0.08	−0.11	−0.19	−0.31
cs−econ−sit	0.24	0.4	0.49	0.47	0.33	0.13	−0.11	−0.26	−0.34
kof−manu−sit	0.34	0.48	0.53	0.48	0.26	0.02	−0.14	−0.26	−0.31
kof−privsec−sit	0.26	0.32	0.35	0.35	0.19	0.01	−0.11	−0.33	−0.35
kof−caputil	0.37	0.44	0.4	0.23	0.02	−0.14	−0.22	−0.23	−0.24

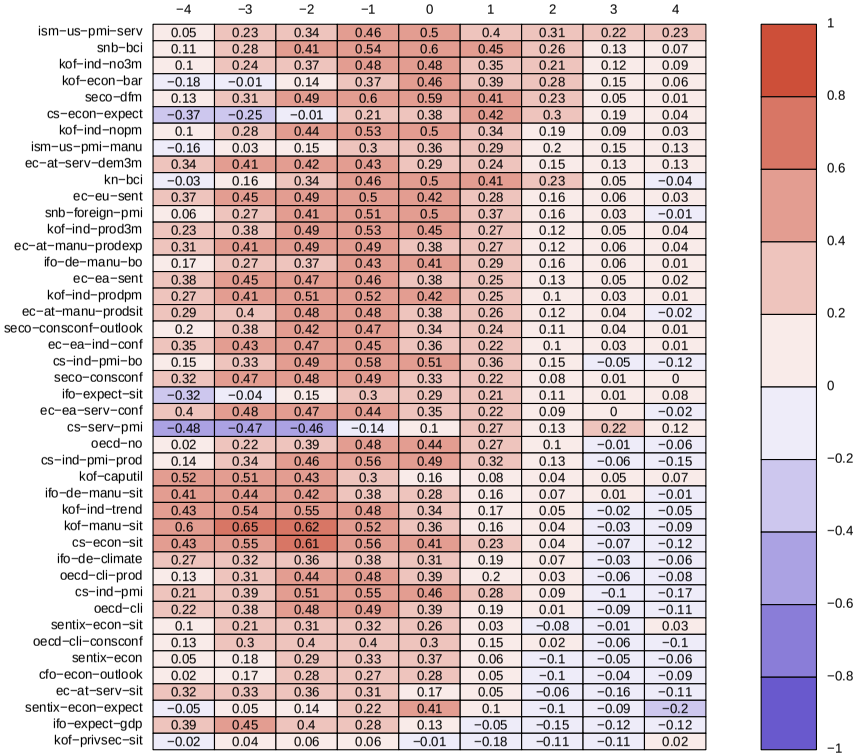
VA−SECOND final release Y−Y



	−4	−3	−2	−1	0	1	2	3	4
kn−bci	−0.43	−0.42	−0.23	0.15	0.56	0.81	0.83	0.66	0.37
cs−serv−pmi	0.15	0.15	0.35	0.48	0.63	0.62	0.54	0.54	0.31
snb−bci	−0.19	−0.17	−0.07	0.16	0.48	0.66	0.69	0.55	0.28
cs−ind−pmi−bo	−0.27	−0.22	−0.05	0.24	0.54	0.7	0.69	0.5	0.25
ifo−de−manu−bo	−0.25	−0.11	0.12	0.41	0.65	0.75	0.68	0.45	0.19
snb−foreign−pmi	−0.31	−0.25	−0.08	0.24	0.56	0.72	0.7	0.5	0.23
kof−ind−nopm	−0.25	−0.12	0.12	0.42	0.66	0.74	0.64	0.43	0.2
cs−ind−pmi−prod	−0.32	−0.23	−0.02	0.26	0.56	0.72	0.68	0.47	0.23
cs−ind−pmi	−0.25	−0.14	0.1	0.38	0.63	0.73	0.64	0.43	0.18
kof−ind−no3m	−0.29	−0.22	−0.04	0.25	0.54	0.7	0.66	0.46	0.22
seco−dfm	−0.16	−0.14	0	0.26	0.55	0.69	0.66	0.47	0.2
oecd−cli−consconf	−0.3	−0.15	0.08	0.34	0.56	0.66	0.61	0.44	0.22
cs−econ−expect	−0.55	−0.65	−0.59	−0.37	−0.01	0.35	0.59	0.67	0.58
seco−consconf−outlook	−0.22	−0.1	0.11	0.34	0.55	0.64	0.57	0.43	0.22
kof−econ−bar	−0.47	−0.52	−0.45	−0.21	0.14	0.44	0.63	0.6	0.44
oecd−no	−0.34	−0.22	0.02	0.34	0.62	0.71	0.62	0.39	0.16
kof−ind−prod3m	−0.19	−0.07	0.16	0.44	0.68	0.74	0.61	0.36	0.09
oecd−cli	−0.18	−0.03	0.2	0.47	0.69	0.74	0.61	0.36	0.07
kof−ind−prodpm	−0.15	0.04	0.32	0.59	0.76	0.73	0.53	0.26	0.01
oecd−cli−prod	−0.28	−0.14	0.1	0.4	0.65	0.72	0.58	0.31	0.03
ec−at−manu−prodexp	−0.06	0.09	0.28	0.49	0.64	0.66	0.51	0.28	0.04
ec−at−manu−prodsit	−0.1	0.11	0.36	0.58	0.7	0.66	0.48	0.24	0.04
seco−consconf	−0.13	0.03	0.25	0.46	0.61	0.62	0.48	0.29	0.08
ism−us−pmi−manu	−0.32	−0.28	−0.12	0.13	0.37	0.5	0.5	0.39	0.22
sentix−econ−expect	−0.44	−0.37	−0.2	0.01	0.37	0.55	0.55	0.37	0.15
ism−us−pmi−serv	−0.22	−0.16	−0.05	0.15	0.35	0.46	0.46	0.36	0.2
ifo−de−climate	0.03	0.19	0.37	0.52	0.6	0.58	0.44	0.22	0.01
kof−ind−trend	0.01	0.26	0.53	0.72	0.76	0.62	0.4	0.16	−0.05
ec−at−serv−sit	−0.12	0.1	0.35	0.56	0.65	0.61	0.42	0.18	−0.01
ec−eu−sent	−0.08	0.06	0.25	0.43	0.55	0.54	0.42	0.21	0.01
sentix−econ	−0.22	0	0.27	0.5	0.72	0.66	0.46	0.16	−0.1
cfo−econ−outlook	−0.4	−0.29	−0.22	−0.03	0.16	0.29	0.39	0.36	0.27
ec−ea−ind−conf	0.03	0.22	0.42	0.59	0.67	0.59	0.4	0.15	−0.08
ec−ea−sent	−0.05	0.11	0.29	0.45	0.55	0.53	0.39	0.19	0
ec−at−serv−dem3m	−0.14	−0.04	0.12	0.31	0.45	0.49	0.38	0.2	0
ec−ea−serv−conf	−0.18	−0.07	0.09	0.25	0.37	0.38	0.3	0.17	0.04
sentix−econ−sit	−0.03	0.22	0.5	0.68	0.78	0.6	0.31	0	−0.23
cs−econ−sit	0.07	0.31	0.54	0.7	0.73	0.59	0.32	0.01	−0.25
ifo−de−manu−sit	0.19	0.36	0.52	0.61	0.6	0.47	0.27	0.04	−0.14
ifo−expect−sit	−0.48	−0.47	−0.3	−0.05	0.15	0.26	0.26	0.24	0.17
ifo−expect−gdp	0.17	0.36	0.56	0.7	0.64	0.43	0.18	−0.04	−0.19
kof−manu−sit	0.22	0.42	0.63	0.74	0.7	0.51	0.23	−0.07	−0.29
kof−privsec−sit	0.02	0.29	0.54	0.71	0.74	0.47	0.16	−0.1	−0.25
kof−caputil	0.3	0.49	0.61	0.61	0.46	0.21	−0.05	−0.24	−0.34

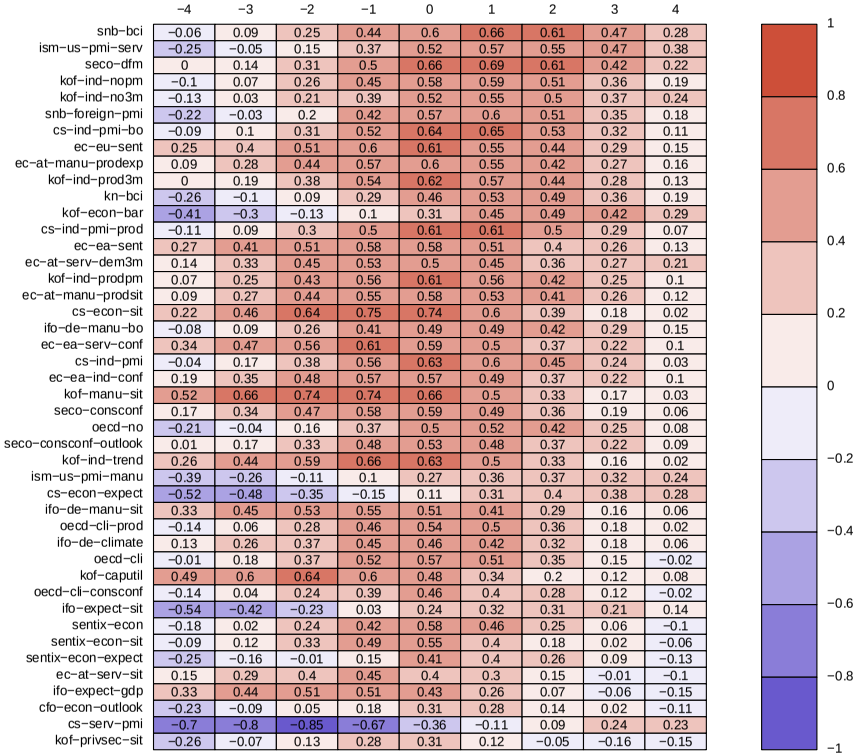
Figure 6: VA-Serv-Priv (q-q and y-y)

VA−SERV−PRIV final release Q−Q



	−4	−3	−2	−1	0	1	2	3	4
ism−us−pmi−serv	0.05	0.23	0.34	0.46	0.5	0.4	0.31	0.22	0.23
snb−bci	0.11	0.28	0.41	0.54	0.6	0.45	0.26	0.13	0.07
kof−ind−no3m	0.1	0.24	0.37	0.48	0.48	0.35	0.21	0.12	0.09
kof−econ−bar	−0.18	−0.01	0.14	0.37	0.46	0.39	0.28	0.15	0.06
seco−dfm	0.13	0.31	0.49	0.6	0.59	0.41	0.23	0.05	0.01
cs−econ−expect	−0.37	−0.25	−0.01	0.21	0.38	0.42	0.3	0.19	0.04
kof−ind−nopm	0.1	0.28	0.44	0.53	0.5	0.34	0.19	0.09	0.03
ism−us−pmi−manu	−0.16	0.03	0.15	0.3	0.36	0.29	0.2	0.15	0.13
ec−at−serv−dem3m	0.34	0.41	0.42	0.43	0.29	0.24	0.15	0.13	0.13
kn−bci	−0.03	0.16	0.34	0.46	0.5	0.41	0.23	0.05	−0.04
ec−eu−sent	0.37	0.45	0.49	0.5	0.42	0.28	0.16	0.06	0.03
snb−foreign−pmi	0.06	0.27	0.41	0.51	0.5	0.37	0.16	0.03	−0.01
kof−ind−prod3m	0.23	0.38	0.49	0.53	0.45	0.27	0.12	0.05	0.04
ec−at−manu−prodexp	0.31	0.41	0.49	0.49	0.38	0.27	0.12	0.06	0.04
ifo−de−manu−bo	0.17	0.27	0.37	0.43	0.41	0.29	0.16	0.06	0.01
ec−ea−sent	0.38	0.45	0.47	0.46	0.38	0.25	0.13	0.05	0.02
kof−ind−prodpm	0.27	0.41	0.51	0.52	0.42	0.25	0.1	0.03	0.01
ec−at−manu−prodsit	0.29	0.4	0.48	0.48	0.38	0.26	0.12	0.04	−0.02
seco−consconf−outlook	0.2	0.38	0.42	0.47	0.34	0.24	0.11	0.04	0.01
ec−ea−ind−conf	0.35	0.43	0.47	0.45	0.36	0.22	0.1	0.03	0.01
cs−ind−pmi−bo	0.15	0.33	0.49	0.58	0.51	0.36	0.15	−0.05	−0.12
seco−consconf	0.32	0.47	0.48	0.49	0.33	0.22	0.08	0.01	0
ifo−expect−sit	−0.32	−0.04	0.15	0.3	0.29	0.21	0.11	0.01	0.08
ec−ea−serv−conf	0.4	0.48	0.47	0.44	0.35	0.22	0.09	0	−0.02
cs−serv−pmi	−0.48	−0.47	−0.46	−0.14	0.1	0.27	0.13	0.22	0.12
oecd−no	0.02	0.22	0.39	0.48	0.44	0.27	0.1	−0.01	−0.06
cs−ind−pmi−prod	0.14	0.34	0.46	0.56	0.49	0.32	0.13	−0.06	−0.15
kof−caputil	0.52	0.51	0.43	0.3	0.16	0.08	0.04	0.05	0.07
ifo−de−manu−sit	0.41	0.44	0.42	0.38	0.28	0.16	0.07	0.01	−0.01
kof−ind−trend	0.43	0.54	0.55	0.48	0.34	0.17	0.05	−0.02	−0.05
kof−manu−sit	0.6	0.65	0.62	0.52	0.36	0.16	0.04	−0.03	−0.09
cs−econ−sit	0.43	0.55	0.61	0.56	0.41	0.23	0.04	−0.07	−0.12
ifo−de−climate	0.27	0.32	0.36	0.38	0.31	0.19	0.07	−0.03	−0.06
oecd−cli−prod	0.13	0.31	0.44	0.48	0.39	0.2	0.03	−0.06	−0.08
cs−ind−pmi	0.21	0.39	0.51	0.55	0.46	0.28	0.09	−0.1	−0.17
oecd−cli	0.22	0.38	0.48	0.49	0.39	0.19	0.01	−0.09	−0.11
sentix−econ−sit	0.1	0.21	0.31	0.32	0.26	0.03	−0.08	−0.01	0.03
oecd−cli−consconf	0.13	0.3	0.4	0.4	0.3	0.15	0.02	−0.06	−0.1
sentix−econ	0.05	0.18	0.29	0.33	0.37	0.06	−0.1	−0.05	−0.06
cfo−econ−outlook	0.02	0.17	0.28	0.27	0.28	0.05	−0.1	−0.04	−0.09
ec−at−serv−sit	0.32	0.33	0.36	0.31	0.17	0.05	−0.06	−0.16	−0.11
sentix−econ−expect	−0.05	0.05	0.14	0.22	0.41	0.1	−0.1	−0.09	−0.2
ifo−expect−gdp	0.39	0.45	0.4	0.28	0.13	−0.05	−0.15	−0.12	−0.12
kof−privsec−sit	−0.02	0.04	0.06	0.06	−0.01	−0.18	−0.11	−0.11	0.02

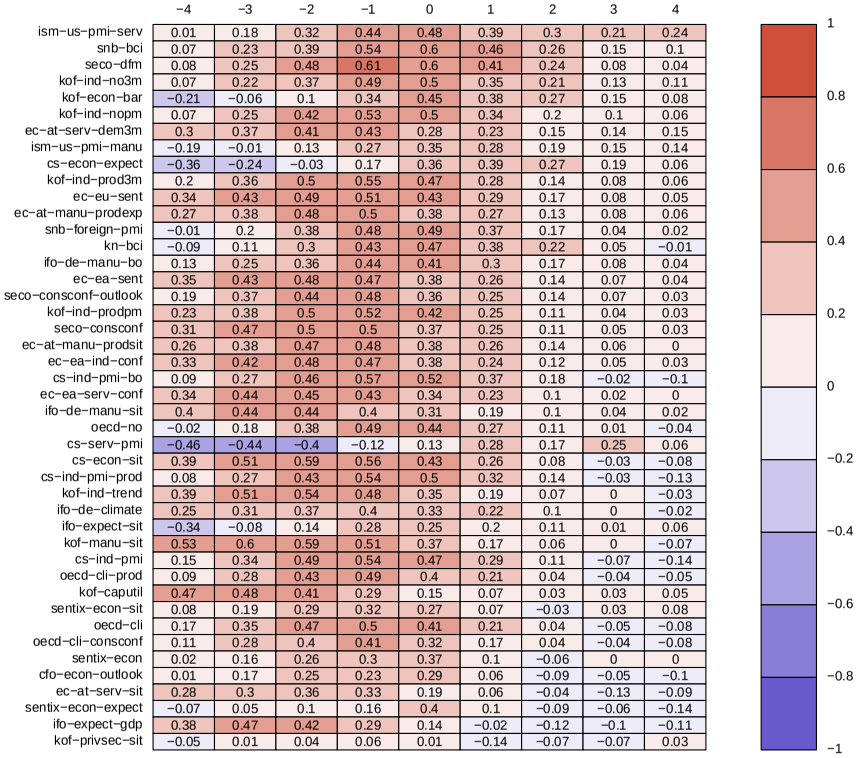
VA−SERV−PRIV final release Y−Y



	−4	−3	−2	−1	0	1	2	3	4
snb−bci	−0.06	0.09	0.25	0.44	0.6	0.66	0.61	0.47	0.28
ism−us−pmi−serv	−0.25	−0.05	0.15	0.37	0.52	0.57	0.55	0.47	0.38
seco−dfm	0	0.14	0.31	0.5	0.66	0.69	0.61	0.42	0.22
kof−ind−nopm	−0.1	0.07	0.26	0.45	0.58	0.59	0.51	0.36	0.19
kof−ind−no3m	−0.13	0.03	0.21	0.39	0.52	0.55	0.5	0.37	0.24
snb−foreign−pmi	−0.22	−0.03	0.2	0.42	0.57	0.6	0.51	0.35	0.18
cs−ind−pmi−bo	−0.09	0.1	0.31	0.52	0.64	0.65	0.53	0.32	0.11
ec−eu−sent	0.25	0.4	0.51	0.6	0.61	0.55	0.44	0.29	0.15
ec−at−manu−prodexp	0.09	0.28	0.44	0.57	0.6	0.55	0.42	0.27	0.16
kof−ind−prod3m	0	0.19	0.38	0.54	0.62	0.57	0.44	0.28	0.13
kn−bci	−0.26	−0.1	0.09	0.29	0.46	0.53	0.49	0.36	0.19
kof−econ−bar	−0.41	−0.3	−0.13	0.1	0.31	0.45	0.49	0.42	0.29
cs−ind−pmi−prod	−0.11	0.09	0.3	0.5	0.61	0.61	0.5	0.29	0.07
ec−ea−sent	0.27	0.41	0.51	0.58	0.58	0.51	0.4	0.26	0.13
ec−at−serv−dem3m	0.14	0.33	0.45	0.53	0.5	0.45	0.36	0.27	0.21
kof−ind−prodpm	0.07	0.25	0.43	0.56	0.61	0.56	0.42	0.25	0.1
ec−at−manu−prodsit	0.09	0.27	0.44	0.55	0.58	0.53	0.41	0.26	0.12
cs−econ−sit	0.22	0.46	0.64	0.75	0.74	0.6	0.39	0.18	0.02
ifo−de−manu−bo	−0.08	0.09	0.26	0.41	0.49	0.49	0.42	0.29	0.15
ec−ea−serv−conf	0.34	0.47	0.56	0.61	0.59	0.5	0.37	0.22	0.1
cs−ind−pmi	−0.04	0.17	0.38	0.56	0.63	0.6	0.45	0.24	0.03
ec−ea−ind−conf	0.19	0.35	0.48	0.57	0.57	0.49	0.37	0.22	0.1
kof−manu−sit	0.52	0.66	0.74	0.74	0.66	0.5	0.33	0.17	0.03
seco−consconf	0.17	0.34	0.47	0.58	0.59	0.49	0.36	0.19	0.06
oecd−no	−0.21	−0.04	0.16	0.37	0.5	0.52	0.42	0.25	0.08
seco−consconf−outlook	0.01	0.17	0.33	0.48	0.53	0.48	0.37	0.22	0.09
kof−ind−trend	0.26	0.44	0.59	0.66	0.63	0.5	0.33	0.16	0.02
ism−us−pmi−manu	−0.39	−0.26	−0.11	0.1	0.27	0.36	0.37	0.32	0.24
cs−econ−expect	−0.52	−0.48	−0.35	−0.15	0.11	0.31	0.4	0.38	0.28
ifo−de−manu−sit	0.33	0.45	0.53	0.55	0.51	0.41	0.29	0.16	0.06
oecd−cli−prod	−0.14	0.06	0.28	0.46	0.54	0.5	0.36	0.18	0.02
ifo−de−climate	0.13	0.26	0.37	0.45	0.46	0.42	0.32	0.18	0.06
oecd−cli	−0.01	0.18	0.37	0.52	0.57	0.51	0.35	0.15	−0.02
kof−caputil	0.49	0.6	0.64	0.6	0.48	0.34	0.2	0.12	0.08
oecd−cli−consconf	−0.14	0.04	0.24	0.39	0.46	0.4	0.28	0.12	−0.02
ifo−expect−sit	−0.54	−0.42	−0.23	0.03	0.24	0.32	0.31	0.21	0.14
sentix−econ	−0.18	0.02	0.24	0.42	0.58	0.46	0.25	0.06	−0.1
sentix−econ−sit	−0.09	0.12	0.33	0.49	0.55	0.4	0.18	0.02	−0.06
sentix−econ−expect	−0.25	−0.16	−0.01	0.15	0.41	0.4	0.26	0.09	−0.13
ec−at−serv−sit	0.15	0.29	0.4	0.45	0.4	0.3	0.15	−0.01	−0.1
ifo−expect−gdp	0.33	0.44	0.51	0.51	0.43	0.26	0.07	−0.06	−0.15
cfo−econ−outlook	−0.23	−0.09	0.05	0.18	0.31	0.28	0.14	0.02	−0.11
cs−serv−pmi	−0.7	−0.8	−0.85	−0.67	−0.36	−0.11	0.09	0.24	0.23
kof−privsec−sit	−0.26	−0.07	0.13	0.28	0.31	0.12	−0.05	−0.16	−0.15

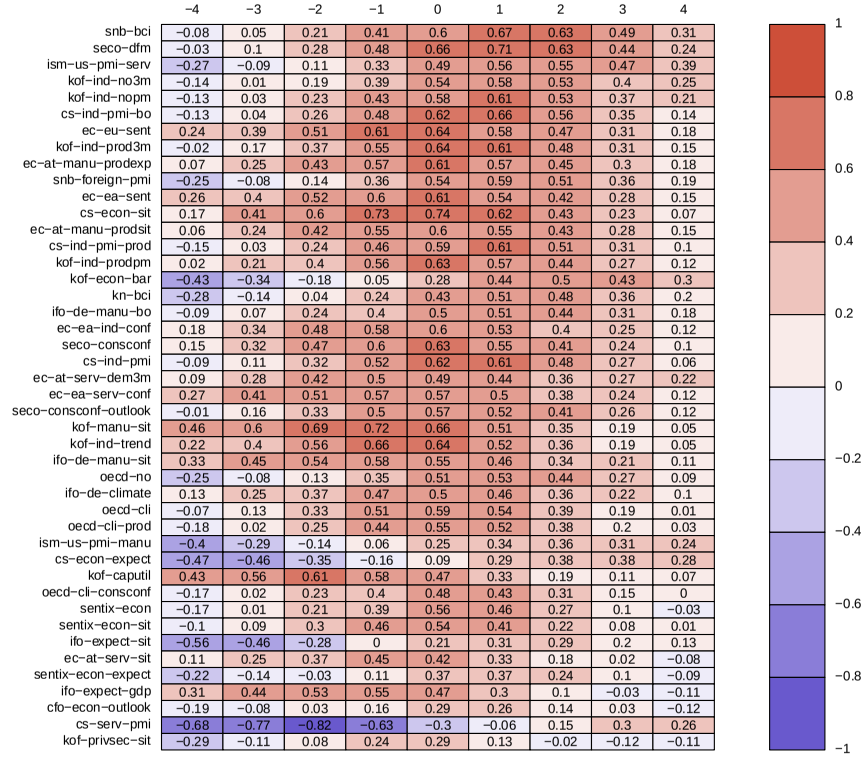
Figure 7: VA-Tert (q-q and y-y)

VA−TERT final release Q−Q



	−4	−3	−2	−1	0	1	2	3	4
ism−us−pmi−serv	0.01	0.18	0.32	0.44	0.48	0.39	0.3	0.21	0.24
snb−bci	0.07	0.23	0.39	0.54	0.6	0.46	0.26	0.15	0.1
seco−dfm	0.08	0.25	0.48	0.61	0.6	0.41	0.24	0.08	0.04
kof−ind−no3m	0.07	0.22	0.37	0.49	0.5	0.35	0.21	0.13	0.11
kof−econ−bar	−0.21	−0.06	0.1	0.34	0.45	0.38	0.27	0.15	0.08
kof−ind−nopm	0.07	0.25	0.42	0.53	0.5	0.34	0.2	0.1	0.06
ec−at−serv−dem3m	0.3	0.37	0.41	0.43	0.28	0.23	0.15	0.14	0.15
ism−us−pmi−manu	−0.19	−0.01	0.13	0.27	0.35	0.28	0.19	0.15	0.14
cs−econ−expect	−0.36	−0.24	−0.03	0.17	0.36	0.39	0.27	0.19	0.06
kof−ind−prod3m	0.2	0.36	0.5	0.55	0.47	0.28	0.14	0.08	0.06
ec−eu−sent	0.34	0.43	0.49	0.51	0.43	0.29	0.17	0.08	0.05
ec−at−manu−prodexp	0.27	0.38	0.48	0.5	0.38	0.27	0.13	0.08	0.06
snb−foreign−pmi	−0.01	0.2	0.38	0.48	0.49	0.37	0.17	0.04	0.02
kn−bci	−0.09	0.11	0.3	0.43	0.47	0.38	0.22	0.05	−0.01
ifo−de−manu−bo	0.13	0.25	0.36	0.44	0.41	0.3	0.17	0.08	0.04
ec−ea−sent	0.35	0.43	0.48	0.47	0.38	0.26	0.14	0.07	0.04
seco−consconf−outlook	0.19	0.37	0.44	0.48	0.36	0.25	0.14	0.07	0.03
kof−ind−prodpm	0.23	0.38	0.5	0.52	0.42	0.25	0.11	0.04	0.03
seco−consconf	0.31	0.47	0.5	0.5	0.37	0.25	0.11	0.05	0.03
ec−at−manu−prodsit	0.26	0.38	0.47	0.48	0.38	0.26	0.14	0.06	0
ec−ea−ind−conf	0.33	0.42	0.48	0.47	0.38	0.24	0.12	0.05	0.03
cs−ind−pmi−bo	0.09	0.27	0.46	0.57	0.52	0.37	0.18	−0.02	−0.1
ec−ea−serv−conf	0.34	0.44	0.45	0.43	0.34	0.23	0.1	0.02	0
ifo−de−manu−sit	0.4	0.44	0.44	0.4	0.31	0.19	0.1	0.04	0.02
oecd−no	−0.02	0.18	0.38	0.49	0.44	0.27	0.11	0.01	−0.04
cs−serv−pmi	−0.46	−0.44	−0.4	−0.12	0.13	0.28	0.17	0.25	0.06
cs−econ−sit	0.39	0.51	0.59	0.56	0.43	0.26	0.08	−0.03	−0.08
cs−ind−pmi−prod	0.08	0.27	0.43	0.54	0.5	0.32	0.14	−0.03	−0.13
kof−ind−trend	0.39	0.51	0.54	0.48	0.35	0.19	0.07	0	−0.03
ifo−de−climate	0.25	0.31	0.37	0.4	0.33	0.22	0.1	0	−0.02
ifo−expect−sit	−0.34	−0.08	0.14	0.28	0.25	0.2	0.11	0.01	0.06
kof−manu−sit	0.53	0.6	0.59	0.51	0.37	0.17	0.06	0	−0.07
cs−ind−pmi	0.15	0.34	0.49	0.54	0.47	0.29	0.11	−0.07	−0.14
oecd−cli−prod	0.09	0.28	0.43	0.49	0.4	0.21	0.04	−0.04	−0.05
kof−caputil	0.47	0.48	0.41	0.29	0.15	0.07	0.03	0.03	0.05
sentix−econ−sit	0.08	0.19	0.29	0.32	0.27	0.07	−0.03	0.03	0.08
oecd−cli	0.17	0.35	0.47	0.5	0.41	0.21	0.04	−0.05	−0.08
oecd−cli−consconf	0.11	0.28	0.4	0.41	0.32	0.17	0.04	−0.04	−0.08
sentix−econ	0.02	0.16	0.26	0.3	0.37	0.1	−0.06	0	0
cfo−econ−outlook	0.01	0.17	0.25	0.23	0.29	0.06	−0.09	−0.05	−0.1
ec−at−serv−sit	0.28	0.3	0.36	0.33	0.19	0.06	−0.04	−0.13	−0.09
sentix−econ−expect	−0.07	0.05	0.1	0.16	0.4	0.1	−0.09	−0.06	−0.14
ifo−expect−gdp	0.38	0.47	0.42	0.29	0.14	−0.02	−0.12	−0.1	−0.11
kof−privsec−sit	−0.05	0.01	0.04	0.06	0.01	−0.14	−0.07	−0.07	0.03

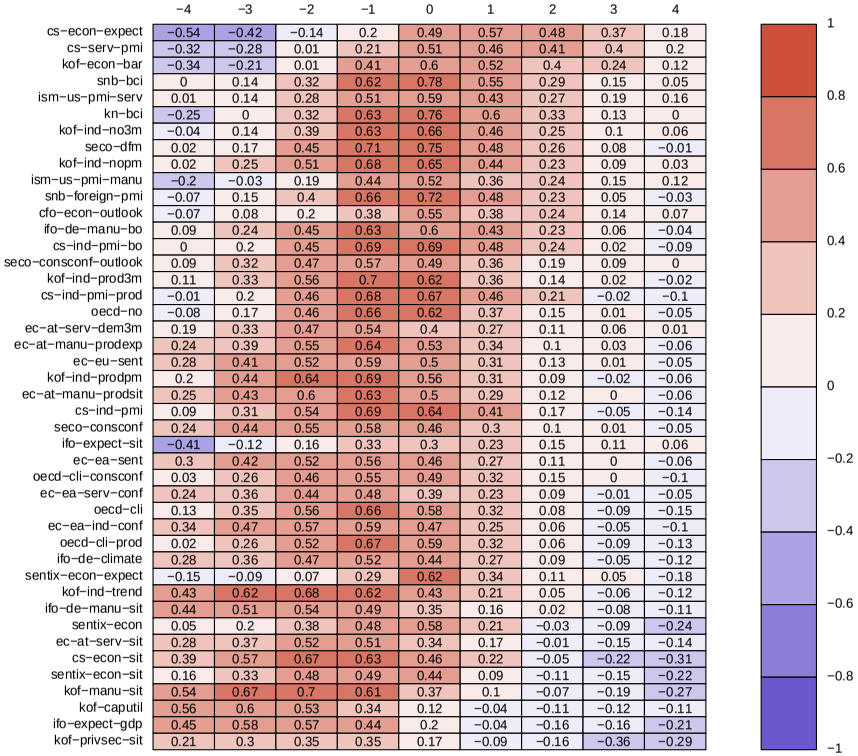
VA−TERT final release Y−Y



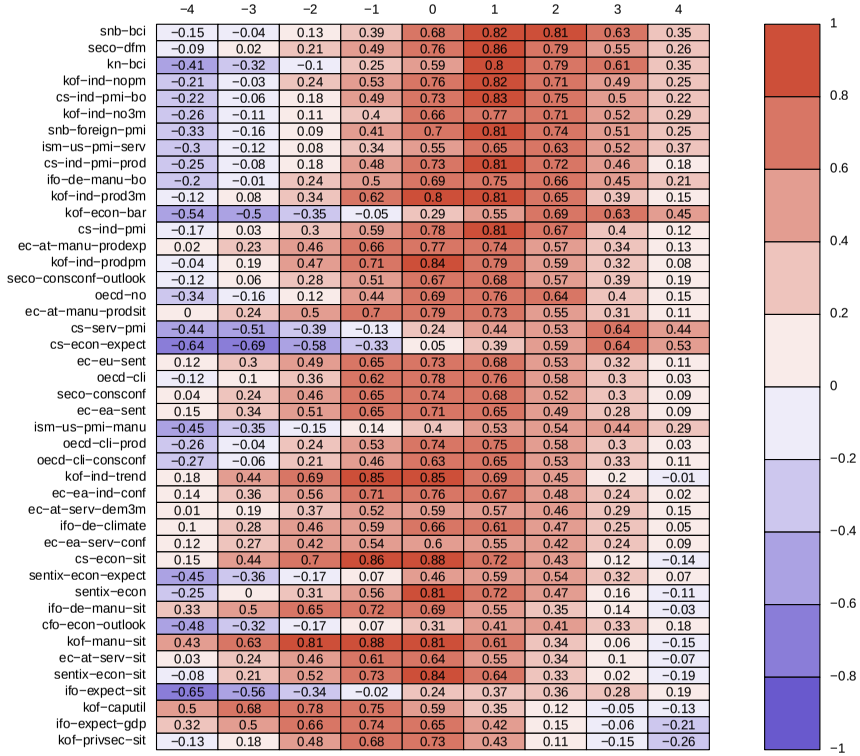
	−4	−3	−2	−1	0	1	2	3	4
snb−bci	−0.08	0.05	0.21	0.41	0.6	0.67	0.63	0.49	0.31
seco−dfm	−0.03	0.1	0.28	0.48	0.66	0.71	0.63	0.44	0.24
ism−us−pmi−serv	−0.27	−0.09	0.11	0.33	0.49	0.56	0.55	0.47	0.39
kof−ind−no3m	−0.14	0.01	0.19	0.39	0.54	0.58	0.53	0.4	0.25
kof−ind−nopm	−0.13	0.03	0.23	0.43	0.58	0.61	0.53	0.37	0.21
cs−ind−pmi−bo	−0.13	0.04	0.26	0.48	0.62	0.66	0.56	0.35	0.14
ec−eu−sent	0.24	0.39	0.51	0.61	0.64	0.58	0.47	0.31	0.18
kof−ind−prod3m	−0.02	0.17	0.37	0.55	0.64	0.61	0.48	0.31	0.15
ec−at−manu−prodexp	0.07	0.25	0.43	0.57	0.61	0.57	0.45	0.3	0.18
snb−foreign−pmi	−0.25	−0.08	0.14	0.36	0.54	0.59	0.51	0.36	0.19
ec−ea−sent	0.26	0.4	0.52	0.6	0.61	0.54	0.42	0.28	0.15
cs−econ−sit	0.17	0.41	0.6	0.73	0.74	0.62	0.43	0.23	0.07
ec−at−manu−prodsit	0.06	0.24	0.42	0.55	0.6	0.55	0.43	0.28	0.15
cs−ind−pmi−prod	−0.15	0.03	0.24	0.46	0.59	0.61	0.51	0.31	0.1
kof−ind−prodpm	0.02	0.21	0.4	0.56	0.63	0.57	0.44	0.27	0.12
kof−econ−bar	−0.43	−0.34	−0.18	0.05	0.28	0.44	0.5	0.43	0.3
kn−bci	−0.28	−0.14	0.04	0.24	0.43	0.51	0.48	0.36	0.2
ifo−de−manu−bo	−0.09	0.07	0.24	0.4	0.5	0.51	0.44	0.31	0.18
ec−ea−ind−conf	0.18	0.34	0.48	0.58	0.6	0.53	0.4	0.25	0.12
seco−consconf	0.15	0.32	0.47	0.6	0.63	0.55	0.41	0.24	0.1
cs−ind−pmi	−0.09	0.11	0.32	0.52	0.62	0.61	0.48	0.27	0.06
ec−at−serv−dem3m	0.09	0.28	0.42	0.5	0.49	0.44	0.36	0.27	0.22
ec−ea−serv−conf	0.27	0.41	0.51	0.57	0.57	0.5	0.38	0.24	0.12
seco−consconf−outlook	−0.01	0.16	0.33	0.5	0.57	0.52	0.41	0.26	0.12
kof−manu−sit	0.46	0.6	0.69	0.72	0.66	0.51	0.35	0.19	0.05
kof−ind−trend	0.22	0.4	0.56	0.66	0.64	0.52	0.36	0.19	0.05
ifo−de−manu−sit	0.33	0.45	0.54	0.58	0.55	0.46	0.34	0.21	0.11
oecd−no	−0.25	−0.08	0.13	0.35	0.51	0.53	0.44	0.27	0.09
ifo−de−climate	0.13	0.25	0.37	0.47	0.5	0.46	0.36	0.22	0.1
oecd−cli	−0.07	0.13	0.33	0.51	0.59	0.54	0.39	0.19	0.01
oecd−cli−prod	−0.18	0.02	0.25	0.44	0.55	0.52	0.38	0.2	0.03
ism−us−pmi−manu	−0.4	−0.29	−0.14	0.06	0.25	0.34	0.36	0.31	0.24
cs−econ−expect	−0.47	−0.46	−0.35	−0.16	0.09	0.29	0.38	0.38	0.28
kof−caputil	0.43	0.56	0.61	0.58	0.47	0.33	0.19	0.11	0.07
oecd−cli−consconf	−0.17	0.02	0.23	0.4	0.48	0.43	0.31	0.15	0
sentix−econ	−0.17	0.01	0.21	0.39	0.56	0.46	0.27	0.1	−0.03
sentix−econ−sit	−0.1	0.09	0.3	0.46	0.54	0.41	0.22	0.08	0.01
ifo−expect−sit	−0.56	−0.46	−0.28	0	0.21	0.31	0.29	0.2	0.13
ec−at−serv−sit	0.11	0.25	0.37	0.45	0.42	0.33	0.18	0.02	−0.08
sentix−econ−expect	−0.22	−0.14	−0.03	0.11	0.37	0.37	0.24	0.1	−0.09
ifo−expect−gdp	0.31	0.44	0.53	0.55	0.47	0.3	0.1	−0.03	−0.11
cfo−econ−outlook	−0.19	−0.08	0.03	0.16	0.29	0.26	0.14	0.03	−0.12
cs−serv−pmi	−0.68	−0.77	−0.82	−0.63	−0.3	−0.06	0.15	0.3	0.26
kof−privsec−sit	−0.29	−0.11	0.08	0.24	0.29	0.13	−0.02	−0.12	−0.11

Figure 8: VA-Priv (q-q and y-y)

VA−PRIV final release Q−Q

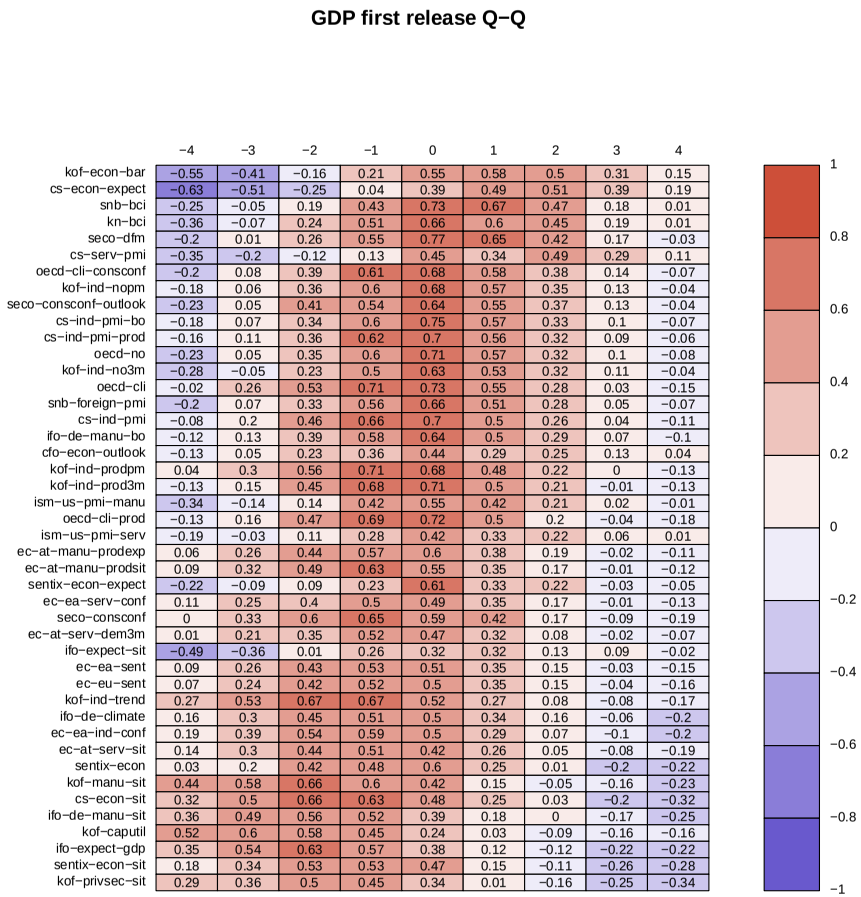


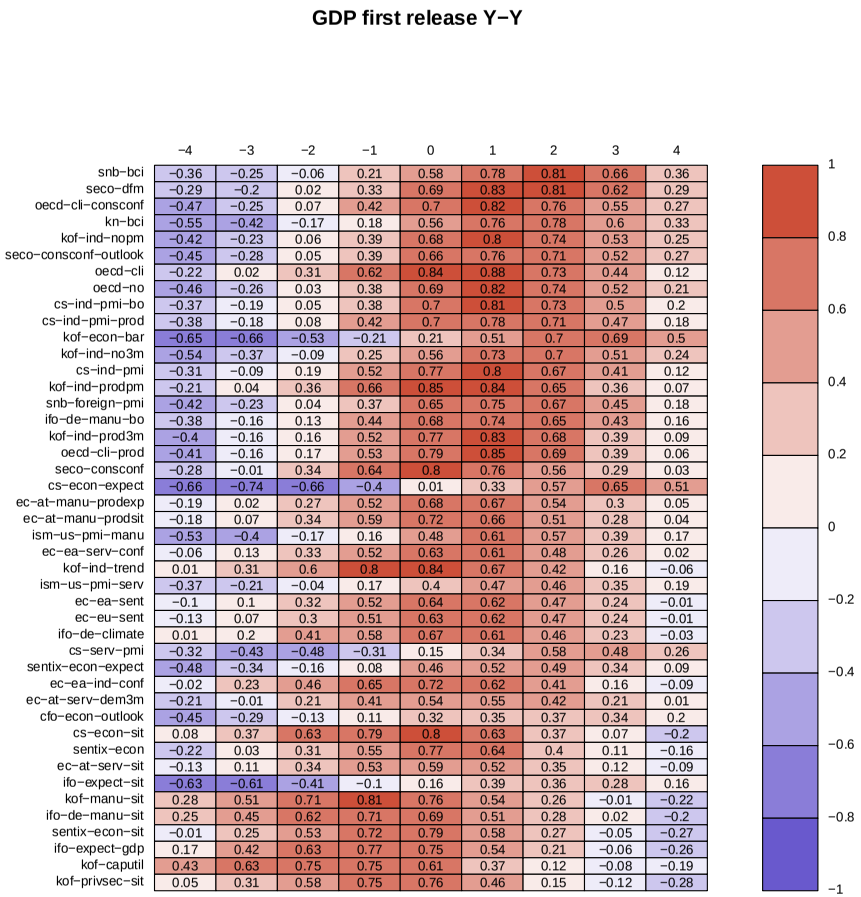
VA−PRIV final release Y−Y



D Figures: Dynamic cross-correlation analysis–First release

Figure 9: GDP-vintage-first release (q-q and y-y)





E Tables: Dynamic cross-correlation analysis–Pre-crisis vs. post-crisis

Table 3: GDP final release Q-Q (post crisis - pre crisis)

	-4	-3	-2	-1	0	1	2	3	4
seco-dfm	-0.22	-0.23	-0.377	-0.393	-0.117	-0.098	-0.118	-0.045	-0.041
kof-ind-nopm	-0.332	-0.428	-0.458	-0.252	-0.064	-0.165	-0.086	-0.027	-0.051
kof-ind-prodpm	0.073	-0.07	-0.133	-0.191	-0.08	0.046	0.071	-0.04	-0.061
kof-ind-trend	-0.199	-0.287	-0.282	-0.181	-0.076	-0.066	-0.13	-0.183	-0.257
kof-ind-no3m	-0.326	-0.364	-0.32	-0.177	-0.016	-0.052	-0.106	-0.144	-0.243
kof-ind-prod3m	-0.425	-0.361	-0.26	-0.086	-0.039	-0.228	-0.205	-0.155	-0.222
oecd-no	-0.091	-0.101	-0.122	-0.167	-0.058	0.068	0.018	-0.031	-0.127
oecd-cli	-0.293	-0.3	-0.256	-0.176	0.003	0.046	0.028	0.033	-0.067
oecd-cli-prod	-0.286	-0.262	-0.291	-0.131	-0.071	-0.066	-0.004	0.01	-0.065
oecd-cli-consconf	-0.274	-0.242	-0.293	-0.149	-0.058	-0.05	0.057	0.014	-0.088
ism-us-pmi-manu	-0.277	-0.253	-0.316	-0.21	-0.121	-0.015	0.063	0.028	-0.052
seco-consconf-outlook	-0.128	-0.243	-0.305	-0.178	0.03	0.022	-0.03	-0.055	-0.196
seco-consconf	-0.314	-0.352	-0.341	-0.235	-0.064	-0.021	0.037	0.076	-0.043
kof-caputil	-0.224	-0.267	-0.267	-0.204	-0.024	0.022	0.043	0.074	-0.047
snb-bci	-0.257	-0.3	-0.217	-0.09	0.103	0.222	0.201	0.115	-0.063
ifo-expect-sit	0.414	0.267	0.172	0.058	-0.016	-0.123	-0.274	-0.278	-0.229
ifo-expect-gdp	-0.312	-0.376	-0.439	-0.45	-0.456	-0.352	-0.168	-0.137	-0.17
ifo-de-climate	-0.48	-0.535	-0.552	-0.505	-0.428	-0.414	-0.223	-0.092	-0.083
ifo-de-manu-sit	-0.257	-0.374	-0.353	-0.272	-0.208	-0.142	-0.023	0.04	0.047
kof-econ-bar	-0.287	-0.368	-0.411	-0.337	-0.261	-0.268	-0.107	0.036	0.024
cs-ind-pmi	-0.247	-0.373	-0.361	-0.299	-0.244	-0.173	-0.046	0.027	0.029
cs-ind-pmi-prod	-0.202	-0.387	-0.112	-0.137	0.092	0.308	0.24	0.078	0.011
cs-ind-pmi-bo	-0.188	-0.302	-0.044	-0.075	-0.012	0.12	0.059	-0.035	-0.106
ec-ea-ind-conf	-0.371	-0.291	-0.245	-0.195	0.278	-0.117	-0.165	0.113	-0.089
ec-ea-sent	0.412	0.058	0.167	0.269	0.357	0.403	0.335	0.161	-0.071
ec-eu-sent	-0.304	-0.294	-0.24	-0.187	-0.243	-0.461	-0.439	-0.386	-0.391

Table 4: GDP final release Y-Y (post crisis - pre crisis)

	-4	-3	-2	-1	0	1	2	3	4
seco-dfm	-0.52	-0.458	-0.456	-0.517	-0.382	-0.29	-0.216	-0.146	-0.15
kof-ind-nopm	-0.474	-0.641	-0.705	-0.565	-0.375	-0.283	-0.208	-0.179	-0.184
kof-ind-prodpm	0.048	-0.064	-0.146	-0.253	-0.277	-0.027	0.072	0.057	0.03
kof-ind-trend	-0.32	-0.395	-0.421	-0.371	-0.22	-0.136	-0.134	-0.182	-0.28
kof-ind-no3m	-0.499	-0.542	-0.516	-0.384	-0.142	-0.133	-0.138	-0.167	-0.278
kof-ind-prod3m	-0.622	-0.64	-0.529	-0.26	-0.009	-0.225	-0.308	-0.336	-0.409
oecd-no	-0.444	-0.351	-0.257	-0.23	-0.117	-0.006	0.007	0.015	-0.034
oecd-cli	-0.605	-0.55	-0.465	-0.377	-0.149	-0.068	-0.03	0.014	-0.032
oecd-cli-prod	-0.446	-0.475	-0.471	-0.321	-0.15	-0.151	-0.118	-0.12	-0.143
oecd-cli-consconf	-0.398	-0.452	-0.475	-0.341	-0.183	-0.13	-0.058	-0.057	-0.108
ism-us-pmi-manu	-0.426	-0.461	-0.496	-0.408	-0.264	-0.15	-0.065	-0.061	-0.075
seco-consconf-outlook	-0.218	-0.282	-0.364	-0.336	-0.159	-0.048	0.007	-0.008	-0.136
seco-consconf	-0.58	-0.555	-0.517	-0.424	-0.213	-0.151	-0.072	0.002	-0.033
kof-caputil	-0.494	-0.451	-0.403	-0.345	-0.151	-0.068	-0.001	0.064	0.022
snb-bci	-0.494	-0.514	-0.455	-0.335	-0.092	0.127	0.233	0.258	0.157
ifo-expect-sit	0.325	0.439	0.425	0.323	0.228	0.067	-0.157	-0.32	-0.414
ifo-expect-gdp	-0.421	-0.442	-0.397	-0.364	-0.41	-0.654	-0.621	-0.519	-0.444
ifo-de-climate	-0.469	-0.563	-0.573	-0.535	-0.498	-0.777	-0.733	-0.552	-0.439
ifo-de-manu-sit	-0.31	-0.369	-0.365	-0.347	-0.284	-0.383	-0.334	-0.236	-0.162
kof-econ-bar	-0.291	-0.34	-0.367	-0.345	-0.275	-0.505	-0.478	-0.349	-0.263
cs-ind-pmi	-0.28	-0.348	-0.36	-0.36	-0.301	-0.412	-0.366	-0.259	-0.181
cs-ind-pmi-prod	-0.486	-0.537	-0.453	-0.304	-0.145	0.138	0.2	0.247	0.192
cs-ind-pmi-bo	-0.59	-0.588	-0.4	-0.106	0.009	0.043	0.01	0.022	-0.031
ec-ea-ind-conf	-0.421	-0.372	-0.395	-0.339	0.143	-0.117	-0.219	-0.034	-0.171
ec-ea-sent	0.427	0.372	0.32	0.264	0.329	0.515	0.545	0.451	0.261
ec-eu-sent	-0.327	-0.339	-0.255	-0.143	-0.109	-0.488	-0.64	-0.681	-0.718

Table 5: VA-MANU final release Q-Q (post crisis - pre crisis)

	-4	-3	-2	-1	0	1	2	3	4
seco-dfm	0.026	0.054	-0.129	-0.069	0.121	0.152	0.122	0.052	-0.028
kof-ind-nopm	0.016	-0.052	-0.156	-0.017	-0.074	-0.02	0.078	0.077	-0.018
kof-ind-prodpm	0.029	-0.044	-0.082	-0.043	0.102	0.27	0.373	0.261	0.245
kof-ind-trend	0.122	0.031	0.021	0.122	0.216	0.232	0.19	0.05	-0.132
kof-ind-no3m	0.068	0.035	0.036	0.11	0.191	0.131	0.083	-0.06	-0.221
kof-ind-prod3m	-0.093	-0.027	0.047	0.119	0.121	-0.013	-0.033	-0.122	-0.295
oecd-no	0.006	-0.069	-0.145	-0.116	0.076	0.263	0.258	0.12	-0.061
oecd-cli	-0.066	-0.112	-0.126	-0.067	0.117	0.211	0.212	0.1	-0.067
oecd-cli-prod	-0.034	0.031	0.113	0.195	0.194	0.218	0.245	0.208	0.057
oecd-cli-consconf	-0.054	-0.051	0.051	0.152	0.166	0.222	0.349	0.27	0.149
ism-us-pmi-manu	-0.069	0.009	0.066	0.08	0.084	0.211	0.243	0.233	0.111
seco-consconf-outlook	0.074	-0.022	-0.047	0.096	0.277	0.266	0.237	0.102	-0.086
seco-consconf	-0.001	-0.065	-0.057	0.059	0.183	0.192	0.184	0.05	-0.154
kof-caputil	-0.004	-0.068	-0.101	-0.03	0.146	0.205	0.239	0.132	-0.058
snb-bci	-0.082	-0.099	0.003	0.15	0.31	0.367	0.343	0.2	0.029
ifo-expect-sit	0.271	0.275	0.359	0.287	0.441	0.269	0.123	0.069	-0.011
ifo-expect-gdp	-0.047	0.013	-0.005	-0.042	-0.116	-0.055	-0.03	-0.218	-0.389
ifo-de-climate	-0.09	-0.074	-0.115	-0.183	-0.244	-0.29	-0.245	-0.347	-0.434
ifo-de-manu-sit	-0.018	-0.004	0.081	0.153	0.165	0.157	0.134	0.032	-0.032
kof-econ-bar	-0.05	0.006	0.038	0.096	0.091	0.003	0.032	-0.064	-0.176
cs-ind-pmi	-0.099	-0.102	-0.021	0.07	0.088	0.112	0.109	0.022	-0.03
cs-ind-pmi-prod	-0.036	-0.195	0.12	0.04	0.224	0.456	0.351	0.168	-0.005
cs-ind-pmi-bo	-0.09	-0.165	0.08	-0.044	0.069	0.302	0.273	0.103	-0.203
ec-ea-ind-conf	-0.155	-0.008	0.04	0.04	0.333	-0.335	-0.373	-0.284	-0.358
ec-ea-sent	0.035	-0.2	0.014	0.278	0.385	0.504	0.303	0.125	0.091
ec-eu-sent	0.086	0.131	0.143	0.08	-0.026	-0.209	-0.258	-0.375	-0.478

Table 6: VA-MANU final release Y-Y (post crisis - pre crisis)

	-4	-3	-2	-1	0	1	2	3	4
seco-dfm	-0.138	-0.069	-0.047	-0.152	-0.103	-0.069	0.024	0.061	0.022
kof-ind-nopm	-0.108	-0.175	-0.224	-0.185	-0.227	-0.237	-0.159	-0.104	-0.03
kof-ind-prodpm	0.05	-0.01	-0.062	-0.135	-0.145	0.055	0.221	0.349	0.426
kof-ind-trend	-0.007	-0.006	0.005	0.01	0.079	0.139	0.21	0.2	0.058
kof-ind-no3m	-0.12	-0.104	-0.061	-0.004	0.112	0.083	0.105	0.057	-0.112
kof-ind-prod3m	-0.327	-0.315	-0.199	-0.029	0.142	-0.006	-0.06	-0.132	-0.283
oecd-no	-0.309	-0.219	-0.169	-0.214	-0.176	-0.06	0.098	0.224	0.178
oecd-cli	-0.371	-0.301	-0.237	-0.257	-0.143	-0.057	0.079	0.178	0.125
oecd-cli-prod	-0.332	-0.279	-0.14	0.035	0.157	0.183	0.228	0.253	0.218
oecd-cli-consconf	-0.339	-0.35	-0.252	-0.054	0.045	0.129	0.251	0.326	0.331
ism-us-pmi-manu	-0.382	-0.332	-0.203	-0.073	0.002	0.08	0.138	0.212	0.245
seco-consconf-outlook	-0.055	-0.055	-0.08	-0.07	0.048	0.155	0.286	0.304	0.149
seco-consconf	-0.174	-0.186	-0.171	-0.127	0.009	0.062	0.166	0.196	0.07
kof-caputil	-0.262	-0.211	-0.175	-0.184	-0.082	-0.002	0.158	0.266	0.196
snb-bci	-0.329	-0.357	-0.284	-0.148	0.076	0.273	0.416	0.463	0.363
ifo-expect-sit	0.18	0.365	0.503	0.481	0.559	0.523	0.384	0.278	0.08
ifo-expect-gdp	-0.377	-0.269	-0.084	0.023	-0.007	-0.22	-0.24	-0.284	-0.394
ifo-de-climate	-0.264	-0.229	-0.149	-0.128	-0.17	-0.469	-0.536	-0.563	-0.632
ifo-de-manu-sit	-0.315	-0.213	-0.03	0.087	0.188	0.117	0.118	0.094	0.026
kof-econ-bar	-0.345	-0.227	-0.073	0.046	0.145	-0.035	-0.048	-0.079	-0.175
cs-ind-pmi	-0.398	-0.322	-0.173	-0.071	0.036	-0.021	0.015	0.03	-0.001
cs-ind-pmi-prod	-0.292	-0.327	-0.226	-0.128	-0.009	0.268	0.347	0.425	0.349
cs-ind-pmi-bo	-0.462	-0.453	-0.291	-0.12	-0.021	0.089	0.155	0.255	0.165
ec-ea-ind-conf	-0.12	-0.107	-0.133	-0.11	0.312	-0.021	-0.243	-0.339	-0.618
ec-ea-sent	0.238	0.13	0.029	0.019	0.193	0.487	0.591	0.505	0.372
ec-eu-sent	-0.126	-0.009	0.151	0.236	0.234	-0.075	-0.248	-0.41	-0.583

Table 7: VA-INDU final release Q-Q (post crisis - pre crisis)

	-4	-3	-2	-1	0	1	2	3	4
seco-dfm	-0.017	0.011	-0.159	-0.1	0.055	0.067	0.055	-0.014	-0.061
kof-ind-nopm	-0.045	-0.102	-0.168	-0.055	-0.125	-0.084	0.001	0.009	-0.062
kof-ind-prodpm	0.074	-0.006	-0.039	-0.016	0.051	0.227	0.276	0.194	0.213
kof-ind-trend	0.109	0.015	-0.01	0.065	0.143	0.159	0.126	0.01	-0.166
kof-ind-no3m	0.016	-0.022	-0.032	0.026	0.103	0.053	0.037	-0.085	-0.24
kof-ind-prod3m	-0.163	-0.102	-0.04	0.036	0.048	-0.091	-0.069	-0.148	-0.303
oecd-no	0.02	-0.048	-0.142	-0.152	0	0.177	0.19	0.078	-0.103
oecd-cli	-0.09	-0.114	-0.146	-0.12	0.039	0.112	0.142	0.067	-0.091
oecd-cli-prod	-0.1	-0.032	0.044	0.128	0.105	0.156	0.184	0.175	0.052
oecd-cli-consconf	-0.121	-0.127	-0.009	0.097	0.068	0.175	0.272	0.215	0.133
ism-us-pmi-manu	-0.12	-0.053	0.013	0.02	-0.011	0.139	0.163	0.193	0.1
seco-consconf-outlook	0.063	-0.041	-0.073	0.036	0.181	0.197	0.171	0.062	-0.112
seco-consconf	-0.061	-0.107	-0.094	0.005	0.114	0.121	0.14	0.028	-0.164
kof-caputil	-0.035	-0.09	-0.135	-0.102	0.043	0.107	0.167	0.098	-0.081
snb-bci	-0.128	-0.141	-0.04	0.093	0.245	0.315	0.289	0.155	-0.013
ifo-expect-sit	0.287	0.292	0.38	0.317	0.431	0.26	0.091	0.03	-0.065
ifo-expect-gdp	-0.162	-0.08	-0.073	-0.116	-0.203	-0.142	-0.069	-0.22	-0.384
ifo-de-climate	-0.198	-0.166	-0.19	-0.247	-0.299	-0.354	-0.255	-0.347	-0.423
ifo-de-manu-sit	-0.113	-0.089	-0.001	0.077	0.103	0.103	0.132	0.058	0.01
kof-econ-bar	-0.143	-0.084	-0.047	0.02	0.019	-0.054	0.033	-0.04	-0.146
cs-ind-pmi	-0.182	-0.187	-0.104	-0.02	0.011	0.044	0.089	0.033	-0.008
cs-ind-pmi-prod	-0.063	-0.219	0.102	0.008	0.188	0.412	0.333	0.125	-0.026
cs-ind-pmi-bo	-0.117	-0.201	0.049	-0.075	0.025	0.22	0.239	0.042	-0.218
ec-ea-ind-conf	-0.185	-0.107	-0.056	-0.011	0.326	-0.343	-0.32	-0.259	-0.322
ec-ea-sent	0.117	-0.141	0.098	0.334	0.411	0.554	0.33	0.142	0.055
ec-eu-sent	-0.014	0.041	0.047	-0.006	-0.09	-0.283	-0.283	-0.4	-0.499

Table 8: VA-INDU final release Y-Y (post crisis - pre crisis)

	-4	-3	-2	-1	0	1	2	3	4
seco-dfm	-0.167	-0.136	-0.116	-0.195	-0.142	-0.133	-0.057	-0.043	-0.07
kof-ind-nopm	-0.144	-0.242	-0.282	-0.223	-0.249	-0.272	-0.232	-0.199	-0.12
kof-ind-prodpm	0.108	0.031	-0.023	-0.072	-0.112	0.05	0.149	0.227	0.31
kof-ind-trend	0.003	-0.017	-0.012	-0.017	0.031	0.057	0.101	0.095	-0.02
kof-ind-no3m	-0.169	-0.174	-0.136	-0.085	0.019	-0.023	-0.001	-0.031	-0.163
kof-ind-prod3m	-0.411	-0.401	-0.281	-0.111	0.059	-0.101	-0.145	-0.2	-0.315
oecd-no	-0.229	-0.177	-0.14	-0.192	-0.183	-0.117	-0.002	0.109	0.083
oecd-cli	-0.373	-0.322	-0.249	-0.261	-0.163	-0.126	-0.026	0.067	0.04
oecd-cli-prod	-0.407	-0.371	-0.236	-0.06	0.058	0.082	0.118	0.147	0.148
oecd-cli-consconf	-0.42	-0.453	-0.353	-0.145	-0.053	0.044	0.142	0.206	0.243
ism-us-pmi-manu	-0.422	-0.403	-0.287	-0.15	-0.085	-0.008	0.029	0.094	0.157
seco-consconf-outlook	-0.057	-0.087	-0.113	-0.111	-0.028	0.059	0.165	0.182	0.063
seco-consconf	-0.246	-0.271	-0.242	-0.179	-0.041	-0.004	0.087	0.116	0.013
kof-caputil	-0.279	-0.261	-0.23	-0.24	-0.161	-0.107	0.032	0.145	0.112
snb-bci	-0.363	-0.422	-0.361	-0.227	-0.012	0.181	0.312	0.359	0.279
ifo-expect-sit	0.202	0.356	0.496	0.508	0.564	0.512	0.343	0.206	0.004
ifo-expect-gdp	-0.501	-0.399	-0.198	-0.07	-0.087	-0.304	-0.326	-0.358	-0.433
ifo-de-climate	-0.39	-0.35	-0.247	-0.2	-0.218	-0.518	-0.574	-0.591	-0.636
ifo-de-manu-sit	-0.449	-0.349	-0.159	-0.027	0.086	0.009	0.027	0.032	0.012
kof-econ-bar	-0.455	-0.348	-0.186	-0.058	0.044	-0.132	-0.125	-0.13	-0.182
cs-ind-pmi	-0.508	-0.44	-0.286	-0.178	-0.071	-0.139	-0.095	-0.051	-0.038
cs-ind-pmi-prod	-0.32	-0.371	-0.271	-0.156	-0.033	0.218	0.279	0.346	0.284
cs-ind-pmi-bo	-0.462	-0.479	-0.328	-0.138	-0.033	0.039	0.087	0.165	0.094
ec-ea-ind-conf	-0.181	-0.199	-0.22	-0.184	0.234	-0.065	-0.227	-0.293	-0.539
ec-ea-sent	0.297	0.183	0.113	0.118	0.265	0.534	0.6	0.494	0.348
ec-eu-sent	-0.265	-0.147	0.019	0.114	0.13	-0.18	-0.332	-0.472	-0.619

Table 9: VA-SECOND final release Q-Q (post crisis - pre crisis)

	-4	-3	-2	-1	0	1	2	3	4
seco-dfm	0.016	0.088	-0.059	-0.001	0.105	0.107	0.099	-0.041	-0.119
kof-ind-nopm	-0.007	-0.028	-0.067	0.04	-0.083	-0.03	0.044	-0.055	-0.128
kof-ind-prodpm	0.083	0.064	0.084	0.117	0.137	0.328	0.349	0.15	0.141
kof-ind-trend	0.143	0.093	0.081	0.127	0.186	0.156	0.071	-0.064	-0.235
kof-ind-no3m	0.101	0.074	0.056	0.085	0.141	0.044	-0.017	-0.133	-0.274
kof-ind-prod3m	-0.087	-0.023	0.046	0.093	0.043	-0.146	-0.148	-0.213	-0.348
oecd-no	0.009	-0.002	-0.081	-0.127	0.001	0.155	0.136	-0.017	-0.197
oecd-cli	-0.051	-0.051	-0.072	-0.075	0.037	0.076	0.072	-0.026	-0.175
oecd-cli-prod	-0.034	0.068	0.154	0.22	0.164	0.181	0.17	0.141	0.009
oecd-cli-consconf	-0.06	-0.005	0.109	0.197	0.159	0.243	0.273	0.21	0.098
ism-us-pmi-manu	-0.068	0.033	0.115	0.12	0.058	0.188	0.177	0.159	0.032
seco-consconf-outlook	0.133	0.062	0.046	0.125	0.246	0.221	0.137	0	-0.171
seco-consconf	0.06	0.037	0.039	0.086	0.151	0.113	0.096	-0.029	-0.221
kof-caputil	0.049	0.032	-0.008	-0.011	0.095	0.111	0.121	0.042	-0.125
snb-bci	-0.057	-0.031	0.064	0.153	0.284	0.312	0.24	0.101	-0.055
ifo-expect-sit	0.326	0.353	0.467	0.405	0.453	0.28	0.069	-0.011	-0.09
ifo-expect-gdp	-0.099	0.005	-0.005	-0.1	-0.215	-0.189	-0.128	-0.273	-0.41
ifo-de-climate	-0.123	-0.111	-0.172	-0.266	-0.363	-0.447	-0.342	-0.404	-0.46
ifo-de-manu-sit	-0.029	0.006	0.076	0.093	0.075	0.052	0.058	-0.007	-0.044
kof-econ-bar	-0.061	0.004	0.018	0.018	-0.038	-0.139	-0.064	-0.11	-0.186
cs-ind-pmi	-0.095	-0.078	-0.011	0.007	-0.012	-0.013	0.006	-0.045	-0.074
cs-ind-pmi-prod	-0.013	-0.139	0.155	0.046	0.188	0.382	0.277	0.031	-0.084
cs-ind-pmi-bo	-0.06	-0.128	0.096	-0.057	-0.023	0.126	0.139	-0.084	-0.316
ec-ea-ind-conf	-0.156	-0.127	-0.063	-0.076	0.233	-0.432	-0.423	-0.296	-0.38
ec-ea-sent	0.185	-0.046	0.18	0.382	0.48	0.589	0.35	0.102	0.059
ec-eu-sent	0.109	0.132	0.11	0.033	-0.098	-0.314	-0.309	-0.386	-0.457

Table 10: VA-SECOND final release Y-Y (post crisis - pre crisis)

	-4	-3	-2	-1	0	1	2	3	4
seco-dfm	-0.217	-0.121	-0.03	-0.052	0.003	-0.012	0.035	-0.007	-0.071
kof-ind-nopm	-0.172	-0.209	-0.174	-0.075	-0.105	-0.147	-0.144	-0.181	-0.144
kof-ind-prodpm	0.006	0.011	0.064	0.095	0.088	0.246	0.312	0.303	0.319
kof-ind-trend	-0.041	0.017	0.083	0.106	0.147	0.128	0.11	0.046	-0.108
kof-ind-no3m	-0.097	-0.043	0.02	0.061	0.129	0.035	0.001	-0.067	-0.219
kof-ind-prod3m	-0.349	-0.287	-0.144	0.01	0.121	-0.093	-0.19	-0.28	-0.406
oecd-no	-0.364	-0.23	-0.117	-0.128	-0.119	-0.093	-0.031	0.025	-0.036
oecd-cli	-0.41	-0.289	-0.165	-0.157	-0.088	-0.103	-0.064	-0.026	-0.083
oecd-cli-prod	-0.378	-0.274	-0.082	0.108	0.208	0.19	0.176	0.155	0.117
oecd-cli-consconf	-0.4	-0.35	-0.184	0.044	0.136	0.195	0.241	0.262	0.247
ism-us-pmi-manu	-0.424	-0.336	-0.151	0.011	0.074	0.121	0.117	0.125	0.134
seco-consconf-outlook	-0.06	-0.005	0.041	0.071	0.141	0.18	0.214	0.166	0.005
seco-consconf	-0.149	-0.098	-0.024	0.034	0.12	0.083	0.099	0.072	-0.06
kof-caputil	-0.257	-0.151	-0.055	-0.041	0.012	0.003	0.063	0.111	0.043
snb-bci	-0.335	-0.312	-0.194	-0.05	0.134	0.258	0.316	0.311	0.203
ifo-expect-sit	0.166	0.376	0.567	0.611	0.659	0.587	0.379	0.196	-0.019
ifo-expect-gdp	-0.426	-0.289	-0.087	0.004	-0.057	-0.315	-0.37	-0.418	-0.492
ifo-de-climate	-0.281	-0.237	-0.166	-0.175	-0.264	-0.605	-0.68	-0.695	-0.724
ifo-de-manu-sit	-0.324	-0.201	-0.017	0.078	0.134	0	-0.032	-0.053	-0.081
kof-econ-bar	-0.36	-0.219	-0.059	0.024	0.055	-0.185	-0.228	-0.25	-0.29
cs-ind-pmi	-0.405	-0.296	-0.13	-0.05	0.001	-0.133	-0.149	-0.144	-0.147
cs-ind-pmi-prod	-0.317	-0.31	-0.167	-0.04	0.047	0.232	0.246	0.255	0.174
cs-ind-pmi-bo	-0.436	-0.404	-0.223	-0.047	-0.009	-0.017	-0.021	0	-0.087
ec-ea-ind-conf	-0.127	-0.16	-0.204	-0.218	0.12	-0.2	-0.38	-0.414	-0.639
ec-ea-sent	0.257	0.223	0.223	0.255	0.394	0.623	0.661	0.519	0.356
ec-eu-sent	-0.05	0.06	0.182	0.219	0.165	-0.178	-0.342	-0.471	-0.592

Table 11: VA-SERV-PRIV final release Q-Q (post crisis - pre crisis)

	-4	-3	-2	-1	0	1	2	3	4
seco-dfm	-0.276	-0.437	-0.481	-0.585	-0.455	-0.415	-0.447	-0.162	-0.059
kof-ind-nopm	-0.463	-0.625	-0.621	-0.47	-0.232	-0.354	-0.295	-0.083	-0.074
kof-ind-prodpm	0.13	-0.095	-0.145	-0.33	-0.326	-0.342	-0.367	-0.339	-0.373
kof-ind-trend	-0.412	-0.512	-0.555	-0.518	-0.462	-0.422	-0.406	-0.327	-0.238
kof-ind-no3m	-0.572	-0.661	-0.657	-0.533	-0.372	-0.322	-0.29	-0.169	-0.11
kof-ind-prod3m	-0.59	-0.619	-0.598	-0.442	-0.325	-0.391	-0.324	-0.113	-0.007
oecd-no	-0.084	-0.09	-0.065	-0.18	-0.253	-0.245	-0.267	-0.164	-0.12
oecd-cli	-0.347	-0.376	-0.33	-0.305	-0.253	-0.223	-0.207	-0.061	-0.018
oecd-cli-prod	-0.375	-0.502	-0.65	-0.565	-0.471	-0.476	-0.336	-0.244	-0.21
oecd-cli-consconf	-0.322	-0.405	-0.588	-0.547	-0.439	-0.503	-0.342	-0.304	-0.366
ism-us-pmi-manu	-0.29	-0.433	-0.618	-0.556	-0.425	-0.409	-0.261	-0.254	-0.246
seco-consconf-outlook	-0.246	-0.373	-0.488	-0.459	-0.348	-0.346	-0.303	-0.181	-0.181
seco-consconf	-0.496	-0.551	-0.568	-0.523	-0.401	-0.311	-0.167	0.074	0.148
kof-caputil	-0.319	-0.37	-0.358	-0.355	-0.292	-0.254	-0.188	-0.017	0.011
snb-bci	-0.283	-0.368	-0.365	-0.33	-0.249	-0.143	-0.091	-0.058	-0.11
ifo-expect-sit	0.245	-0.014	-0.242	-0.378	-0.546	-0.53	-0.527	-0.469	-0.331
ifo-expect-gdp	-0.444	-0.665	-0.757	-0.691	-0.597	-0.503	-0.255	0.023	0.174
ifo-de-climate	-0.667	-0.782	-0.776	-0.608	-0.399	-0.28	-0.062	0.268	0.376
ifo-de-manu-sit	-0.321	-0.562	-0.627	-0.58	-0.497	-0.395	-0.2	0.005	0.09
kof-econ-bar	-0.399	-0.622	-0.723	-0.658	-0.51	-0.429	-0.216	0.109	0.218
cs-ind-pmi	-0.23	-0.46	-0.543	-0.529	-0.467	-0.379	-0.19	0.012	0.081
cs-ind-pmi-prod	-0.249	-0.397	-0.331	-0.284	-0.205	-0.087	-0.068	-0.059	0.015
cs-ind-pmi-bo	-0.173	-0.297	-0.216	-0.114	-0.125	-0.113	-0.168	-0.077	0.115
ec-ea-ind-conf	-0.459	-0.351	-0.449	-0.351	0.029	0.173	0.107	0.444	0.308
ec-ea-sent	0.536	0.243	0.098	-0.001	-0.001	-0.012	0.096	0.035	-0.189
ec-eu-sent	-0.673	-0.71	-0.633	-0.471	-0.373	-0.407	-0.313	-0.094	-0.004

Table 12: VA-SERV-PRIV final release Y-Y (post crisis - pre crisis)

	-4	-3	-2	-1	0	1	2	3	4
seco-dfm	-0.45	-0.5	-0.596	-0.698	-0.705	-0.643	-0.649	-0.537	-0.43
kof-ind-nopm	-0.487	-0.695	-0.821	-0.815	-0.677	-0.559	-0.472	-0.378	-0.348
kof-ind-prodpm	0.206	0.067	-0.068	-0.266	-0.409	-0.336	-0.372	-0.43	-0.489
kof-ind-trend	-0.406	-0.582	-0.724	-0.759	-0.698	-0.635	-0.619	-0.593	-0.543
kof-ind-no3m	-0.603	-0.763	-0.875	-0.849	-0.688	-0.619	-0.559	-0.466	-0.392
kof-ind-prod3m	-0.63	-0.776	-0.85	-0.729	-0.559	-0.627	-0.616	-0.511	-0.405
oecd-no	-0.185	-0.195	-0.189	-0.217	-0.205	-0.2	-0.294	-0.328	-0.306
oecd-cli	-0.436	-0.5	-0.538	-0.513	-0.4	-0.356	-0.364	-0.309	-0.245
oecd-cli-prod	-0.279	-0.457	-0.68	-0.738	-0.708	-0.736	-0.682	-0.616	-0.549
oecd-cli-consconf	-0.166	-0.337	-0.573	-0.674	-0.658	-0.693	-0.648	-0.619	-0.625
ism-us-pmi-manu	-0.17	-0.332	-0.584	-0.703	-0.696	-0.662	-0.572	-0.53	-0.507
seco-consconf-outlook	-0.193	-0.337	-0.509	-0.584	-0.53	-0.498	-0.471	-0.419	-0.393
seco-consconf	-0.672	-0.718	-0.764	-0.756	-0.643	-0.577	-0.485	-0.312	-0.15
kof-caputil	-0.39	-0.446	-0.491	-0.496	-0.401	-0.368	-0.358	-0.278	-0.198
snb-bci	-0.331	-0.413	-0.47	-0.487	-0.405	-0.296	-0.235	-0.188	-0.18
ifo-expect-sit	0.316	0.251	0.032	-0.192	-0.414	-0.584	-0.709	-0.764	-0.699
ifo-expect-gdp	-0.303	-0.52	-0.705	-0.787	-0.817	-0.901	-0.792	-0.56	-0.311
ifo-de-climate	-0.557	-0.77	-0.901	-0.874	-0.755	-0.765	-0.589	-0.274	-0.01
ifo-de-manu-sit	-0.067	-0.325	-0.55	-0.671	-0.7	-0.729	-0.638	-0.456	-0.275
kof-econ-bar	-0.133	-0.394	-0.638	-0.745	-0.733	-0.815	-0.716	-0.465	-0.228
cs-ind-pmi	0.064	-0.19	-0.417	-0.553	-0.594	-0.652	-0.587	-0.421	-0.261
cs-ind-pmi-prod	-0.337	-0.438	-0.485	-0.465	-0.419	-0.273	-0.215	-0.172	-0.121
cs-ind-pmi-bo	-0.392	-0.443	-0.404	-0.249	-0.203	-0.187	-0.215	-0.216	-0.15
ec-ea-ind-conf	-0.535	-0.498	-0.574	-0.537	-0.221	-0.218	-0.122	0.197	0.304
ec-ea-sent	0.592	0.564	0.453	0.26	0.128	0.1	0.092	0.071	-0.029
ec-eu-sent	-0.616	-0.773	-0.825	-0.734	-0.616	-0.706	-0.666	-0.514	-0.369

Table 13: VA-TERT final release Q-Q (post crisis - pre crisis)

	-4	-3	-2	-1	0	1	2	3	4
seco-dfm	-0.256	-0.388	-0.464	-0.644	-0.485	-0.441	-0.47	-0.218	-0.114
kof-ind-nopm	-0.402	-0.553	-0.627	-0.558	-0.236	-0.379	-0.348	-0.143	-0.095
kof-ind-prodpm	0.185	-0.015	-0.138	-0.373	-0.342	-0.391	-0.401	-0.364	-0.378
kof-ind-trend	-0.402	-0.537	-0.595	-0.571	-0.514	-0.456	-0.437	-0.362	-0.269
kof-ind-no3m	-0.569	-0.691	-0.705	-0.59	-0.416	-0.33	-0.31	-0.201	-0.138
kof-ind-prod3m	-0.601	-0.647	-0.638	-0.481	-0.347	-0.378	-0.338	-0.146	-0.032
oecd-no	-0.066	-0.093	-0.106	-0.239	-0.298	-0.267	-0.291	-0.196	-0.153
oecd-cli	-0.337	-0.398	-0.392	-0.377	-0.309	-0.259	-0.244	-0.099	-0.051
oecd-cli-prod	-0.352	-0.47	-0.68	-0.601	-0.51	-0.505	-0.367	-0.284	-0.221
oecd-cli-consconf	-0.277	-0.345	-0.627	-0.577	-0.473	-0.548	-0.362	-0.339	-0.361
ism-us-pmi-manu	-0.264	-0.38	-0.629	-0.594	-0.466	-0.441	-0.299	-0.306	-0.258
seco-consconf-outlook	-0.227	-0.374	-0.533	-0.532	-0.396	-0.371	-0.338	-0.219	-0.208
seco-consconf	-0.496	-0.573	-0.621	-0.596	-0.456	-0.333	-0.2	0.031	0.108
kof-caputil	-0.299	-0.386	-0.418	-0.429	-0.345	-0.282	-0.217	-0.046	-0.015
snb-bci	-0.272	-0.404	-0.439	-0.416	-0.322	-0.198	-0.133	-0.081	-0.126
ifo-expect-sit	0.272	0.037	-0.209	-0.341	-0.53	-0.53	-0.558	-0.507	-0.34
ifo-expect-gdp	-0.414	-0.635	-0.749	-0.688	-0.57	-0.446	-0.256	-0.006	0.131
ifo-de-climate	-0.645	-0.761	-0.761	-0.599	-0.374	-0.229	-0.072	0.227	0.327
ifo-de-manu-sit	-0.307	-0.558	-0.64	-0.592	-0.505	-0.384	-0.232	-0.043	0.047
kof-econ-bar	-0.392	-0.613	-0.727	-0.67	-0.509	-0.395	-0.236	0.069	0.192
cs-ind-pmi	-0.204	-0.446	-0.548	-0.536	-0.475	-0.37	-0.224	-0.04	0.037
cs-ind-pmi-prod	-0.235	-0.415	-0.406	-0.381	-0.27	-0.147	-0.133	-0.088	-0.014
cs-ind-pmi-bo	-0.2	-0.341	-0.311	-0.233	-0.209	-0.14	-0.23	-0.123	0.083
ec-ea-ind-conf	-0.511	-0.43	-0.473	-0.379	-0.007	0.186	0.116	0.404	0.231
ec-ea-sent	0.57	0.28	0.112	0.009	0.031	-0.018	0.066	0.027	-0.182
ec-eu-sent	-0.672	-0.714	-0.629	-0.438	-0.308	-0.319	-0.28	-0.093	-0.011

Table 14: VA-TERT final release Y-Y (post crisis - pre crisis)

	-4	-3	-2	-1	0	1	2	3	4
seco-dfm	-0.375	-0.427	-0.548	-0.696	-0.723	-0.698	-0.714	-0.595	-0.49
kof-ind-nopm	-0.401	-0.601	-0.769	-0.813	-0.697	-0.626	-0.556	-0.445	-0.412
kof-ind-prodpm	0.31	0.182	0.018	-0.228	-0.395	-0.391	-0.447	-0.493	-0.542
kof-ind-trend	-0.348	-0.546	-0.727	-0.806	-0.774	-0.724	-0.697	-0.656	-0.593
kof-ind-no3m	-0.552	-0.745	-0.898	-0.913	-0.774	-0.697	-0.614	-0.505	-0.42
kof-ind-prod3m	-0.588	-0.768	-0.882	-0.79	-0.627	-0.672	-0.642	-0.525	-0.417
oecd-no	-0.134	-0.163	-0.184	-0.242	-0.26	-0.274	-0.36	-0.378	-0.347
oecd-cli	-0.373	-0.47	-0.554	-0.569	-0.485	-0.449	-0.441	-0.367	-0.291
oecd-cli-prod	-0.199	-0.392	-0.658	-0.757	-0.754	-0.807	-0.743	-0.669	-0.587
oecd-cli-consconf	-0.073	-0.247	-0.528	-0.673	-0.689	-0.771	-0.71	-0.672	-0.661
ism-us-pmi-manu	-0.085	-0.248	-0.541	-0.704	-0.723	-0.727	-0.64	-0.594	-0.554
seco-consconf-outlook	-0.113	-0.276	-0.499	-0.629	-0.606	-0.592	-0.551	-0.481	-0.442
seco-consconf	-0.613	-0.696	-0.788	-0.824	-0.734	-0.671	-0.562	-0.369	-0.194
kof-caputil	-0.321	-0.408	-0.5	-0.552	-0.49	-0.465	-0.433	-0.329	-0.235
snb-bci	-0.268	-0.389	-0.495	-0.563	-0.516	-0.423	-0.341	-0.263	-0.227
ifo-expect-sit	0.351	0.306	0.085	-0.138	-0.371	-0.573	-0.72	-0.799	-0.738
ifo-expect-gdp	-0.249	-0.481	-0.687	-0.785	-0.818	-0.886	-0.768	-0.537	-0.307
ifo-de-climate	-0.518	-0.743	-0.89	-0.874	-0.754	-0.738	-0.56	-0.251	-0.009
ifo-de-manu-sit	0	-0.288	-0.546	-0.691	-0.731	-0.759	-0.665	-0.484	-0.308
kof-econ-bar	-0.079	-0.363	-0.638	-0.768	-0.762	-0.829	-0.723	-0.47	-0.236
cs-ind-pmi	0.148	-0.132	-0.396	-0.559	-0.617	-0.678	-0.614	-0.453	-0.297
cs-ind-pmi-prod	-0.281	-0.413	-0.511	-0.534	-0.518	-0.395	-0.33	-0.253	-0.182
cs-ind-pmi-bo	-0.353	-0.441	-0.462	-0.355	-0.331	-0.309	-0.324	-0.291	-0.201
ec-ea-ind-conf	-0.588	-0.573	-0.655	-0.613	-0.299	-0.245	-0.129	0.194	0.287
ec-ea-sent	0.666	0.647	0.519	0.303	0.163	0.105	0.083	0.058	-0.047
ec-eu-sent	-0.6	-0.782	-0.848	-0.751	-0.608	-0.647	-0.588	-0.442	-0.321

Table 15: VA-PRIV final release Q-Q (post crisis - pre crisis)

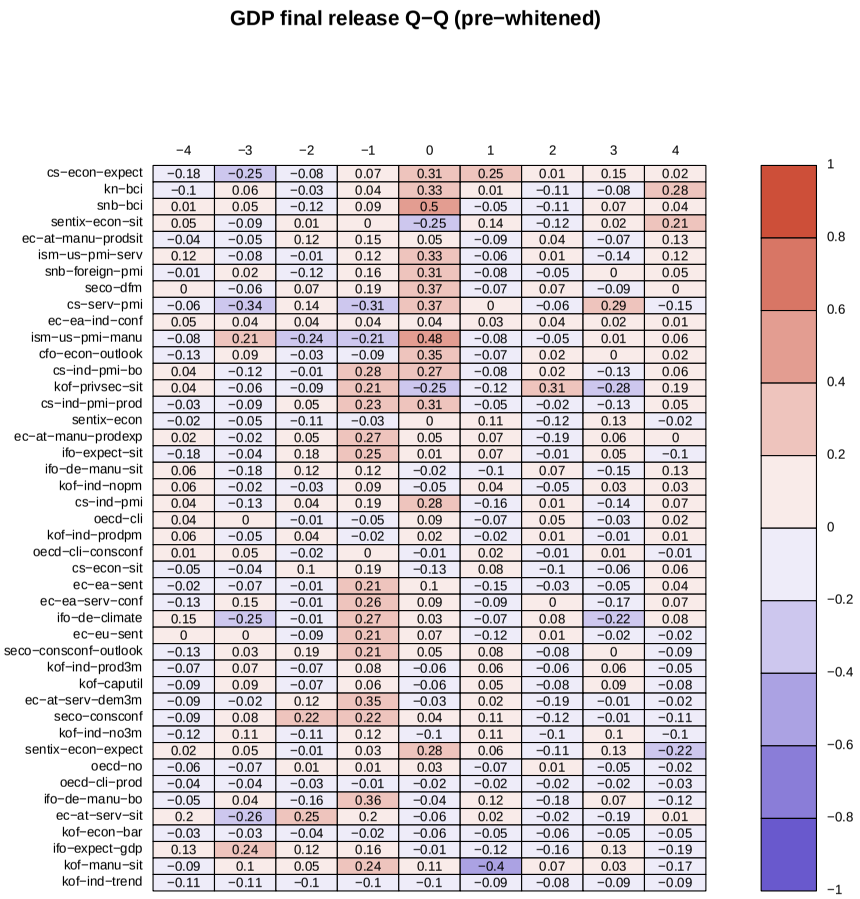
	-4	-3	-2	-1	0	1	2	3	4
seco-dfm	-0.202	-0.237	-0.378	-0.353	-0.103	-0.091	-0.105	-0.016	-0.012
kof-ind-nopm	-0.329	-0.449	-0.453	-0.201	-0.091	-0.167	-0.059	0.01	-0.038
kof-ind-prodpm	0.067	-0.103	-0.126	-0.164	-0.083	0.063	0.095	-0.023	-0.036
kof-ind-trend	-0.178	-0.253	-0.253	-0.156	-0.054	-0.051	-0.107	-0.148	-0.218
kof-ind-no3m	-0.307	-0.337	-0.296	-0.156	0	-0.053	-0.087	-0.104	-0.205
kof-ind-prod3m	-0.417	-0.354	-0.251	-0.08	-0.038	-0.242	-0.197	-0.132	-0.213
oecd-no	-0.104	-0.11	-0.112	-0.151	-0.048	0.065	0.021	-0.017	-0.107
oecd-cli	-0.296	-0.298	-0.237	-0.157	0.014	0.051	0.038	0.053	-0.041
oecd-cli-prod	-0.287	-0.278	-0.273	-0.117	-0.057	-0.052	0.022	0.049	-0.041
oecd-cli-consconf	-0.29	-0.281	-0.273	-0.147	-0.053	-0.029	0.079	0.056	-0.061
ism-us-pmi-manu	-0.278	-0.281	-0.311	-0.199	-0.112	-0.008	0.086	0.067	-0.031
seco-consconf-outlook	-0.107	-0.224	-0.272	-0.137	0.049	0.026	-0.006	-0.016	-0.152
seco-consconf	-0.289	-0.328	-0.307	-0.19	-0.026	-0.002	0.068	0.119	0
kof-caputil	-0.22	-0.255	-0.238	-0.172	-0.003	0.032	0.063	0.105	-0.01
snb-bci	-0.254	-0.281	-0.182	-0.052	0.14	0.254	0.238	0.152	-0.023
ifo-expect-sit	0.403	0.256	0.192	0.069	0.007	-0.1	-0.235	-0.247	-0.22
ifo-expect-gdp	-0.329	-0.39	-0.436	-0.445	-0.463	-0.385	-0.176	-0.136	-0.169
ifo-de-climate	-0.481	-0.538	-0.554	-0.506	-0.439	-0.454	-0.239	-0.096	-0.093
ifo-de-manu-sit	-0.251	-0.362	-0.33	-0.256	-0.195	-0.143	-0.003	0.07	0.071
kof-econ-bar	-0.285	-0.368	-0.406	-0.332	-0.264	-0.297	-0.106	0.049	0.026
cs-ind-pmi	-0.253	-0.374	-0.35	-0.295	-0.243	-0.186	-0.036	0.051	0.049
cs-ind-pmi-prod	-0.196	-0.383	-0.072	-0.096	0.126	0.336	0.282	0.107	0.048
cs-ind-pmi-bo	-0.164	-0.29	-0.005	-0.025	0.039	0.133	0.103	0.003	-0.085
ec-ea-ind-conf	-0.335	-0.238	-0.236	-0.188	0.3	-0.128	-0.179	0.13	-0.072
ec-ea-sent	0.41	0.05	0.161	0.25	0.319	0.402	0.35	0.186	-0.042
ec-eu-sent	-0.31	-0.291	-0.233	-0.188	-0.253	-0.483	-0.432	-0.368	-0.388

Table 16: VA-PRIV final release Y-Y (post crisis - pre crisis)

	-4	-3	-2	-1	0	1	2	3	4
seco-dfm	-0.534	-0.475	-0.464	-0.514	-0.385	-0.278	-0.196	-0.126	-0.122
kof-ind-nopm	-0.488	-0.66	-0.712	-0.565	-0.395	-0.284	-0.192	-0.163	-0.151
kof-ind-prodpm	0.016	-0.106	-0.178	-0.273	-0.307	-0.026	0.085	0.072	0.056
kof-ind-trend	-0.342	-0.403	-0.414	-0.353	-0.198	-0.111	-0.107	-0.147	-0.235
kof-ind-no3m	-0.516	-0.548	-0.51	-0.37	-0.12	-0.115	-0.118	-0.138	-0.236
kof-ind-prod3m	-0.66	-0.666	-0.54	-0.26	0.001	-0.218	-0.3	-0.325	-0.393
oecd-no	-0.46	-0.371	-0.278	-0.251	-0.13	-0.008	0.008	0.019	-0.023
oecd-cli	-0.626	-0.57	-0.476	-0.384	-0.147	-0.058	-0.019	0.027	-0.01
oecd-cli-prod	-0.498	-0.523	-0.498	-0.335	-0.156	-0.136	-0.096	-0.087	-0.104
oecd-cli-consconf	-0.458	-0.518	-0.524	-0.375	-0.209	-0.122	-0.046	-0.028	-0.065
ism-us-pmi-manu	-0.475	-0.515	-0.532	-0.432	-0.287	-0.151	-0.055	-0.036	-0.044
seco-consconf-outlook	-0.241	-0.297	-0.359	-0.317	-0.138	-0.023	0.033	0.022	-0.09
seco-consconf	-0.583	-0.55	-0.499	-0.394	-0.171	-0.105	-0.025	0.049	0.019
kof-caputil	-0.504	-0.462	-0.406	-0.338	-0.132	-0.043	0.022	0.09	0.058
snb-bci	-0.507	-0.528	-0.462	-0.328	-0.068	0.167	0.279	0.307	0.211
ifo-expect-sit	0.26	0.383	0.397	0.305	0.222	0.087	-0.122	-0.272	-0.369
ifo-expect-gdp	-0.481	-0.484	-0.415	-0.361	-0.392	-0.647	-0.625	-0.532	-0.455
ifo-de-climate	-0.502	-0.579	-0.569	-0.516	-0.471	-0.773	-0.742	-0.575	-0.463
ifo-de-manu-sit	-0.35	-0.387	-0.357	-0.326	-0.255	-0.354	-0.307	-0.208	-0.131
kof-econ-bar	-0.344	-0.37	-0.371	-0.334	-0.257	-0.498	-0.476	-0.351	-0.264
cs-ind-pmi	-0.333	-0.383	-0.37	-0.358	-0.29	-0.402	-0.357	-0.247	-0.163
cs-ind-pmi-prod	-0.494	-0.546	-0.452	-0.295	-0.124	0.178	0.248	0.292	0.241
cs-ind-pmi-bo	-0.597	-0.596	-0.394	-0.083	0.052	0.093	0.068	0.074	0.012
ec-ea-ind-conf	-0.379	-0.322	-0.349	-0.303	0.19	-0.098	-0.204	-0.027	-0.161
ec-ea-sent	0.397	0.34	0.292	0.233	0.281	0.474	0.518	0.447	0.285
ec-eu-sent	-0.377	-0.365	-0.258	-0.129	-0.084	-0.477	-0.632	-0.673	-0.706

F Figures: Dynamic cross-correlation analysis based on pre-whitened data

Figure 10: GDP (q-q and y-y)



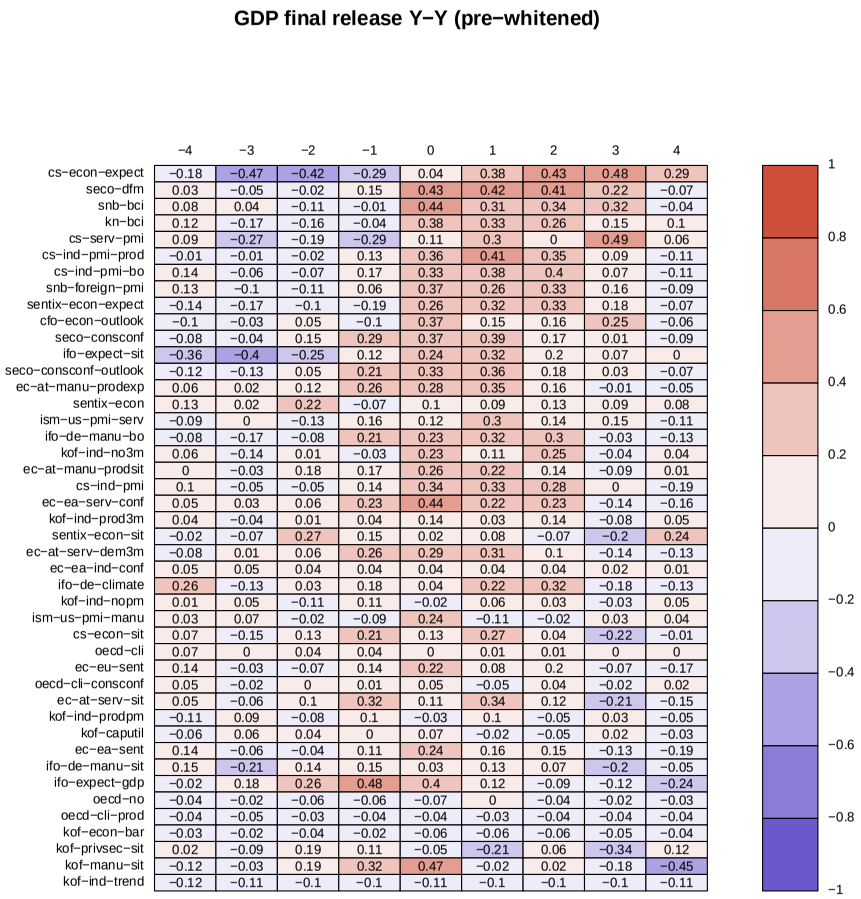
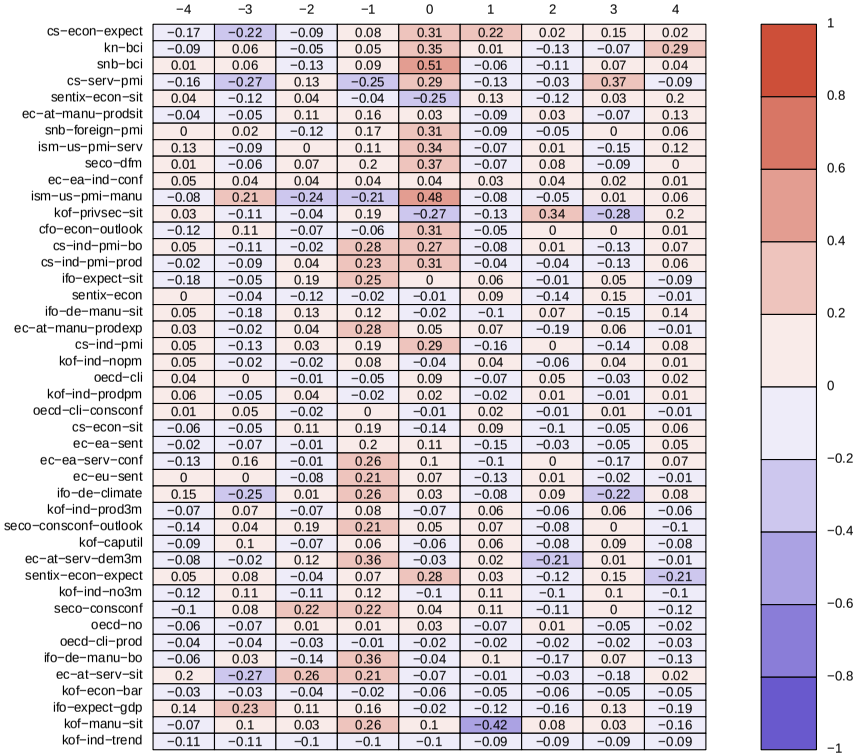


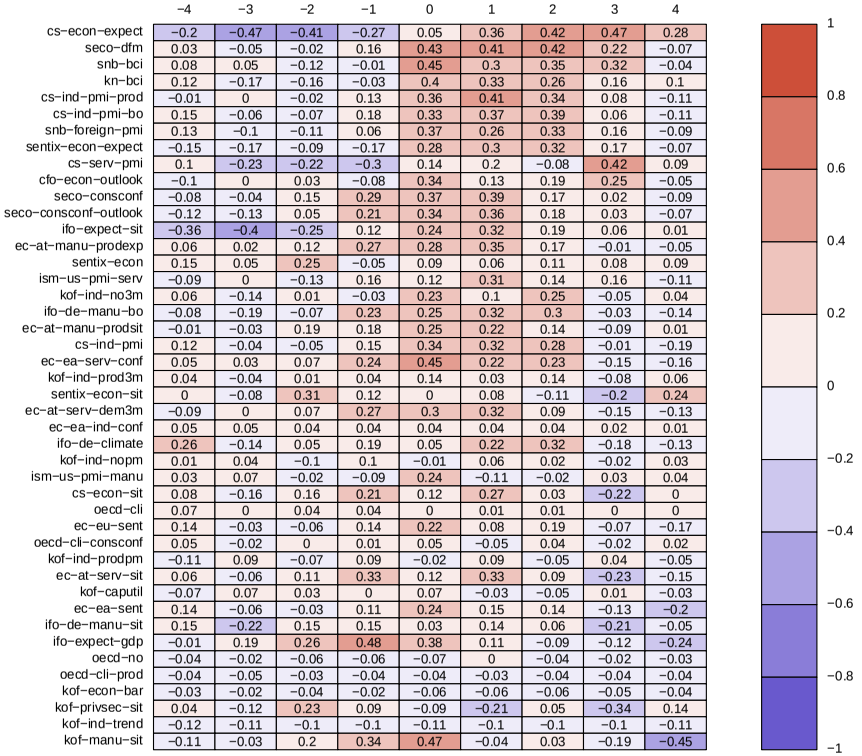
Figure 11: GDP-nosports (q-q and y-y)

GDP−NOSPORTS final release Q−Q (pre−whitened)



	−4	−3	−2	−1	0	1	2	3	4
cs−econ−expect	−0.17	−0.22	−0.09	0.08	0.31	0.22	0.02	0.15	0.02
kn−bci	−0.09	0.06	−0.05	0.05	0.35	0.01	−0.13	−0.07	0.29
snb−bci	0.01	0.06	−0.13	0.09	0.51	−0.06	−0.11	0.07	0.04
cs−serv−pmi	−0.16	−0.27	0.13	−0.25	0.29	−0.13	−0.03	0.37	−0.09
sentix−econ−sit	0.04	−0.12	0.04	−0.04	−0.25	0.13	−0.12	0.03	0.2
ec−at−manu−prodsit	−0.04	−0.05	0.11	0.16	0.03	−0.09	0.03	−0.07	0.13
snb−foreign−pmi	0	0.02	−0.12	0.17	0.31	−0.09	−0.05	0	0.06
ism−us−pmi−serv	0.13	−0.09	0	0.11	0.34	−0.07	0.01	−0.15	0.12
seco−dfm	0.01	−0.06	0.07	0.2	0.37	−0.07	0.08	−0.09	0
ec−ea−ind−conf	0.05	0.04	0.04	0.04	0.04	0.03	0.04	0.02	0.01
ism−us−pmi−manu	−0.08	0.21	−0.24	−0.21	0.48	−0.08	−0.05	0.01	0.06
kof−privsec−sit	0.03	−0.11	−0.04	0.19	−0.27	−0.13	0.34	−0.28	0.2
cfo−econ−outlook	−0.12	0.11	−0.07	−0.06	0.31	−0.05	0	0	0.01
cs−ind−pmi−bo	0.05	−0.11	−0.02	0.28	0.27	−0.08	0.01	−0.13	0.07
cs−ind−pmi−prod	−0.02	−0.09	0.04	0.23	0.31	−0.04	−0.04	−0.13	0.06
ifo−expect−sit	−0.18	−0.05	0.19	0.25	0	0.06	−0.01	0.05	−0.09
sentix−econ	0	−0.04	−0.12	−0.02	−0.01	0.09	−0.14	0.15	−0.01
ifo−de−manu−sit	0.05	−0.18	0.13	0.12	−0.02	−0.1	0.07	−0.15	0.14
ec−at−manu−prodexp	0.03	−0.02	0.04	0.28	0.05	0.07	−0.19	0.06	−0.01
cs−ind−pmi	0.05	−0.13	0.03	0.19	0.29	−0.16	0	−0.14	0.08
kof−ind−nopm	0.05	−0.02	−0.02	0.08	−0.04	0.04	−0.06	0.04	0.01
oecd−cli	0.04	0	−0.01	−0.05	0.09	−0.07	0.05	−0.03	0.02
kof−ind−prodpm	0.06	−0.05	0.04	−0.02	0.02	−0.02	0.01	−0.01	0.01
oecd−cli−consconf	0.01	0.05	−0.02	0	−0.01	0.02	−0.01	0.01	−0.01
cs−econ−sit	−0.06	−0.05	0.11	0.19	−0.14	0.09	−0.1	−0.05	0.06
ec−ea−sent	−0.02	−0.07	−0.01	0.2	0.11	−0.15	−0.03	−0.05	0.05
ec−ea−serv−conf	−0.13	0.16	−0.01	0.26	0.1	−0.1	0	−0.17	0.07
ec−eu−sent	0	0	−0.08	0.21	0.07	−0.13	0.01	−0.02	−0.01
ifo−de−climate	0.15	−0.25	0.01	0.26	0.03	−0.08	0.09	−0.22	0.08
kof−ind−prod3m	−0.07	0.07	−0.07	0.08	−0.07	0.06	−0.06	0.06	−0.06
seco−consconf−outlook	−0.14	0.04	0.19	0.21	0.05	0.07	−0.08	0	−0.1
kof−caputil	−0.09	0.1	−0.07	0.06	−0.06	0.06	−0.08	0.09	−0.08
ec−at−serv−dem3m	−0.08	−0.02	0.12	0.36	−0.03	0.02	−0.21	0.01	−0.01
sentix−econ−expect	0.05	0.08	−0.04	0.07	0.28	0.03	−0.12	0.15	−0.21
kof−ind−no3m	−0.12	0.11	−0.11	0.12	−0.1	0.11	−0.1	0.1	−0.1
seco−consconf	−0.1	0.08	0.22	0.22	0.04	0.11	−0.11	0	−0.12
oecd−no	−0.06	−0.07	0.01	0.01	0.03	−0.07	0.01	−0.05	−0.02
oecd−cli−prod	−0.04	−0.04	−0.03	−0.01	−0.02	−0.02	−0.02	−0.02	−0.03
ifo−de−manu−bo	−0.06	0.03	−0.14	0.36	−0.04	0.1	−0.17	0.07	−0.13
ec−at−serv−sit	0.2	−0.27	0.26	0.21	−0.07	−0.01	−0.03	−0.18	0.02
kof−econ−bar	−0.03	−0.03	−0.04	−0.02	−0.06	−0.05	−0.06	−0.05	−0.05
ifo−expect−gdp	0.14	0.23	0.11	0.16	−0.02	−0.12	−0.16	0.13	−0.19
kof−manu−sit	−0.07	0.1	0.03	0.26	0.1	−0.42	0.08	0.03	−0.16
kof−ind−trend	−0.11	−0.11	−0.1	−0.1	−0.1	−0.09	−0.09	−0.09	−0.09

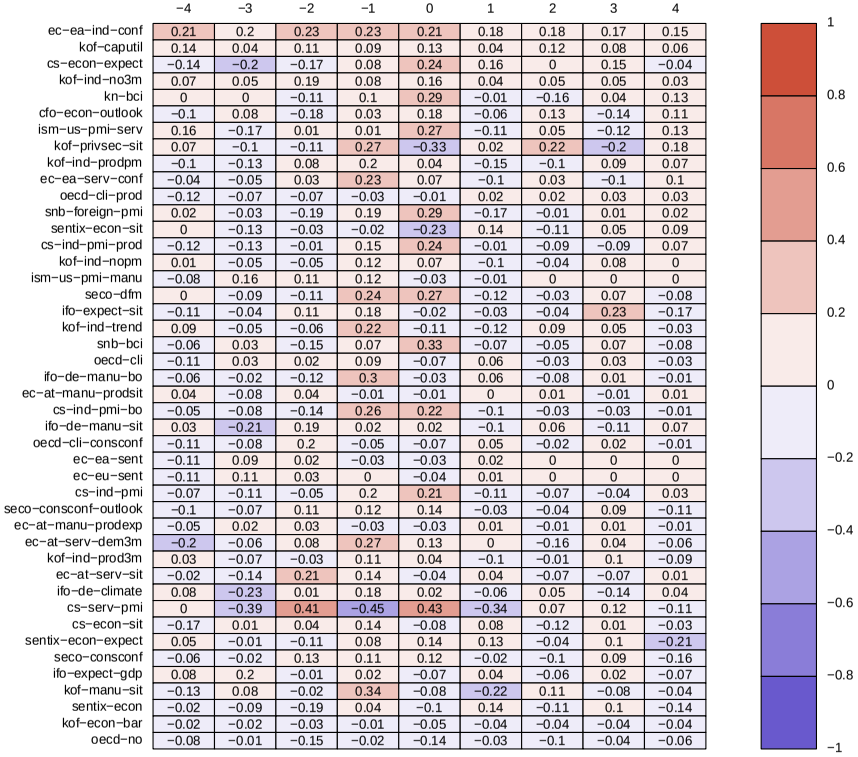
GDP−NOSPORTS final release Y−Y (pre−whitened)



	−4	−3	−2	−1	0	1	2	3	4
cs−econ−expect	−0.2	−0.47	−0.41	−0.27	0.05	0.36	0.42	0.47	0.28
seco−dfm	0.03	−0.05	−0.02	0.16	0.43	0.41	0.42	0.22	−0.07
snb−bci	0.08	0.05	−0.12	−0.01	0.45	0.3	0.35	0.32	−0.04
kn−bci	0.12	−0.17	−0.16	−0.03	0.4	0.33	0.26	0.16	0.1
cs−ind−pmi−prod	−0.01	0	−0.02	0.13	0.36	0.41	0.34	0.08	−0.11
cs−ind−pmi−bo	0.15	−0.06	−0.07	0.18	0.33	0.37	0.39	0.06	−0.11
snb−foreign−pmi	0.13	−0.1	−0.11	0.06	0.37	0.26	0.33	0.16	−0.09
sentix−econ−expect	−0.15	−0.17	−0.09	−0.17	0.28	0.3	0.32	0.17	−0.07
cs−serv−pmi	0.1	−0.23	−0.22	−0.3	0.14	0.2	−0.08	0.42	0.09
cfo−econ−outlook	−0.1	0	0.03	−0.08	0.34	0.13	0.19	0.25	−0.05
seco−consconf	−0.08	−0.04	0.15	0.29	0.37	0.39	0.17	0.02	−0.09
seco−consconf−outlook	−0.12	−0.13	0.05	0.21	0.34	0.36	0.18	0.03	−0.07
ifo−expect−sit	−0.36	−0.4	−0.25	0.12	0.24	0.32	0.19	0.06	0.01
ec−at−manu−prodexp	0.06	0.02	0.12	0.27	0.28	0.35	0.17	−0.01	−0.05
sentix−econ	0.15	0.05	0.25	−0.05	0.09	0.06	0.11	0.08	0.09
ism−us−pmi−serv	−0.09	0	−0.13	0.16	0.12	0.31	0.14	0.16	−0.11
kof−ind−no3m	0.06	−0.14	0.01	−0.03	0.23	0.1	0.25	−0.05	0.04
ifo−de−manu−bo	−0.08	−0.19	−0.07	0.23	0.25	0.32	0.3	−0.03	−0.14
ec−at−manu−prodsit	−0.01	−0.03	0.19	0.18	0.25	0.22	0.14	−0.09	0.01
cs−ind−pmi	0.12	−0.04	−0.05	0.15	0.34	0.32	0.28	−0.01	−0.19
ec−ea−serv−conf	0.05	0.03	0.07	0.24	0.45	0.22	0.23	−0.15	−0.16
kof−ind−prod3m	0.04	−0.04	0.01	0.04	0.14	0.03	0.14	−0.08	0.06
sentix−econ−sit	0	−0.08	0.31	0.12	0	0.08	−0.11	−0.2	0.24
ec−at−serv−dem3m	−0.09	0	0.07	0.27	0.3	0.32	0.09	−0.15	−0.13
ec−ea−ind−conf	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.02	0.01
ifo−de−climate	0.26	−0.14	0.05	0.19	0.05	0.22	0.32	−0.18	−0.13
kof−ind−nopm	0.01	0.04	−0.1	0.1	−0.01	0.06	0.02	−0.02	0.03
ism−us−pmi−manu	0.03	0.07	−0.02	−0.09	0.24	−0.11	−0.02	0.03	0.04
cs−econ−sit	0.08	−0.16	0.16	0.21	0.12	0.27	0.03	−0.22	0
oecd−cli	0.07	0	0.04	0.04	0	0.01	0.01	0	0
ec−eu−sent	0.14	−0.03	−0.06	0.14	0.22	0.08	0.19	−0.07	−0.17
oecd−cli−consconf	0.05	−0.02	0	0.01	0.05	−0.05	0.04	−0.02	0.02
kof−ind−prodpm	−0.11	0.09	−0.07	0.09	−0.02	0.09	−0.05	0.04	−0.05
ec−at−serv−sit	0.06	−0.06	0.11	0.33	0.12	0.33	0.09	−0.23	−0.15
kof−caputil	−0.07	0.07	0.03	0	0.07	−0.03	−0.05	0.01	−0.03
ec−ea−sent	0.14	−0.06	−0.03	0.11	0.24	0.15	0.14	−0.13	−0.2
ifo−de−manu−sit	0.15	−0.22	0.15	0.15	0.03	0.14	0.06	−0.21	−0.05
ifo−expect−gdp	−0.01	0.19	0.26	0.48	0.38	0.11	−0.09	−0.12	−0.24
oecd−no	−0.04	−0.02	−0.06	−0.06	−0.07	0	−0.04	−0.02	−0.03
oecd−cli−prod	−0.04	−0.05	−0.03	−0.04	−0.04	−0.03	−0.04	−0.04	−0.04
kof−econ−bar	−0.03	−0.02	−0.04	−0.02	−0.06	−0.06	−0.06	−0.05	−0.04
kof−privsec−sit	0.04	−0.12	0.23	0.09	−0.09	−0.21	0.05	−0.34	0.14
kof−ind−trend	−0.12	−0.11	−0.1	−0.1	−0.11	−0.1	−0.1	−0.1	−0.11
kof−manu−sit	−0.11	−0.03	0.2	0.34	0.47	−0.04	0.03	−0.19	−0.45

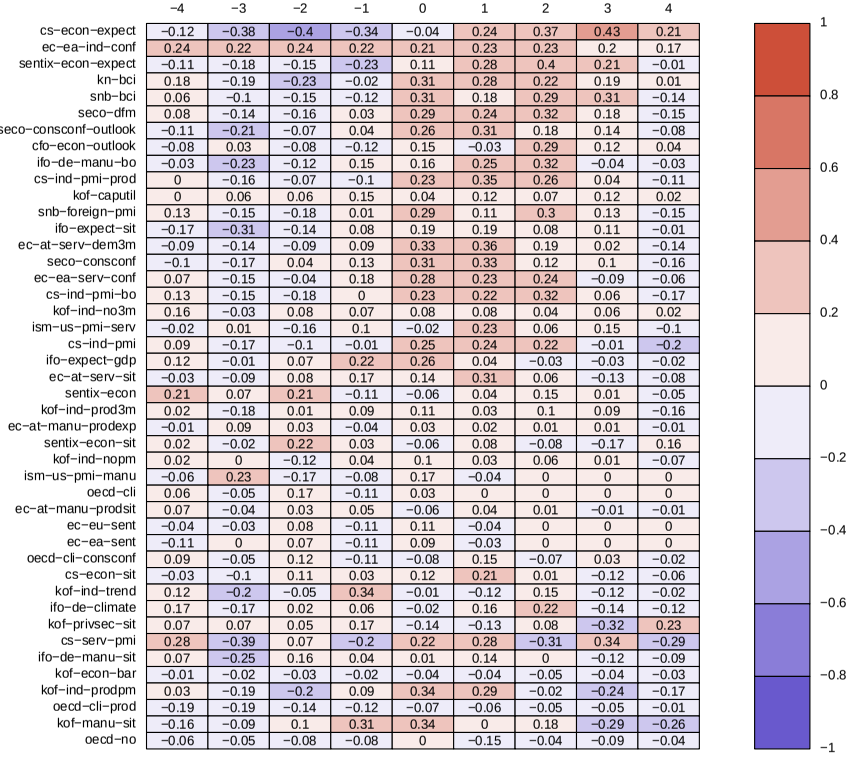
Figure 12: VA-Manu (q-q and y-y)

VA−MANU final release Q−Q (pre−whitened)



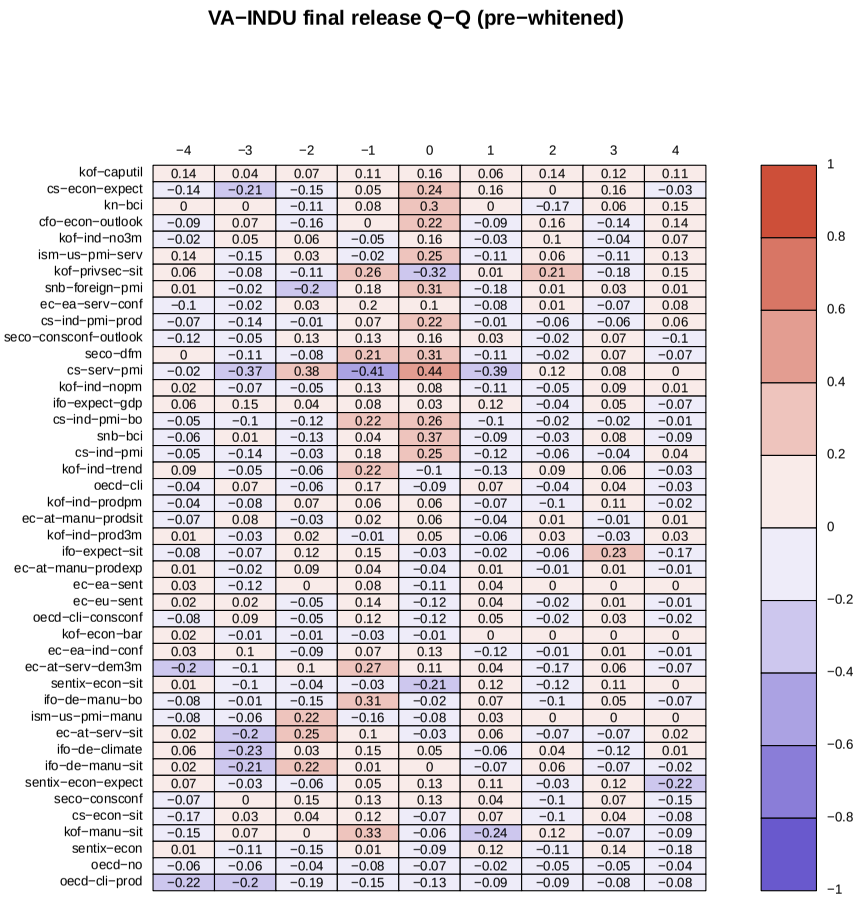
	−4	−3	−2	−1	0	1	2	3	4
ec−ea−ind−conf	0.21	0.2	0.23	0.23	0.21	0.18	0.18	0.17	0.15
kof−caputil	0.14	0.04	0.11	0.09	0.13	0.04	0.12	0.08	0.06
cs−econ−expect	−0.14	−0.2	−0.17	0.08	0.24	0.16	0	0.15	−0.04
kof−ind−no3m	0.07	0.05	0.19	0.08	0.16	0.04	0.05	0.05	0.03
kn−bci	0	0	−0.11	0.1	0.29	−0.01	−0.16	0.04	0.13
cfo−econ−outlook	−0.1	0.08	−0.18	0.03	0.18	−0.06	0.13	−0.14	0.11
ism−us−pmi−serv	0.16	−0.17	0.01	0.01	0.27	−0.11	0.05	−0.12	0.13
kof−privsec−sit	0.07	−0.1	−0.11	0.27	−0.33	0.02	0.22	−0.2	0.18
kof−ind−prodpm	−0.1	−0.13	0.08	0.2	0.04	−0.15	−0.1	0.09	0.07
ec−ea−serv−conf	−0.04	−0.05	0.03	0.23	0.07	−0.1	0.03	−0.1	0.1
oecd−cli−prod	−0.12	−0.07	−0.07	−0.03	−0.01	0.02	0.02	0.03	0.03
snb−foreign−pmi	0.02	−0.03	−0.19	0.19	0.29	−0.17	−0.01	0.01	0.02
sentix−econ−sit	0	−0.13	−0.03	−0.02	−0.23	0.14	−0.11	0.05	0.09
cs−ind−pmi−prod	−0.12	−0.13	−0.01	0.15	0.24	−0.01	−0.09	−0.09	0.07
kof−ind−nopm	0.01	−0.05	−0.05	0.12	0.07	−0.1	−0.04	0.08	0
ism−us−pmi−manu	−0.08	0.16	0.11	0.12	−0.03	−0.01	0	0	0
seco−dfm	0	−0.09	−0.11	0.24	0.27	−0.12	−0.03	0.07	−0.08
ifo−expect−sit	−0.11	−0.04	0.11	0.18	−0.02	−0.03	−0.04	0.23	−0.17
kof−ind−trend	0.09	−0.05	−0.06	0.22	−0.11	−0.12	0.09	0.05	−0.03
snb−bci	−0.06	0.03	−0.15	0.07	0.33	−0.07	−0.05	0.07	−0.08
oecd−cli	−0.11	0.03	0.02	0.09	−0.07	0.06	−0.03	0.03	−0.03
ifo−de−manu−bo	−0.06	−0.02	−0.12	0.3	−0.03	0.06	−0.08	0.01	−0.01
ec−at−manu−prodsit	0.04	−0.08	0.04	−0.01	−0.01	0	0.01	−0.01	0.01
cs−ind−pmi−bo	−0.05	−0.08	−0.14	0.26	0.22	−0.1	−0.03	−0.03	−0.01
ifo−de−manu−sit	0.03	−0.21	0.19	0.02	0.02	−0.1	0.06	−0.11	0.07
oecd−cli−consconf	−0.11	−0.08	0.2	−0.05	−0.07	0.05	−0.02	0.02	−0.01
ec−ea−sent	−0.11	0.09	0.02	−0.03	−0.03	0.02	0	0	0
ec−eu−sent	−0.11	0.11	0.03	0	−0.04	0.01	0	0	0
cs−ind−pmi	−0.07	−0.11	−0.05	0.2	0.21	−0.11	−0.07	−0.04	0.03
seco−consconf−outlook	−0.1	−0.07	0.11	0.12	0.14	−0.03	−0.04	0.09	−0.11
ec−at−manu−prodexp	−0.05	0.02	0.03	−0.03	−0.03	0.01	−0.01	0.01	−0.01
ec−at−serv−dem3m	−0.2	−0.06	0.08	0.27	0.13	0	−0.16	0.04	−0.06
kof−ind−prod3m	0.03	−0.07	−0.03	0.11	0.04	−0.1	−0.01	0.1	−0.09
ec−at−serv−sit	−0.02	−0.14	0.21	0.14	−0.04	0.04	−0.07	−0.07	0.01
ifo−de−climate	0.08	−0.23	0.01	0.18	0.02	−0.06	0.05	−0.14	0.04
cs−serv−pmi	0	−0.39	0.41	−0.45	0.43	−0.34	0.07	0.12	−0.11
cs−econ−sit	−0.17	0.01	0.04	0.14	−0.08	0.08	−0.12	0.01	−0.03
sentix−econ−expect	0.05	−0.01	−0.11	0.08	0.14	0.13	−0.04	0.1	−0.21
seco−consconf	−0.06	−0.02	0.13	0.11	0.12	−0.02	−0.1	0.09	−0.16
ifo−expect−gdp	0.08	0.2	−0.01	0.02	−0.07	0.04	−0.06	0.02	−0.07
kof−manu−sit	−0.13	0.08	−0.02	0.34	−0.08	−0.22	0.11	−0.08	−0.04
sentix−econ	−0.02	−0.09	−0.19	0.04	−0.1	0.14	−0.11	0.1	−0.14
kof−econ−bar	−0.02	−0.02	−0.03	−0.01	−0.05	−0.04	−0.04	−0.04	−0.04
oecd−no	−0.08	−0.01	−0.15	−0.02	−0.14	−0.03	−0.1	−0.04	−0.06

VA−MANU final release Y−Y (pre−whitened)



	−4	−3	−2	−1	0	1	2	3	4
cs−econ−expect	−0.12	−0.38	−0.4	−0.34	−0.04	0.24	0.37	0.43	0.21
ec−ea−ind−conf	0.24	0.22	0.24	0.22	0.21	0.23	0.23	0.2	0.17
sentix−econ−expect	−0.11	−0.18	−0.15	−0.23	0.11	0.28	0.4	0.21	−0.01
kn−bci	0.18	−0.19	−0.23	−0.02	0.31	0.28	0.22	0.19	0.01
snb−bci	0.06	−0.1	−0.15	−0.12	0.31	0.18	0.29	0.31	−0.14
seco−dfm	0.08	−0.14	−0.16	0.03	0.29	0.24	0.32	0.18	−0.15
seco−consconf−outlook	−0.11	−0.21	−0.07	0.04	0.26	0.31	0.18	0.14	−0.08
cfo−econ−outlook	−0.08	0.03	−0.08	−0.12	0.15	−0.03	0.29	0.12	0.04
ifo−de−manu−bo	−0.03	−0.23	−0.12	0.15	0.16	0.25	0.32	−0.04	−0.03
cs−ind−pmi−prod	0	−0.16	−0.07	−0.1	0.23	0.35	0.26	0.04	−0.11
kof−caputil	0	0.06	0.06	0.15	0.04	0.12	0.07	0.12	0.02
snb−foreign−pmi	0.13	−0.15	−0.18	0.01	0.29	0.11	0.3	0.13	−0.15
ifo−expect−sit	−0.17	−0.31	−0.14	0.08	0.19	0.19	0.08	0.11	−0.01
ec−at−serv−dem3m	−0.09	−0.14	−0.09	0.09	0.33	0.36	0.19	0.02	−0.14
seco−consconf	−0.1	−0.17	0.04	0.13	0.31	0.33	0.12	0.1	−0.16
ec−ea−serv−conf	0.07	−0.15	−0.04	0.18	0.28	0.23	0.24	−0.09	−0.06
cs−ind−pmi−bo	0.13	−0.15	−0.18	0	0.23	0.22	0.32	0.06	−0.17
kof−ind−no3m	0.16	−0.03	0.08	0.07	0.08	0.08	0.04	0.06	0.02
ism−us−pmi−serv	−0.02	0.01	−0.16	0.1	−0.02	0.23	0.06	0.15	−0.1
cs−ind−pmi	0.09	−0.17	−0.1	−0.01	0.25	0.24	0.22	−0.01	−0.2
ifo−expect−gdp	0.12	−0.01	0.07	0.22	0.26	0.04	−0.03	−0.03	−0.02
ec−at−serv−sit	−0.03	−0.09	0.08	0.17	0.14	0.31	0.06	−0.13	−0.08
sentix−econ	0.21	0.07	0.21	−0.11	−0.06	0.04	0.15	0.01	−0.05
kof−ind−prod3m	0.02	−0.18	0.01	0.09	0.11	0.03	0.1	0.09	−0.16
ec−at−manu−prodexp	−0.01	0.09	0.03	−0.04	0.03	0.02	0.01	0.01	−0.01
sentix−econ−sit	0.02	−0.02	0.22	0.03	−0.06	0.08	−0.08	−0.17	0.16
kof−ind−nopm	0.02	0	−0.12	0.04	0.1	0.03	0.06	0.01	−0.07
ism−us−pmi−manu	−0.06	0.23	−0.17	−0.08	0.17	−0.04	0	0	0
oecd−cli	0.06	−0.05	0.17	−0.11	0.03	0	0	0	0
ec−at−manu−prodsit	0.07	−0.04	0.03	0.05	−0.06	0.04	0.01	−0.01	−0.01
ec−eu−sent	−0.04	−0.03	0.08	−0.11	0.11	−0.04	0	0	0
ec−ea−sent	−0.11	0	0.07	−0.11	0.09	−0.03	0	0	0
oecd−cli−consconf	0.09	−0.05	0.12	−0.11	−0.08	0.15	−0.07	0.03	−0.02
cs−econ−sit	−0.03	−0.1	0.11	0.03	0.12	0.21	0.01	−0.12	−0.06
kof−ind−trend	0.12	−0.2	−0.05	0.34	−0.01	−0.12	0.15	−0.12	−0.02
ifo−de−climate	0.17	−0.17	0.02	0.06	−0.02	0.16	0.22	−0.14	−0.12
kof−privsec−sit	0.07	0.07	0.05	0.17	−0.14	−0.13	0.08	−0.32	0.23
cs−serv−pmi	0.28	−0.39	0.07	−0.2	0.22	0.28	−0.31	0.34	−0.29
ifo−de−manu−sit	0.07	−0.25	0.16	0.04	0.01	0.14	0	−0.12	−0.09
kof−econ−bar	−0.01	−0.02	−0.03	−0.02	−0.04	−0.04	−0.05	−0.04	−0.03
kof−ind−prodpm	0.03	−0.19	−0.2	0.09	0.34	0.29	−0.02	−0.24	−0.17
oecd−cli−prod	−0.19	−0.19	−0.14	−0.12	−0.07	−0.06	−0.05	−0.05	−0.01
kof−manu−sit	−0.16	−0.09	0.1	0.31	0.34	0	0.18	−0.29	−0.26
oecd−no	−0.06	−0.05	−0.08	−0.08	0	−0.15	−0.04	−0.09	−0.04

Figure 13: VA-Indu (q-q and y-y)



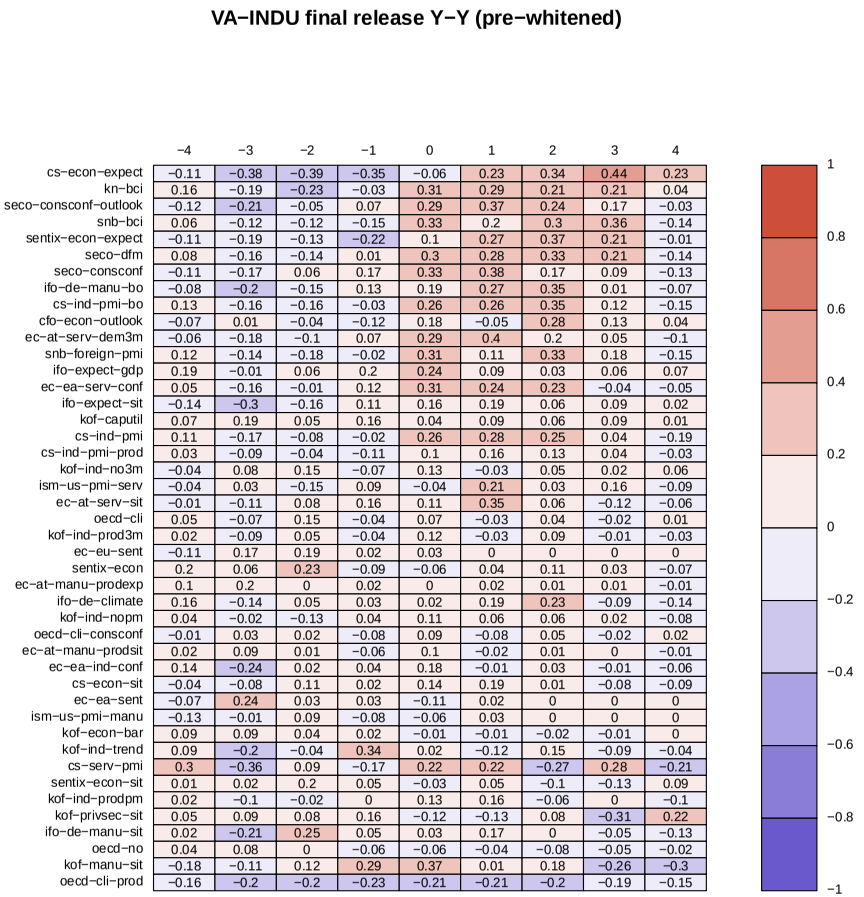
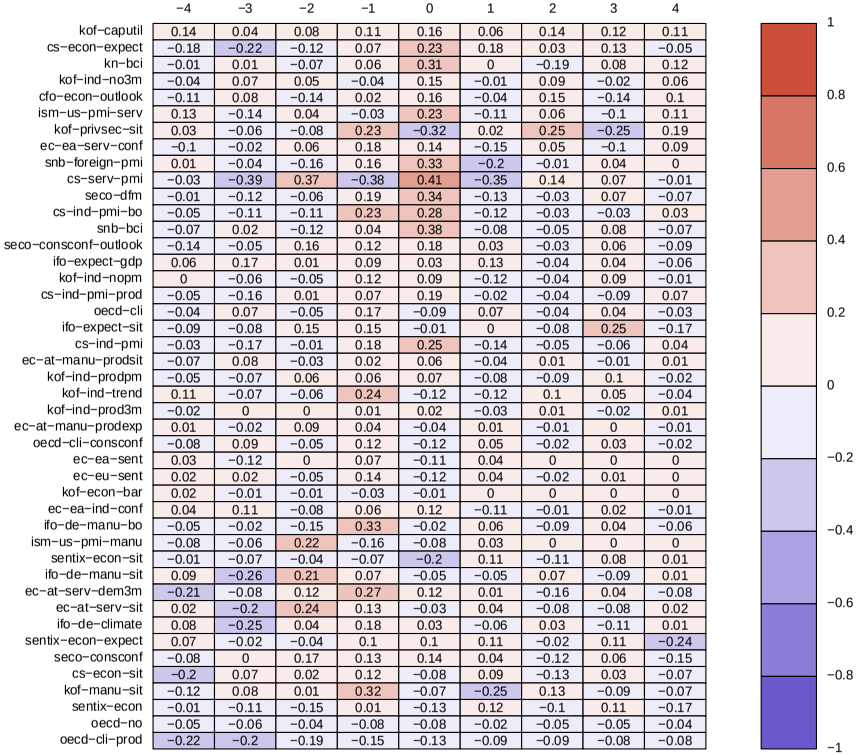


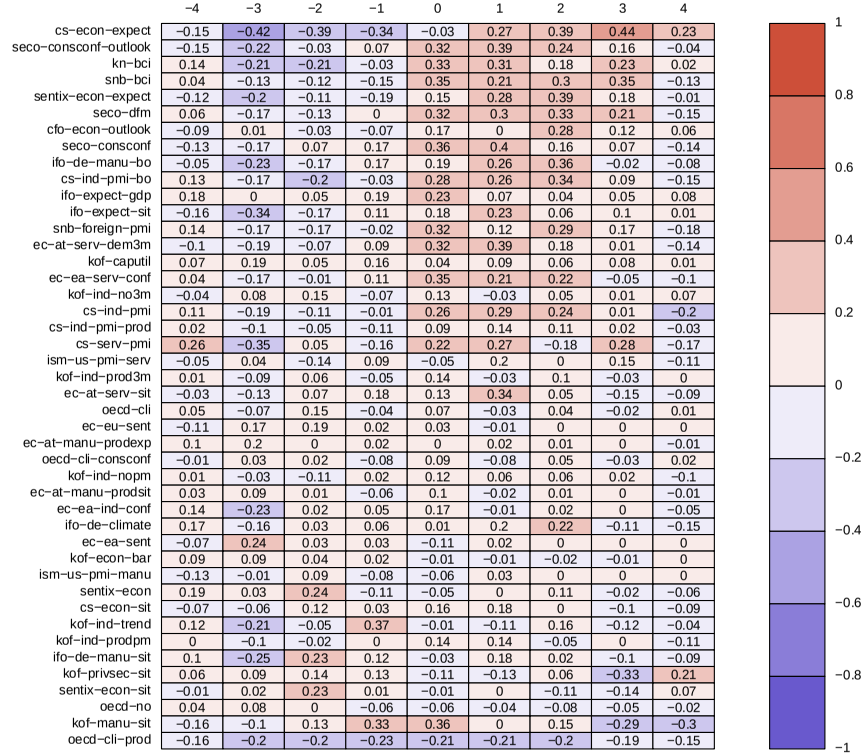
Figure 14: VA-Second (q-q and y-y)

VA−SECOND final release Q−Q (pre−whitened)



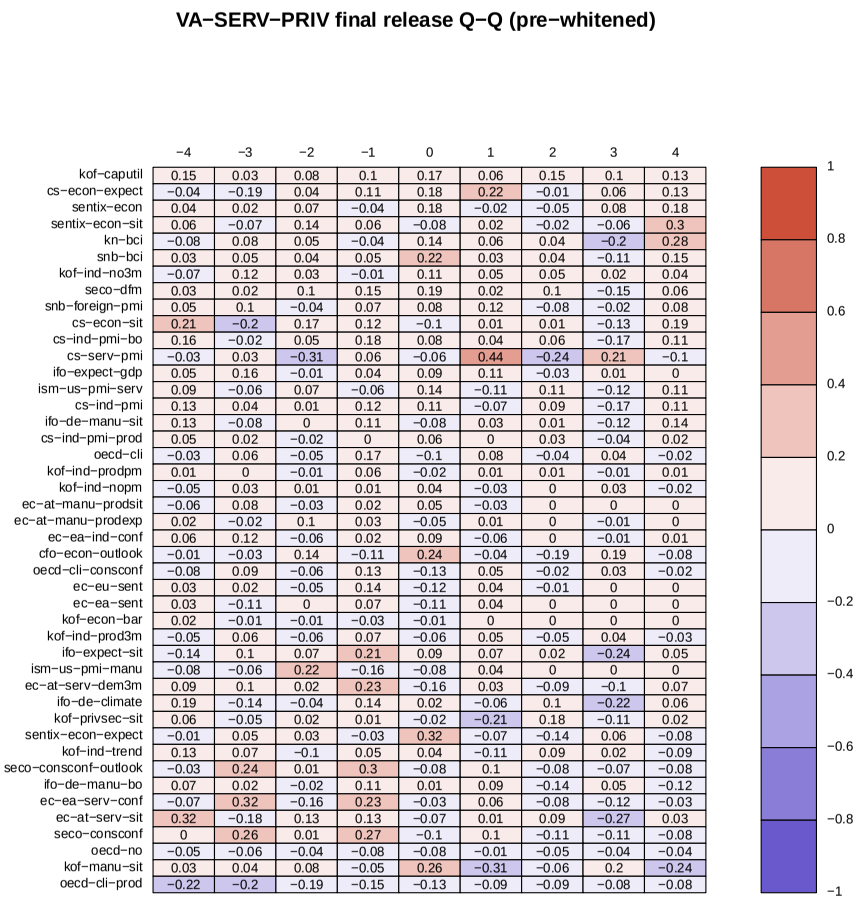
	−4	−3	−2	−1	0	1	2	3	4
kof−caputil	0.14	0.04	0.08	0.11	0.16	0.06	0.14	0.12	0.11
cs−econ−expect	−0.18	−0.22	−0.12	0.07	0.23	0.18	0.03	0.13	−0.05
kn−bci	−0.01	0.01	−0.07	0.06	0.31	0	−0.19	0.08	0.12
kof−ind−no3m	−0.04	0.07	0.05	−0.04	0.15	−0.01	0.09	−0.02	0.06
cfo−econ−outlook	−0.11	0.08	−0.14	0.02	0.16	−0.04	0.15	−0.14	0.1
ism−us−pmi−serv	0.13	−0.14	0.04	−0.03	0.23	−0.11	0.06	−0.1	0.11
kof−privsec−sit	0.03	−0.06	−0.08	0.23	−0.32	0.02	0.25	−0.25	0.19
ec−ea−serv−conf	−0.1	−0.02	0.06	0.18	0.14	−0.15	0.05	−0.1	0.09
snb−foreign−pmi	0.01	−0.04	−0.16	0.16	0.33	−0.2	−0.01	0.04	0
cs−serv−pmi	−0.03	−0.39	0.37	−0.38	0.41	−0.35	0.14	0.07	−0.01
seco−dfm	−0.01	−0.12	−0.06	0.19	0.34	−0.13	−0.03	0.07	−0.07
cs−ind−pmi−bo	−0.05	−0.11	−0.11	0.23	0.28	−0.12	−0.03	−0.03	0.03
snb−bci	−0.07	0.02	−0.12	0.04	0.38	−0.08	−0.05	0.08	−0.07
seco−consconf−outlook	−0.14	−0.05	0.16	0.12	0.18	0.03	−0.03	0.06	−0.09
ifo−expect−gdp	0.06	0.17	0.01	0.09	0.03	0.13	−0.04	0.04	−0.06
kof−ind−nopm	0	−0.06	−0.05	0.12	0.09	−0.12	−0.04	0.09	−0.01
cs−ind−pmi−prod	−0.05	−0.16	0.01	0.07	0.19	−0.02	−0.04	−0.09	0.07
oecd−cli	−0.04	0.07	−0.05	0.17	−0.09	0.07	−0.04	0.04	−0.03
ifo−expect−sit	−0.09	−0.08	0.15	0.15	−0.01	0	−0.08	0.25	−0.17
cs−ind−pmi	−0.03	−0.17	−0.01	0.18	0.25	−0.14	−0.05	−0.06	0.04
ec−at−manu−prodsit	−0.07	0.08	−0.03	0.02	0.06	−0.04	0.01	−0.01	0.01
kof−ind−prodpm	−0.05	−0.07	0.06	0.06	0.07	−0.08	−0.09	0.1	−0.02
kof−ind−trend	0.11	−0.07	−0.06	0.24	−0.12	−0.12	0.1	0.05	−0.04
kof−ind−prod3m	−0.02	0	0	0.01	0.02	−0.03	0.01	−0.02	0.01
ec−at−manu−prodexp	0.01	−0.02	0.09	0.04	−0.04	0.01	−0.01	0	−0.01
oecd−cli−consconf	−0.08	0.09	−0.05	0.12	−0.12	0.05	−0.02	0.03	−0.02
ec−ea−sent	0.03	−0.12	0	0.07	−0.11	0.04	0	0	0
ec−eu−sent	0.02	0.02	−0.05	0.14	−0.12	0.04	−0.02	0.01	0
kof−econ−bar	0.02	−0.01	−0.01	−0.03	−0.01	0	0	0	0
ec−ea−ind−conf	0.04	0.11	−0.08	0.06	0.12	−0.11	−0.01	0.02	−0.01
ifo−de−manu−bo	−0.05	−0.02	−0.15	0.33	−0.02	0.06	−0.09	0.04	−0.06
ism−us−pmi−manu	−0.08	−0.06	0.22	−0.16	−0.08	0.03	0	0	0
sentix−econ−sit	−0.01	−0.07	−0.04	−0.07	−0.2	0.11	−0.11	0.08	0.01
ifo−de−manu−sit	0.09	−0.26	0.21	0.07	−0.05	−0.05	0.07	−0.09	0.01
ec−at−serv−dem3m	−0.21	−0.08	0.12	0.27	0.12	0.01	−0.16	0.04	−0.08
ec−at−serv−sit	0.02	−0.2	0.24	0.13	−0.03	0.04	−0.08	−0.08	0.02
ifo−de−climate	0.08	−0.25	0.04	0.18	0.03	−0.06	0.03	−0.11	0.01
sentix−econ−expect	0.07	−0.02	−0.04	0.1	0.1	0.11	−0.02	0.11	−0.24
seco−consconf	−0.08	0	0.17	0.13	0.14	0.04	−0.12	0.06	−0.15
cs−econ−sit	−0.2	0.07	0.02	0.12	−0.08	0.09	−0.13	0.03	−0.07
kof−manu−sit	−0.12	0.08	0.01	0.32	−0.07	−0.25	0.13	−0.09	−0.07
sentix−econ	−0.01	−0.11	−0.15	0.01	−0.13	0.12	−0.1	0.11	−0.17
oecd−no	−0.05	−0.06	−0.04	−0.08	−0.08	−0.02	−0.05	−0.05	−0.04
oecd−cli−prod	−0.22	−0.2	−0.19	−0.15	−0.13	−0.09	−0.09	−0.08	−0.08

VA−SECOND final release Y−Y (pre−whitened)



	−4	−3	−2	−1	0	1	2	3	4
cs−econ−expect	−0.15	−0.42	−0.39	−0.34	−0.03	0.27	0.39	0.44	0.23
seco−consconf−outlook	−0.15	−0.22	−0.03	0.07	0.32	0.39	0.24	0.16	−0.04
kn−bci	0.14	−0.21	−0.21	−0.03	0.33	0.31	0.18	0.23	0.02
snb−bci	0.04	−0.13	−0.12	−0.15	0.35	0.21	0.3	0.35	−0.13
sentix−econ−expect	−0.12	−0.2	−0.11	−0.19	0.15	0.28	0.39	0.18	−0.01
seco−dfm	0.06	−0.17	−0.13	0	0.32	0.3	0.33	0.21	−0.15
cfo−econ−outlook	−0.09	0.01	−0.03	−0.07	0.17	0	0.28	0.12	0.06
seco−consconf	−0.13	−0.17	0.07	0.17	0.36	0.4	0.16	0.07	−0.14
ifo−de−manu−bo	−0.05	−0.23	−0.17	0.17	0.19	0.26	0.36	−0.02	−0.08
cs−ind−pmi−bo	0.13	−0.17	−0.2	−0.03	0.28	0.26	0.34	0.09	−0.15
ifo−expect−gdp	0.18	0	0.05	0.19	0.23	0.07	0.04	0.05	0.08
ifo−expect−sit	−0.16	−0.34	−0.17	0.11	0.18	0.23	0.06	0.1	0.01
snb−foreign−pmi	0.14	−0.17	−0.17	−0.02	0.32	0.12	0.29	0.17	−0.18
ec−at−serv−dem3m	−0.1	−0.19	−0.07	0.09	0.32	0.39	0.18	0.01	−0.14
kof−caputil	0.07	0.19	0.05	0.16	0.04	0.09	0.06	0.08	0.01
ec−ea−serv−conf	0.04	−0.17	−0.01	0.11	0.35	0.21	0.22	−0.05	−0.1
kof−ind−no3m	−0.04	0.08	0.15	−0.07	0.13	−0.03	0.05	0.01	0.07
cs−ind−pmi	0.11	−0.19	−0.11	−0.01	0.26	0.29	0.24	0.01	−0.2
cs−ind−pmi−prod	0.02	−0.1	−0.05	−0.11	0.09	0.14	0.11	0.02	−0.03
cs−serv−pmi	0.26	−0.35	0.05	−0.16	0.22	0.27	−0.18	0.28	−0.17
ism−us−pmi−serv	−0.05	0.04	−0.14	0.09	−0.05	0.2	0	0.15	−0.11
kof−ind−prod3m	0.01	−0.09	0.06	−0.05	0.14	−0.03	0.1	−0.03	0
ec−at−serv−sit	−0.03	−0.13	0.07	0.18	0.13	0.34	0.05	−0.15	−0.09
oecd−cli	0.05	−0.07	0.15	−0.04	0.07	−0.03	0.04	−0.02	0.01
ec−eu−sent	−0.11	0.17	0.19	0.02	0.03	−0.01	0	0	0
ec−at−manu−prodexp	0.1	0.2	0	0.02	0	0.02	0.01	0	−0.01
oecd−cli−consconf	−0.01	0.03	0.02	−0.08	0.09	−0.08	0.05	−0.03	0.02
kof−ind−nopm	0.01	−0.03	−0.11	0.02	0.12	0.06	0.06	0.02	−0.1
ec−at−manu−prodsit	0.03	0.09	0.01	−0.06	0.1	−0.02	0.01	0	−0.01
ec−ea−ind−conf	0.14	−0.23	0.02	0.05	0.17	−0.01	0.02	0	−0.05
ifo−de−climate	0.17	−0.16	0.03	0.06	0.01	0.2	0.22	−0.11	−0.15
ec−ea−sent	−0.07	0.24	0.03	0.03	−0.11	0.02	0	0	0
kof−econ−bar	0.09	0.09	0.04	0.02	−0.01	−0.01	−0.02	−0.01	0
ism−us−pmi−manu	−0.13	−0.01	0.09	−0.08	−0.06	0.03	0	0	0
sentix−econ	0.19	0.03	0.24	−0.11	−0.05	0	0.11	−0.02	−0.06
cs−econ−sit	−0.07	−0.06	0.12	0.03	0.16	0.18	0	−0.1	−0.09
kof−ind−trend	0.12	−0.21	−0.05	0.37	−0.01	−0.11	0.16	−0.12	−0.04
kof−ind−prodpm	0	−0.1	−0.02	0	0.14	0.14	−0.05	0	−0.11
ifo−de−manu−sit	0.1	−0.25	0.23	0.12	−0.03	0.18	0.02	−0.1	−0.09
kof−privsec−sit	0.06	0.09	0.14	0.13	−0.11	−0.13	0.06	−0.33	0.21
sentix−econ−sit	−0.01	0.02	0.23	0.01	−0.01	0	−0.11	−0.14	0.07
oecd−no	0.04	0.08	0	−0.06	−0.06	−0.04	−0.08	−0.05	−0.02
kof−manu−sit	−0.16	−0.1	0.13	0.33	0.36	0	0.15	−0.29	−0.3
oecd−cli−prod	−0.16	−0.2	−0.2	−0.23	−0.21	−0.21	−0.2	−0.19	−0.15

Figure 15: VA-Serv-Priv (q-q and y-y)



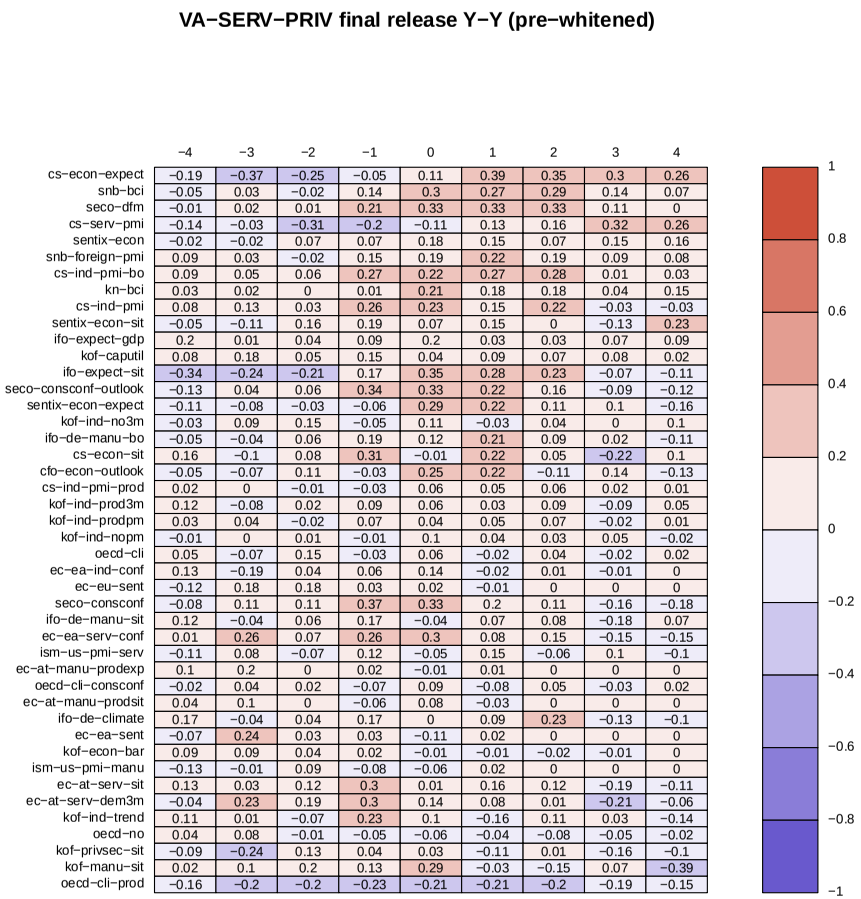
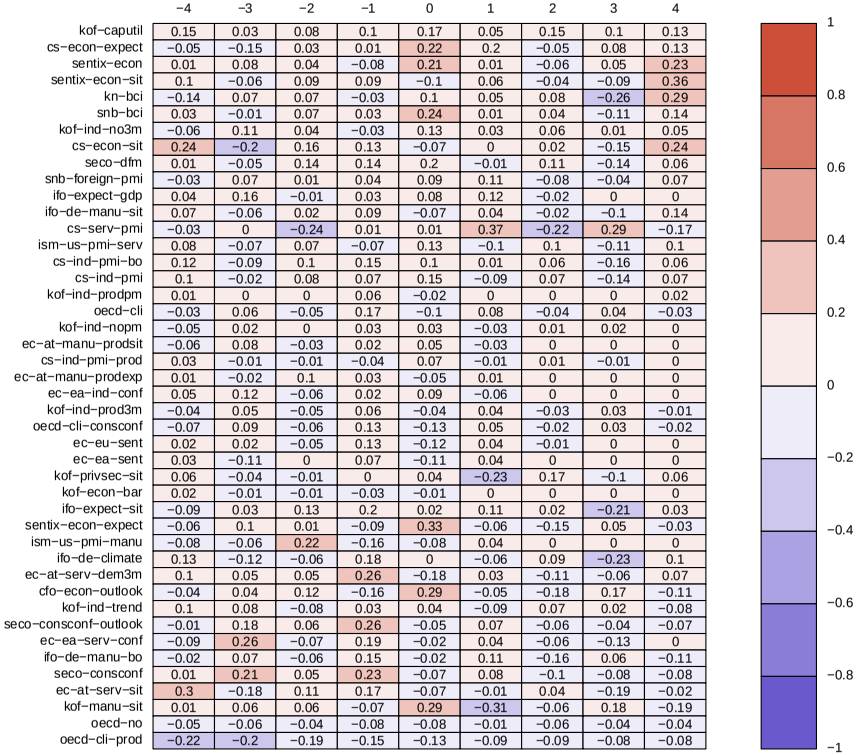


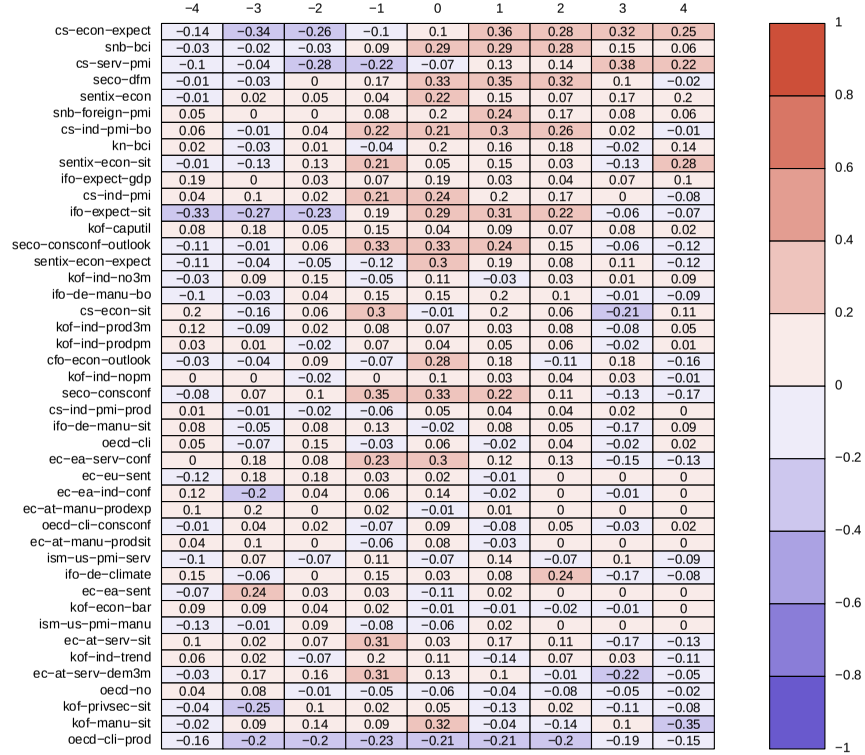
Figure 16: VA-Tert (q-q and y-y)

VA−TERT final release Q−Q (pre−whitened)



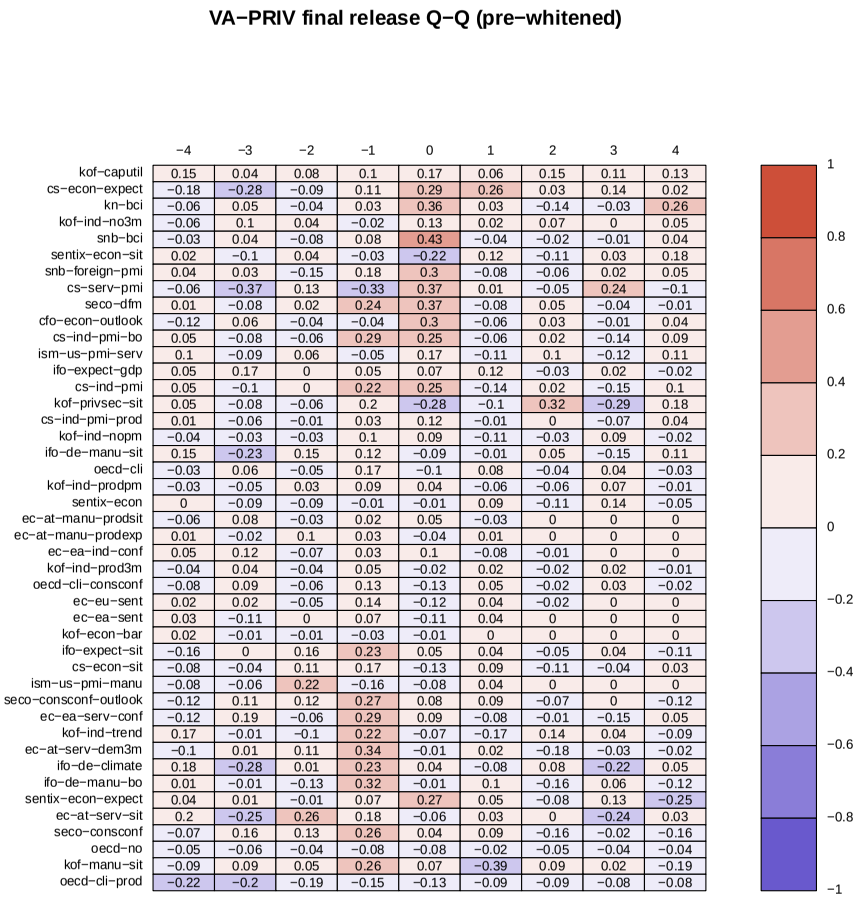
	−4	−3	−2	−1	0	1	2	3	4
kof−caputil	0.15	0.03	0.08	0.1	0.17	0.05	0.15	0.1	0.13
cs−econ−expect	−0.05	−0.15	0.03	0.01	0.22	0.2	−0.05	0.08	0.13
sentix−econ	0.01	0.08	0.04	−0.08	0.21	0.01	−0.06	0.05	0.23
sentix−econ−sit	0.1	−0.06	0.09	0.09	−0.1	0.06	−0.04	−0.09	0.36
kn−bci	−0.14	0.07	0.07	−0.03	0.1	0.05	0.08	−0.26	0.29
snb−bci	0.03	−0.01	0.07	0.03	0.24	0.01	0.04	−0.11	0.14
kof−ind−no3m	−0.06	0.11	0.04	−0.03	0.13	0.03	0.06	0.01	0.05
cs−econ−sit	0.24	−0.2	0.16	0.13	−0.07	0	0.02	−0.15	0.24
seco−dfm	0.01	−0.05	0.14	0.14	0.2	−0.01	0.11	−0.14	0.06
snb−foreign−pmi	−0.03	0.07	0.01	0.04	0.09	0.11	−0.08	−0.04	0.07
ifo−expect−gdp	0.04	0.16	−0.01	0.03	0.08	0.12	−0.02	0	0
ifo−de−manu−sit	0.07	−0.06	0.02	0.09	−0.07	0.04	−0.02	−0.1	0.14
cs−serv−pmi	−0.03	0	−0.24	0.01	0.01	0.37	−0.22	0.29	−0.17
ism−us−pmi−serv	0.08	−0.07	0.07	−0.07	0.13	−0.1	0.1	−0.11	0.1
cs−ind−pmi−bo	0.12	−0.09	0.1	0.15	0.1	0.01	0.06	−0.16	0.06
cs−ind−pmi	0.1	−0.02	0.08	0.07	0.15	−0.09	0.07	−0.14	0.07
kof−ind−prodpm	0.01	0	0	0.06	−0.02	0	0	0	0.02
oecd−cli	−0.03	0.06	−0.05	0.17	−0.1	0.08	−0.04	0.04	−0.03
kof−ind−nopm	−0.05	0.02	0	0.03	0.03	−0.03	0.01	0.02	0
ec−at−manu−prodsit	−0.06	0.08	−0.03	0.02	0.05	−0.03	0	0	0
cs−ind−pmi−prod	0.03	−0.01	−0.01	−0.04	0.07	−0.01	0.01	−0.01	0
ec−at−manu−prodexp	0.01	−0.02	0.1	0.03	−0.05	0.01	0	0	0
ec−ea−ind−conf	0.05	0.12	−0.06	0.02	0.09	−0.06	0	0	0
kof−ind−prod3m	−0.04	0.05	−0.05	0.06	−0.04	0.04	−0.03	0.03	−0.01
oecd−cli−consconf	−0.07	0.09	−0.06	0.13	−0.13	0.05	−0.02	0.03	−0.02
ec−eu−sent	0.02	0.02	−0.05	0.13	−0.12	0.04	−0.01	0	0
ec−ea−sent	0.03	−0.11	0	0.07	−0.11	0.04	0	0	0
kof−privsec−sit	0.06	−0.04	−0.01	0	0.04	−0.23	0.17	−0.1	0.06
kof−econ−bar	0.02	−0.01	−0.01	−0.03	−0.01	0	0	0	0
ifo−expect−sit	−0.09	0.03	0.13	0.2	0.02	0.11	0.02	−0.21	0.03
sentix−econ−expect	−0.06	0.1	0.01	−0.09	0.33	−0.06	−0.15	0.05	−0.03
ism−us−pmi−manu	−0.08	−0.06	0.22	−0.16	−0.08	0.04	0	0	0
ifo−de−climate	0.13	−0.12	−0.06	0.18	0	−0.06	0.09	−0.23	0.1
ec−at−serv−dem3m	0.1	0.05	0.05	0.26	−0.18	0.03	−0.11	−0.06	0.07
cfo−econ−outlook	−0.04	0.04	0.12	−0.16	0.29	−0.05	−0.18	0.17	−0.11
kof−ind−trend	0.1	0.08	−0.08	0.03	0.04	−0.09	0.07	0.02	−0.08
seco−consconf−outlook	−0.01	0.18	0.06	0.26	−0.05	0.07	−0.06	−0.04	−0.07
ec−ea−serv−conf	−0.09	0.26	−0.07	0.19	−0.02	0.04	−0.06	−0.13	0
ifo−de−manu−bo	−0.02	0.07	−0.06	0.15	−0.02	0.11	−0.16	0.06	−0.11
seco−consconf	0.01	0.21	0.05	0.23	−0.07	0.08	−0.1	−0.08	−0.08
ec−at−serv−sit	0.3	−0.18	0.11	0.17	−0.07	−0.01	0.04	−0.19	−0.02
kof−manu−sit	0.01	0.06	0.06	−0.07	0.29	−0.31	−0.06	0.18	−0.19
oecd−no	−0.05	−0.06	−0.04	−0.08	−0.08	−0.01	−0.06	−0.04	−0.04
oecd−cli−prod	−0.22	−0.2	−0.19	−0.15	−0.13	−0.09	−0.09	−0.08	−0.08

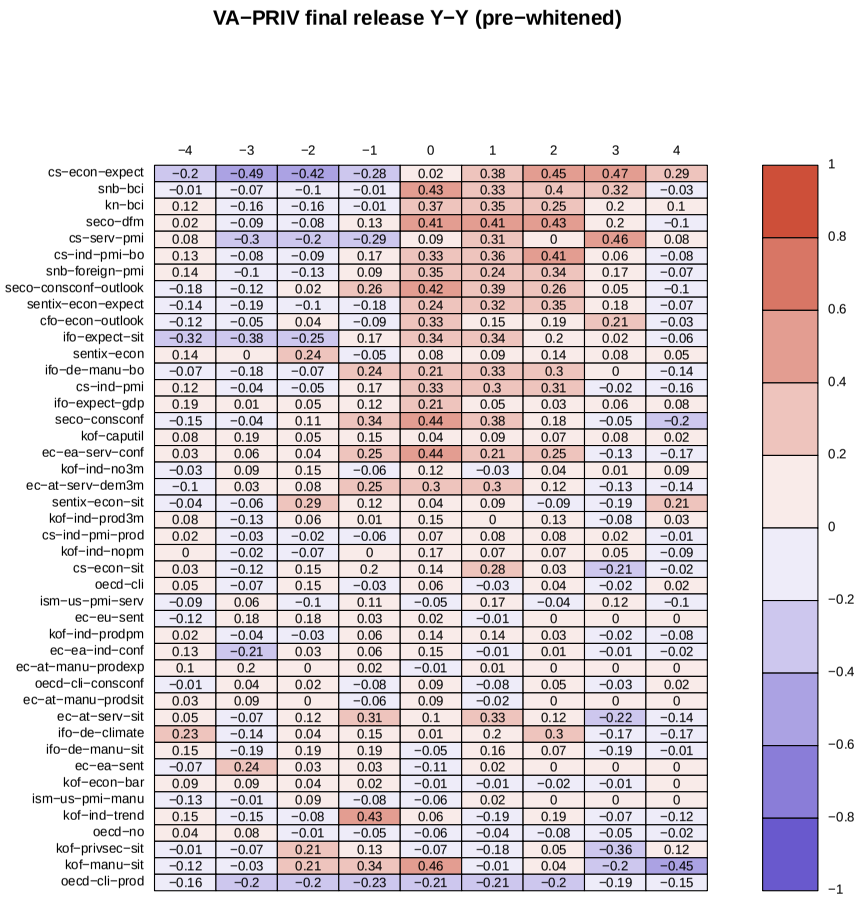
VA−TERT final release Y−Y (pre−whitened)



	−4	−3	−2	−1	0	1	2	3	4
cs−econ−expect	−0.14	−0.34	−0.26	−0.1	0.1	0.36	0.28	0.32	0.25
snb−bci	−0.03	−0.02	−0.03	0.09	0.29	0.29	0.28	0.15	0.06
cs−serv−pmi	−0.1	−0.04	−0.28	−0.22	−0.07	0.13	0.14	0.38	0.22
seco−dfm	−0.01	−0.03	0	0.17	0.33	0.35	0.32	0.1	−0.02
sentix−econ	−0.01	0.02	0.05	0.04	0.22	0.15	0.07	0.17	0.2
snb−foreign−pmi	0.05	0	0	0.08	0.2	0.24	0.17	0.08	0.06
cs−ind−pmi−bo	0.06	−0.01	0.04	0.22	0.21	0.3	0.26	0.02	−0.01
kn−bci	0.02	−0.03	0.01	−0.04	0.2	0.16	0.18	−0.02	0.14
sentix−econ−sit	−0.01	−0.13	0.13	0.21	0.05	0.15	0.03	−0.13	0.28
ifo−expect−gdp	0.19	0	0.03	0.07	0.19	0.03	0.04	0.07	0.1
cs−ind−pmi	0.04	0.1	0.02	0.21	0.24	0.2	0.17	0	−0.08
ifo−expect−sit	−0.33	−0.27	−0.23	0.19	0.29	0.31	0.22	−0.06	−0.07
kof−caputil	0.08	0.18	0.05	0.15	0.04	0.09	0.07	0.08	0.02
seco−consconf−outlook	−0.11	−0.01	0.06	0.33	0.33	0.24	0.15	−0.06	−0.12
sentix−econ−expect	−0.11	−0.04	−0.05	−0.12	0.3	0.19	0.08	0.11	−0.12
kof−ind−no3m	−0.03	0.09	0.15	−0.05	0.11	−0.03	0.03	0.01	0.09
ifo−de−manu−bo	−0.1	−0.03	0.04	0.15	0.15	0.2	0.1	−0.01	−0.09
cs−econ−sit	0.2	−0.16	0.06	0.3	−0.01	0.2	0.06	−0.21	0.11
kof−ind−prod3m	0.12	−0.09	0.02	0.08	0.07	0.03	0.08	−0.08	0.05
kof−ind−prodpm	0.03	0.01	−0.02	0.07	0.04	0.05	0.06	−0.02	0.01
cfo−econ−outlook	−0.03	−0.04	0.09	−0.07	0.28	0.18	−0.11	0.18	−0.16
kof−ind−nopm	0	0	−0.02	0	0.1	0.03	0.04	0.03	−0.01
seco−consconf	−0.08	0.07	0.1	0.35	0.33	0.22	0.11	−0.13	−0.17
cs−ind−pmi−prod	0.01	−0.01	−0.02	−0.06	0.05	0.04	0.04	0.02	0
ifo−de−manu−sit	0.08	−0.05	0.08	0.13	−0.02	0.08	0.05	−0.17	0.09
oecd−cli	0.05	−0.07	0.15	−0.03	0.06	−0.02	0.04	−0.02	0.02
ec−ea−serv−conf	0	0.18	0.08	0.23	0.3	0.12	0.13	−0.15	−0.13
ec−eu−sent	−0.12	0.18	0.18	0.03	0.02	−0.01	0	0	0
ec−ea−ind−conf	0.12	−0.2	0.04	0.06	0.14	−0.02	0	−0.01	0
ec−at−manu−prodexp	0.1	0.2	0	0.02	−0.01	0.01	0	0	0
oecd−cli−consconf	−0.01	0.04	0.02	−0.07	0.09	−0.08	0.05	−0.03	0.02
ec−at−manu−prodsit	0.04	0.1	0	−0.06	0.08	−0.03	0	0	0
ism−us−pmi−serv	−0.1	0.07	−0.07	0.11	−0.07	0.14	−0.07	0.1	−0.09
ifo−de−climate	0.15	−0.06	0	0.15	0.03	0.08	0.24	−0.17	−0.08
ec−ea−sent	−0.07	0.24	0.03	0.03	−0.11	0.02	0	0	0
kof−econ−bar	0.09	0.09	0.04	0.02	−0.01	−0.01	−0.02	−0.01	0
ism−us−pmi−manu	−0.13	−0.01	0.09	−0.08	−0.06	0.02	0	0	0
ec−at−serv−sit	0.1	0.02	0.07	0.31	0.03	0.17	0.11	−0.17	−0.13
kof−ind−trend	0.06	0.02	−0.07	0.2	0.11	−0.14	0.07	0.03	−0.11
ec−at−serv−dem3m	−0.03	0.17	0.16	0.31	0.13	0.1	−0.01	−0.22	−0.05
oecd−no	0.04	0.08	−0.01	−0.05	−0.06	−0.04	−0.08	−0.05	−0.02
kof−privsec−sit	−0.04	−0.25	0.1	0.02	0.05	−0.13	0.02	−0.11	−0.08
kof−manu−sit	−0.02	0.09	0.14	0.09	0.32	−0.04	−0.14	0.1	−0.35
oecd−cli−prod	−0.16	−0.2	−0.2	−0.23	−0.21	−0.21	−0.2	−0.19	−0.15

Figure 17: VA-Priv (q-q and y-y)





G Tables: Dynamic cross-correlation analysis–Different temporal aggregation methods

Table 17: GDP final release Q-Q (average - m1)

	-4	-3	-2	-1	0	1	2	3	4
snb-bci	0	0	-0.1	-0.1	0.1	0.1	0.1	0	0
kn-bci	-0.1	-0.1	-0.1	-0.1	0	0.1	0.1	0.1	0
seco-dfm	-0.1	0	-0.1	0	0.1	0.1	0.1	0.1	0
snb-foreign-pmi	-0.1	-0.1	-0.1	0	0.1	0.1	0	0	0
sentix-econ-expect	-0.1	0	-0.1	-0.1	0.1	0	0.1	0	0
sentix-econ-sit	-0.1	0	-0.1	0	0.2	0	0	0	0
sentix-econ	-0.1	0	-0.1	0	0.2	0	0.1	0	0
cs-econ-sit	0	0	0	0	0.1	0.1	0	0	0
cs-econ-expect	0	-0.1	-0.1	-0.1	0	0	0	0.1	0.1
kof-econ-bar	-0.1	-0.1	-0.2	-0.2	0	0.1	0.1	0.1	0
kof-privsec-sit	0	0	0	0	0.1	0	0	0	0
kof-ind-nopm	-0.1	-0.1	-0.1	0	0	0.1	0.1	0	0
kof-ind-prodpm	-0.1	-0.1	0	0	0.1	0.1	0.1	0	0
kof-manu-sit	-0.1	0	0	0.1	0.1	0.1	0	0	0
kof-ind-trend	-0.1	0	0	0.1	0.1	0.1	0	0	0
kof-ind-no3m	0	-0.1	-0.1	0	0	0.1	0.1	0	0
kof-ind-prod3m	-0.1	-0.1	-0.1	0	0.1	0.1	0.1	0	0
cs-ind-pmi	0	-0.1	-0.1	0	0.1	0.1	0.1	0.1	0
cs-ind-pmi-prod	0	0	-0.1	0	0.1	0.1	0.1	0.1	0.1
cs-ind-pmi-bo	0	-0.1	-0.1	0	0.1	0.1	0.1	0.1	0
cs-serv-pmi	-0.2	-0.1	-0.1	0	0	0.1	0.1	0	0.4
oecd-no	-0.1	-0.1	-0.1	0	0.1	0.1	0.1	0	0
oecd-cli	-0.1	-0.1	0	0	0.1	0.1	0.1	0	0
oecd-cli-prod	-0.1	-0.1	-0.1	0	0.1	0.1	0.1	0	0
oecd-cli-consconf	-0.1	-0.1	0	0	0	0.1	0.1	0	0
ism-us-pmi-serv	0	0	-0.1	0	0.1	0.1	0	0	0
ism-us-pmi-manu	-0.1	-0.1	-0.1	0	0	0	0	0	0
ifo-de-climate	0	0	0	0	0.1	0.1	0	0	0
ifo-de-manu-sit	0	0	0	0.1	0.1	0.1	0	0	0
ifo-de-manu-bo	0	-0.1	-0.1	0	0.1	0.1	0	0	0
ec-ea-sent	0	0	0	0	0.1	0.1	0	0	0
ec-ea-ind-conf	0	0	0	0	0.1	0.1	0	0	0
ec-ea-serv-conf	0	0	0	0	0	0.1	0	0	0
ec-eu-sent	0	0	0	0	0.1	0.1	0	0	0
ec-at-manu-prodsit	0	0	0	0	0.1	0	0	0	0
ec-at-manu-prodexp	-0.1	-0.1	0	0	0.1	0.1	0	0	0
ec-at-serv-sit	0	0	0	0	0.1	0	0	0	0
ec-at-serv-dem3m	0	-0.1	0	0.1	0.1	0	0	0	0
cfo-econ-outlook	0	0	0	0	0	0	0	0	0
seco-consconf-outlook	0	0	0	0	0	0	0	0	0
seco-consconf	0	0	0	0	0	0	0	0	0
ifo-expect-gdp	0	0	0	0	0	0	0	0	0
ifo-expect-sit	0	0	0	0	0	0	0	0	0
kof-caputil	0	0	0	0	0	0	0	0	0

Table 18: GDP final release Q-Q (average - m2)

	-4	-3	-2	-1	0	1	2	3	4
snb-bci	0	0	0	0	0	0	0	0	0
kn-bci	0	0	0	0	0	0	0	0	0
seco-dfm	0	0	0	0	0	0	0	0	0
snb-foreign-pmi	0	0	0	0	0	0	0	0	0
sentix-econ-expect	-0.1	-0.1	0.1	0	0.1	0.2	-0.1	0	0
sentix-econ-sit	0	0	0	0	-0.1	0	0	0	0
sentix-econ	0	0	0.1	0	0	0.1	0	0	0
cs-econ-sit	0	0	0	0	0	0	0	0	0
cs-econ-expect	0	0	0	0	0	0	0	0	0
kof-econ-bar	0	0	0	0	0	0	0	0	0
kof-privsec-sit	0	0	0	0	0	0	0	0	0
kof-ind-nopm	0	0	0	0	0	0	0	0	0
kof-ind-prodpm	0	0	0	0	0	0	0	0	0
kof-manu-sit	0	0	0	0	0	0	0	0	0
kof-ind-trend	0	0	0	0	0	0	0	0	0
kof-ind-no3m	0	0	0	0	0	0	0	0	0
kof-ind-prod3m	0	0	0	0	0	0	0	0	0
cs-ind-pmi	0	0	0	0	0	0	0	0	0
cs-ind-pmi-prod	0	0	0.1	0.1	0.1	0	0	0	0
cs-ind-pmi-bo	0	0	0.1	0	0.1	0.1	0	0	0
cs-serv-pmi	0	-0.1	-0.1	0	0	-0.1	0	0.2	0
oecd-no	0	0	0	0	0	0	0	0	0
oecd-cli	0	0	0	0	0	0	0	0	0
oecd-cli-prod	0	0	0	0	0	0	0	0	0
oecd-cli-consconf	0	0	0	0	0	0	0	0	0
ism-us-pmi-serv	0	0	0	0	0	0	0	0.1	0.1
ism-us-pmi-manu	0	0	0	0	0	0	0	0	0
ifo-de-climate	0	0	0	0	0	0	0	0	0
ifo-de-manu-sit	0	0	0	0	0	0	0	0	0
ifo-de-manu-bo	0	0	0	0	0	0	0	0	0
ec-ea-sent	0	0	0	0	0	0	0	0	0
ec-ea-ind-conf	0	0	0	0	0	0	0	0	0
ec-ea-serv-conf	0	0	0	0	0	0	0	0	0
ec-eu-sent	0	0	0	0	0	0	0	0	0
ec-at-manu-prodsit	0	0	0	0	0	0	0	0	0
ec-at-manu-prodexp	0	0	0	0	0.1	0	0	0	0
ec-at-serv-sit	0	0	0	0	0	0	0	0	0
ec-at-serv-dem3m	0	0	0	0	0	0	0.1	0	0
cfo-econ-outlook	0	0	0	0	0	0	0	0	0
seco-consconf-outlook	0	0	0	0	0	0	0	0	0
seco-consconf	0	0	0	0	0	0	0	0	0
ifo-expect-gdp	0	0	0	0	0	0	0	0	0
ifo-expect-sit	0	0	0	0	0	0	0	0	0
kof-caputil	0	0	0	0	0	0	0	0	0

Table 19: GDP final release Q-Q (average - m3)

	-4	-3	-2	-1	0	1	2	3	4
snb-bci	0	0	0.1	0.1	0	-0.1	0	0	0
kn-bci	0.1	0.1	0.1	0.1	0	-0.1	-0.1	-0.1	-0.1
seco-dfm	0.1	0.1	0.1	0	0	0	0	0	0
snb-foreign-pmi	0.1	0.1	0.1	0.1	0	-0.1	-0.1	0	0
sentix-econ-expect	0.2	0	0.1	0.2	0.1	0	0	0	-0.1
sentix-econ-sit	0	0	0.1	0	-0.1	0	-0.1	-0.1	0
sentix-econ	0.1	0	0.1	0	0	0	0	-0.1	0
cs-econ-sit	0	0	0	0	-0.1	0	-0.1	-0.1	0
cs-econ-expect	0	0.1	0.1	0.1	0.1	0.1	0	0	-0.1
kof-econ-bar	0	0.1	0.1	0.2	0	0	0	0	0
kof-privsec-sit	0	0	0	0	-0.1	0	0	0	0
kof-ind-nopm	0.1	0.1	0.1	0	0	-0.1	-0.1	0	0
kof-ind-prodpm	0.1	0.1	0	0	-0.1	-0.1	-0.1	0	0
kof-manu-sit	0.1	0	0	0	-0.1	-0.1	0	0	0
kof-ind-trend	0.1	0	0	0	-0.1	-0.1	0	0	0
kof-ind-no3m	0	0.1	0.1	0.1	0	-0.1	-0.1	0	0
kof-ind-prod3m	0.1	0.1	0.1	0	-0.1	-0.1	-0.1	0	0
cs-ind-pmi	0.1	0.1	0.1	0	-0.1	-0.1	-0.1	-0.1	0
cs-ind-pmi-prod	0.1	0.1	0.1	0.1	0	-0.1	-0.1	-0.1	-0.1
cs-ind-pmi-bo	0	0.1	0.1	0.1	0	-0.1	-0.1	-0.1	0
cs-serv-pmi	0	0.1	0.3	0.2	0.4	0.2	0.1	0	-0.4
oecd-no	0.1	0.1	0.1	0	0	-0.1	-0.1	0	0
oecd-cli	0.1	0.1	0.1	0	-0.1	-0.1	-0.1	0	0
oecd-cli-prod	0.1	0.1	0.1	0	-0.1	-0.1	-0.1	0	0
oecd-cli-consconf	0.1	0.1	0.1	0	0	-0.1	-0.1	0	0
ism-us-pmi-serv	0.1	0	0.1	0	0	0	0	0	0
ism-us-pmi-manu	0.1	0.1	0.1	0.1	0	0	0	0	0
ifo-de-climate	0	0	0	0	-0.1	-0.1	0	0	0
ifo-de-manu-sit	0	0	0	0	-0.1	-0.1	0	0	0
ifo-de-manu-bo	0	0.1	0.1	0	0	-0.1	-0.1	0	0
ec-ea-sent	0	0	0	0	-0.1	-0.1	0	0	0
ec-ea-ind-conf	0	0	0	0	-0.1	-0.1	0	0	0
ec-ea-serv-conf	0	0	0	0	0	0	0	0	0
ec-eu-sent	0	0	0	0	0	-0.1	0	0	0
ec-at-manu-prodsit	0.1	0.1	0.1	0	0	0	0	0	0
ec-at-manu-prodexp	0.1	0.1	0.1	0	-0.1	0	0	0	0
ec-at-serv-sit	0	0.1	0.1	0	0	0	0	0	0
ec-at-serv-dem3m	0	0.1	0.1	0	0	0	0	-0.1	0
cfo-econ-outlook	0	0	0	0	0	0	0	0	0
seco-consconf-outlook	0	0	0	0	0	0	0	0	0
seco-consconf	0	0	0	0	0	0	0	0	0
ifo-expect-gdp	0	0	0	0	0	0	0	0	0
ifo-expect-sit	0	0	0	0	0	0	0	0	0
kof-caputil	0	0	0	0	0	0	0	0	0

Table 20: GDP final release Y-Y (average - m1)

	-4	-3	-2	-1	0	1	2	3	4
snb-bci	0	0	-0.1	-0.1	-0.1	0	0	0.1	0.1
kn-bci	0	0	-0.1	-0.1	-0.1	0	0.1	0.1	0.1
seco-dfm	0	0	-0.1	-0.1	0	0	0.1	0.1	0.1
snb-foreign-pmi	0	-0.1	-0.1	-0.1	0	0	0.1	0.1	0.1
sentix-econ-expect	-0.1	-0.1	-0.1	-0.1	-0.1	0	0.1	0.1	0.1
sentix-econ-sit	-0.1	-0.1	-0.1	0	0.1	0.1	0.1	0.1	0
sentix-econ	-0.1	-0.1	-0.1	-0.1	0	0	0.1	0.1	0
cs-econ-sit	-0.1	-0.1	0	0	0	0.1	0.1	0.1	0
cs-econ-expect	0	0	-0.1	-0.1	-0.1	-0.1	-0.1	0	0
kof-econ-bar	0	-0.1	-0.1	-0.2	-0.1	-0.1	0	0.1	0.1
kof-privsec-sit	0	0	0	0	0	0	0	0	0
kof-ind-nopm	-0.1	-0.1	-0.1	-0.1	0	0	0.1	0.1	0.1
kof-ind-prodpm	-0.1	-0.1	-0.1	0	0	0.1	0.1	0.1	0.1
kof-manu-sit	-0.1	-0.1	-0.1	0	0.1	0.1	0.1	0.1	0
kof-ind-trend	-0.1	-0.1	-0.1	0	0	0.1	0.1	0.1	0.1
kof-ind-no3m	0	-0.1	-0.1	-0.1	0	0	0	0.1	0.1
kof-ind-prod3m	-0.1	-0.1	-0.1	-0.1	0	0	0.1	0.1	0.1
cs-ind-pmi	0	-0.1	-0.1	-0.1	0	0	0.1	0.1	0.1
cs-ind-pmi-prod	0	0	-0.1	0	0	0.1	0.1	0.1	0.1
cs-ind-pmi-bo	0	0	-0.1	-0.1	0	0	0.1	0.1	0.1
cs-serv-pmi	-0.2	-0.1	-0.1	-0.1	-0.1	0	0.1	0.1	0.2
oecd-no	0	-0.1	-0.1	-0.1	0	0	0.1	0.1	0.1
oecd-cli	-0.1	-0.1	-0.1	-0.1	0	0	0.1	0.1	0.1
oecd-cli-prod	-0.1	-0.1	-0.1	-0.1	0	0	0.1	0.1	0.1
oecd-cli-consconf	-0.1	-0.1	-0.1	-0.1	0	0	0.1	0.1	0.1
ism-us-pmi-serv	0	0	0	0	0	0	0.1	0.1	0
ism-us-pmi-manu	0	-0.1	-0.1	-0.1	-0.1	0	0	0	0
ifo-de-climate	0	0	0	0	0	0	0.1	0.1	0
ifo-de-manu-sit	0	0	0	0	0	0.1	0.1	0.1	0
ifo-de-manu-bo	0	-0.1	-0.1	-0.1	0	0	0.1	0.1	0
ec-ea-sent	0	0	0	0	0	0	0.1	0.1	0
ec-ea-ind-conf	-0.1	-0.1	0	0	0	0.1	0.1	0.1	0
ec-ea-serv-conf	0	0	0	0	0	0	0.1	0.1	0.1
ec-eu-sent	0	0	0	0	0	0	0.1	0.1	0
ec-at-manu-prodsit	0	0	0	0	0	0	0	0	0
ec-at-manu-prodexp	-0.1	-0.1	-0.1	0	0	0	0.1	0.1	0
ec-at-serv-sit	0	0	0	0	0	0	0	0	0
ec-at-serv-dem3m	-0.1	-0.1	-0.1	0	0	0	0	0	0
cfo-econ-outlook	0	0	0	0	0	0	0	0	0
seco-consconf-outlook	0	0	0	0	0	0	0	0	0
seco-consconf	0	0	0	0	0	0	0	0	0
ifo-expect-gdp	0	0	0	0	0	0	0	0	0
ifo-expect-sit	0	0	0	0	0	0	0	0	0
kof-caputil	0	0	0	0	0	0	0	0	0

Table 21: GDP final release Y-Y (average - m2)

	-4	-3	-2	-1	0	1	2	3	4
snb-bci	0	0	0	0	0	0	0	0	0
kn-bci	0	0	0	0	0	0	0	0	0
seco-dfm	0	0	0	0	0	0	0	0	0
snb-foreign-pmi	0	0	0	0	0	0	0	0	0
sentix-econ-expect	-0.1	-0.1	-0.1	0	0.1	0.2	0.1	0.1	0
sentix-econ-sit	0	0	0	0.1	0	0	0	0	0
sentix-econ	0	0	0	0	0.1	0.1	0	0	0
cs-econ-sit	0	0	0	0	0	0	0	0	0
cs-econ-expect	0	0	0	0	0	0	0	0	0
kof-econ-bar	0	0	0	0	0	0	0	0	0
kof-privsec-sit	0	0	0	0	0	0	0	0	0
kof-ind-nopm	0	0	0	0	0	0	0	0	0
kof-ind-prodpm	0	0	0	0	0	0	0	0	0
kof-manu-sit	0	0	0	0	0	0	0	0	0
kof-ind-trend	0	0	0	0	0	0	0	0	0
kof-ind-no3m	0	0	0	0	0	0	0	0	0
kof-ind-prod3m	0	0	0	0	0	0	0	0	0
cs-ind-pmi	0	0	0	0	0	0	0	0	0
cs-ind-pmi-prod	0	0	0	0	0	0.1	0.1	0	0
cs-ind-pmi-bo	0	0	0	0	0.1	0.1	0.1	0.1	0
cs-serv-pmi	0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0	0.1	0.1
oecd-no	0	0	0	0	0	0	0	0	0
oecd-cli	0	0	0	0	0	0	0	0	0
oecd-cli-prod	0	0	0	0	0	0	0	0	0
oecd-cli-consconf	0	0	0	0	0	0	0	0	0
ism-us-pmi-serv	0	0	0	0	0	0	0	0	0.1
ism-us-pmi-manu	0	0	0	0	0	0	0	0	0
ifo-de-climate	0	0	0	0	0	0	0	0	0
ifo-de-manu-sit	0	0	0	0	0	0	0	0	0
ifo-de-manu-bo	0	0	0	0	0	0	0	0	0
ec-ea-sent	0	0	0	0	0	0	0	0	0
ec-ea-ind-conf	0	0	0	0	0	0	0	0	0
ec-ea-serv-conf	0	0	0	0	0	0	0	0	0
ec-eu-sent	0	0	0	0	0	0	0	0	0
ec-at-manu-prodsit	0	0	0	0	0	0	0	0	0
ec-at-manu-prodexp	0	0	0	0	0	0	0	0	0
ec-at-serv-sit	0	0	0	0	0	0	0	0	0
ec-at-serv-dem3m	0	0	0	0	0	0	0	0	0.1
cfo-econ-outlook	0	0	0	0	0	0	0	0	0
seco-consconf-outlook	0	0	0	0	0	0	0	0	0
seco-consconf	0	0	0	0	0	0	0	0	0
ifo-expect-gdp	0	0	0	0	0	0	0	0	0
ifo-expect-sit	0	0	0	0	0	0	0	0	0
kof-caputil	0	0	0	0	0	0	0	0	0

Table 22: GDP final release Y-Y (average - m3)

	-4	-3	-2	-1	0	1	2	3	4
snb-bci	0	0	0.1	0.1	0.1	0.1	0	-0.1	-0.1
kn-bci	0	0.1	0.1	0.1	0.1	0	0	-0.1	-0.1
seco-dfm	0	0	0.1	0.1	0.1	0	0	-0.1	0
snb-foreign-pmi	0	0.1	0.1	0.1	0.1	0	0	-0.1	-0.1
sentix-econ-expect	0	0.1	0.1	0.2	0.2	0.1	0	0	-0.1
sentix-econ-sit	0.1	0.1	0.1	0.1	0	0	-0.1	-0.1	0
sentix-econ	0.1	0.1	0.1	0.1	0.1	0	0	-0.1	-0.1
cs-econ-sit	0.1	0.1	0.1	0	0	0	-0.1	-0.1	-0.1
cs-econ-expect	-0.1	0	0.1	0.1	0.1	0.2	0.1	0.1	0
kof-econ-bar	0	0	0.1	0.1	0.1	0.1	0	0	0
kof-privsec-sit	0	0	0	0	0	0	0	0	0
kof-ind-nopm	0	0.1	0.1	0.1	0.1	0	0	-0.1	-0.1
kof-ind-prodpm	0.1	0.1	0.1	0.1	0	0	-0.1	-0.1	-0.1
kof-manu-sit	0.1	0.1	0.1	0	0	-0.1	-0.1	-0.1	0
kof-ind-trend	0.1	0.1	0.1	0	0	-0.1	-0.1	-0.1	-0.1
kof-ind-no3m	0	0.1	0.1	0.1	0.1	0	0	-0.1	-0.1
kof-ind-prod3m	0.1	0.1	0.1	0.1	0	0	-0.1	-0.1	-0.1
cs-ind-pmi	0	0.1	0.1	0.1	0.1	0	-0.1	-0.1	-0.1
cs-ind-pmi-prod	0	0.1	0.1	0.1	0.1	0	0	-0.1	-0.1
cs-ind-pmi-bo	0	0.1	0.1	0.1	0.1	0	0	-0.1	-0.1
cs-serv-pmi	-0.1	-0.1	0.1	0.3	0.5	0.4	0.3	0.2	-0.1
oecd-no	0	0.1	0.1	0.1	0.1	0	0	-0.1	-0.1
oecd-cli	0.1	0.1	0.1	0.1	0	0	-0.1	-0.1	-0.1
oecd-cli-prod	0.1	0.1	0.1	0.1	0	0	-0.1	-0.1	-0.1
oecd-cli-consconf	0.1	0.1	0.1	0.1	0	0	0	-0.1	-0.1
ism-us-pmi-serv	0	0	0.1	0.1	0	0	0	0	0
ism-us-pmi-manu	0	0	0.1	0.1	0.1	0.1	0	0	0
ifo-de-climate	0	0	0	0	0	0	-0.1	-0.1	0
ifo-de-manu-sit	0	0	0	0	0	-0.1	-0.1	-0.1	0
ifo-de-manu-bo	0	0.1	0.1	0.1	0	0	0	-0.1	-0.1
ec-ea-sent	0	0	0	0	0	0	-0.1	-0.1	0
ec-ea-ind-conf	0.1	0.1	0.1	0	0	0	-0.1	-0.1	-0.1
ec-ea-serv-conf	0	0.1	0.1	0	0	0	-0.1	-0.1	0
ec-eu-sent	0	0	0	0	0	0	0	-0.1	0
ec-at-manu-prodsit	0	0.1	0.1	0.1	0	0	0	0	0
ec-at-manu-prodexp	0.1	0.1	0.1	0.1	0	0	0	-0.1	0
ec-at-serv-sit	0	0.1	0.1	0.1	0.1	0	0	0	0
ec-at-serv-dem3m	0	0.1	0.1	0.1	0.1	0	0	0	-0.1
cfo-econ-outlook	0	0	0	0	0	0	0	0	0
seco-consconf-outlook	0	0	0	0	0	0	0	0	0
seco-consconf	0	0	0	0	0	0	0	0	0
ifo-expect-gdp	0	0	0	0	0	0	0	0	0
ifo-expect-sit	0	0	0	0	0	0	0	0	0
kof-caputil	0	0	0	0	0	0	0	0	0

H Figures: Dynamic-Model-Averaging analysis

Figure 18: GDP (q-q)

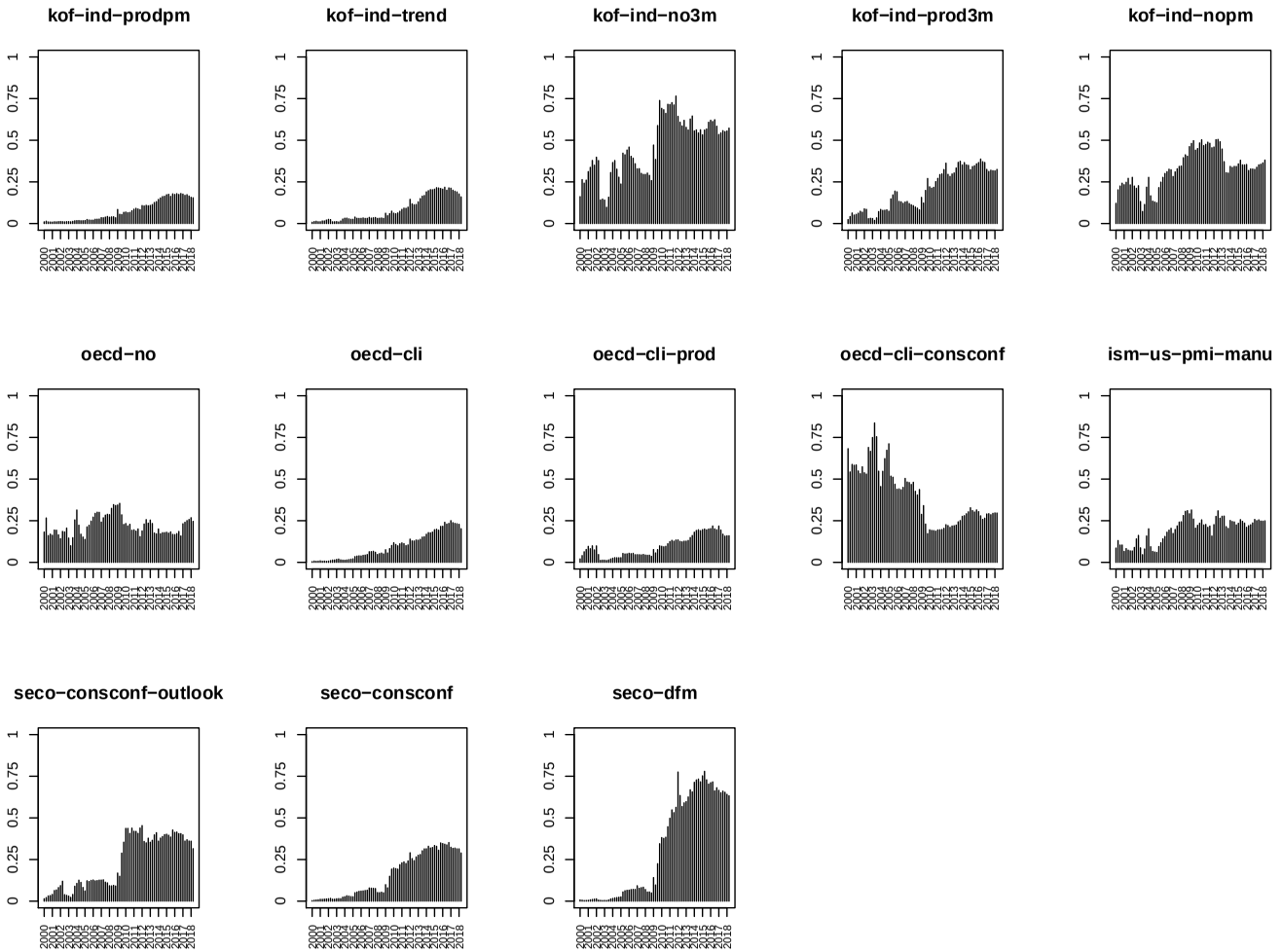


Figure 19: GDP (y-y)

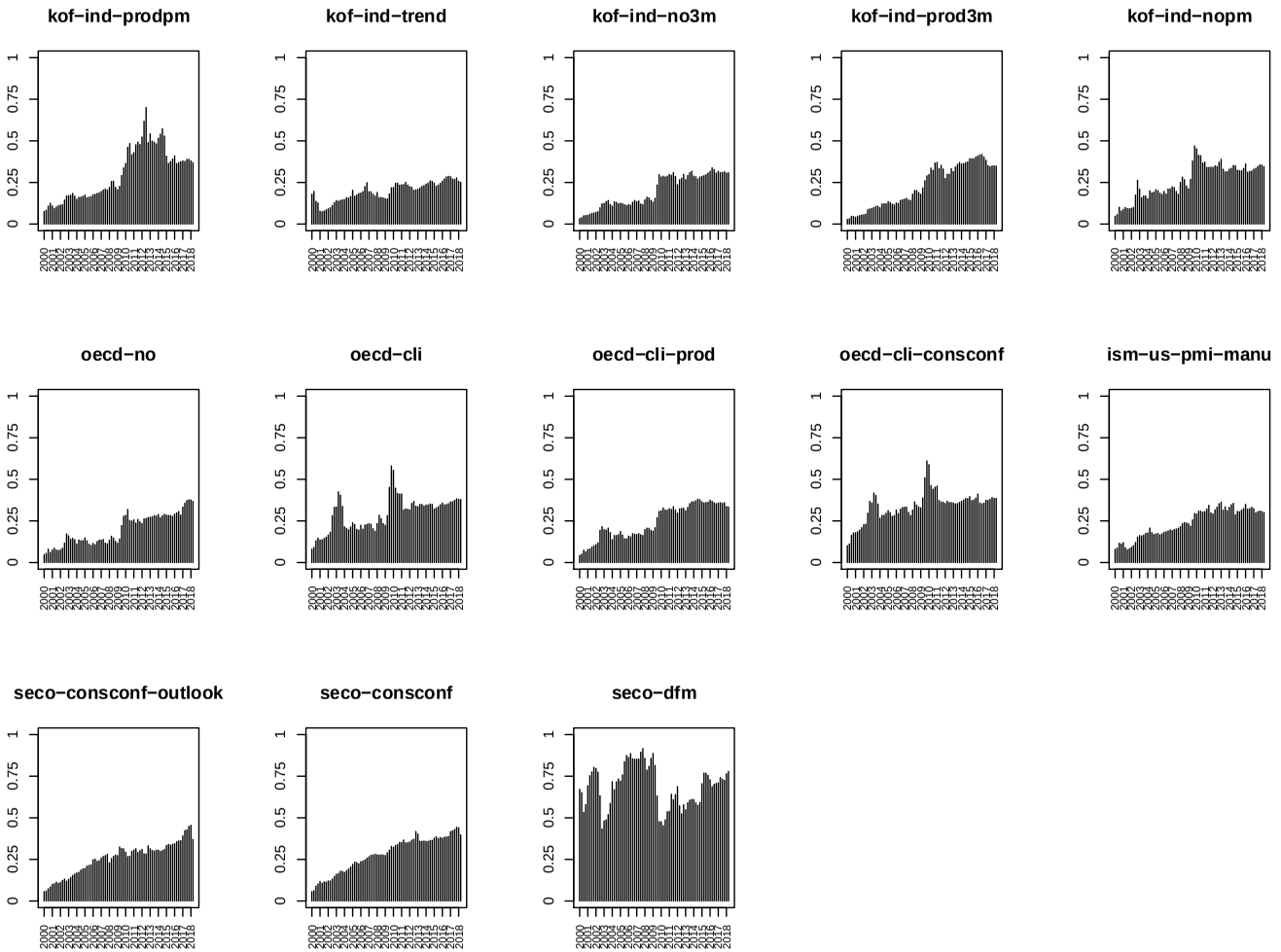


Figure 20: VA-Manu (q-q)

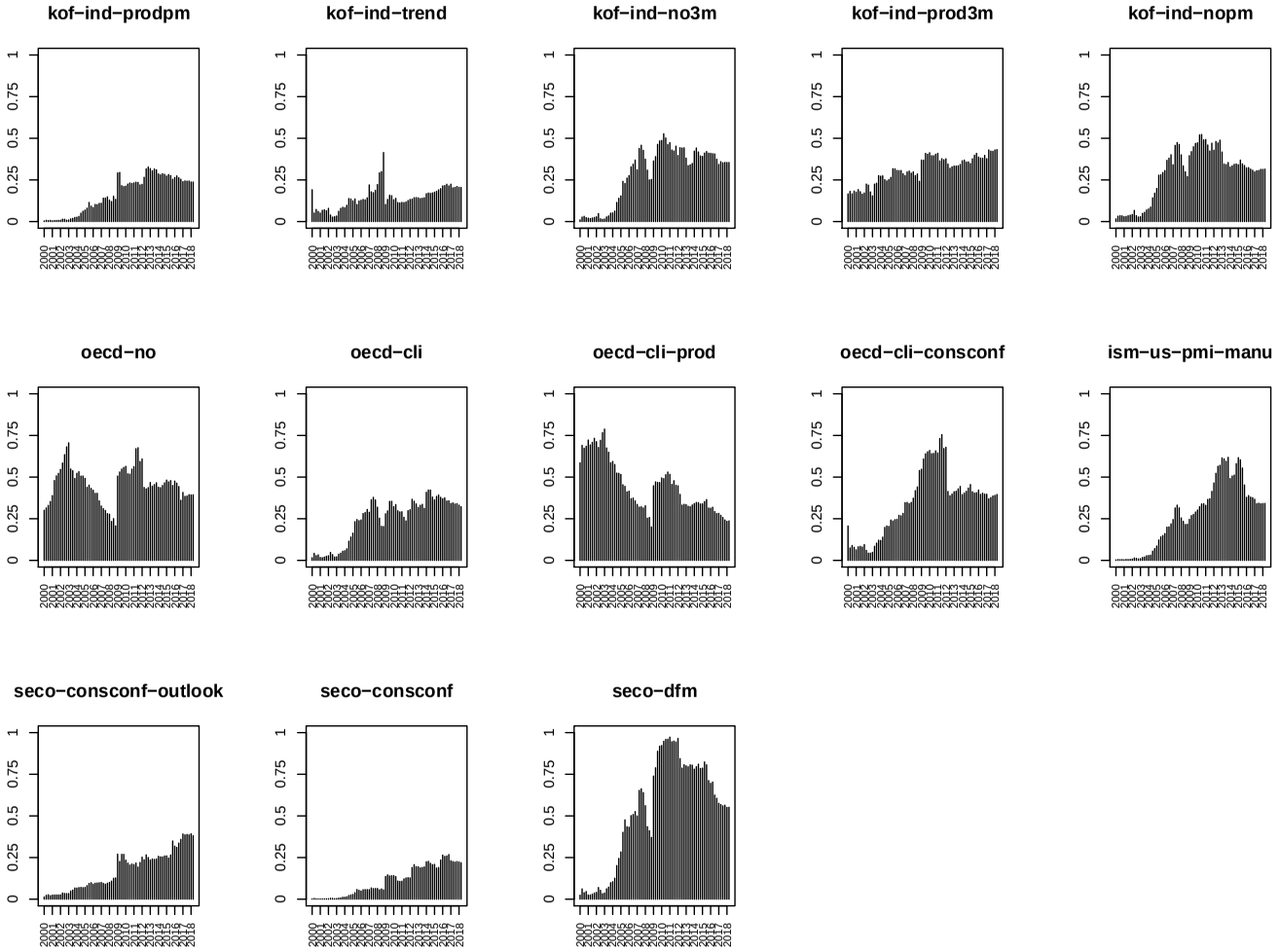


Figure 21: VA-Manu (y-y)

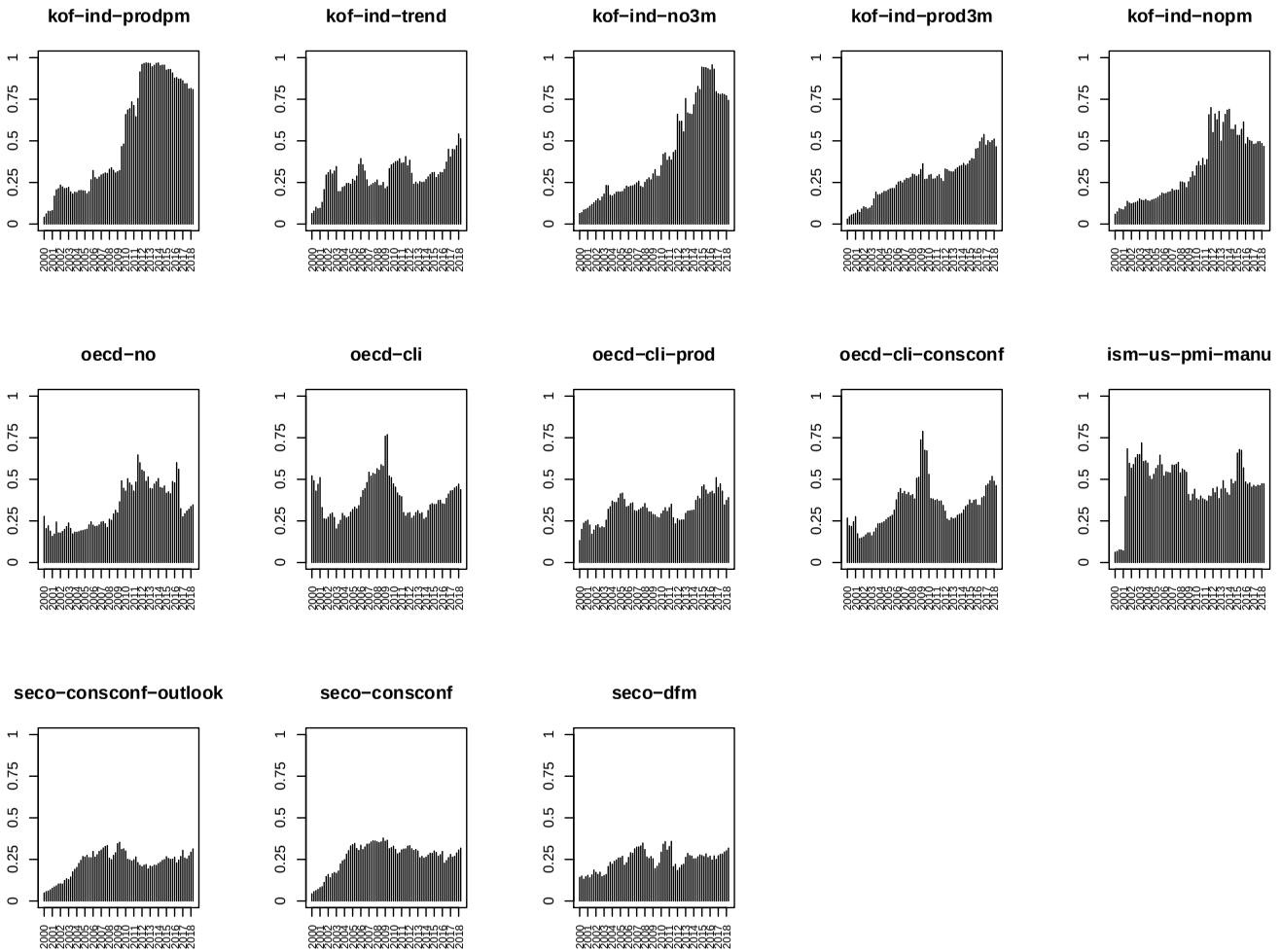


Figure 22: VA-Second (q-q)

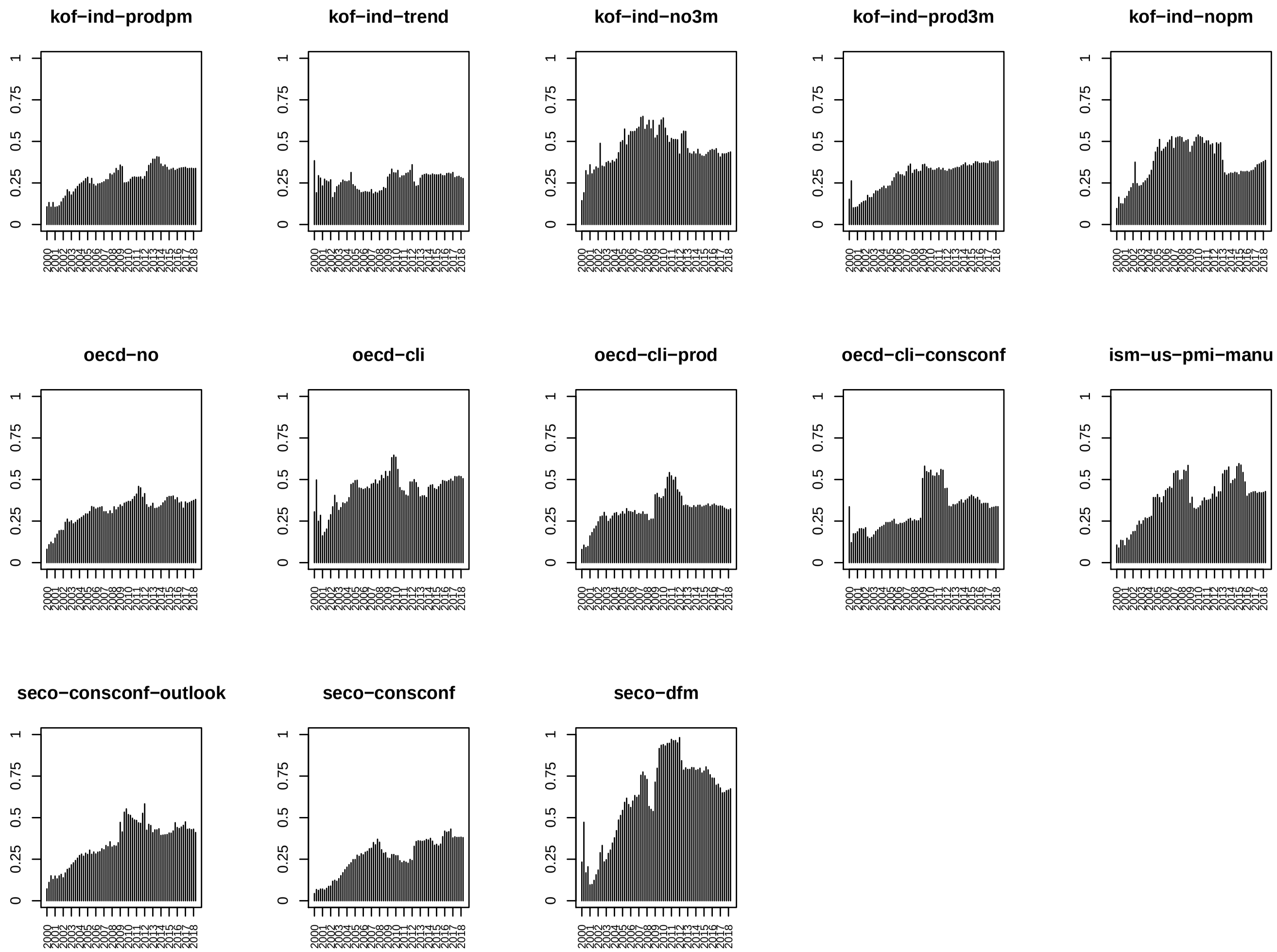
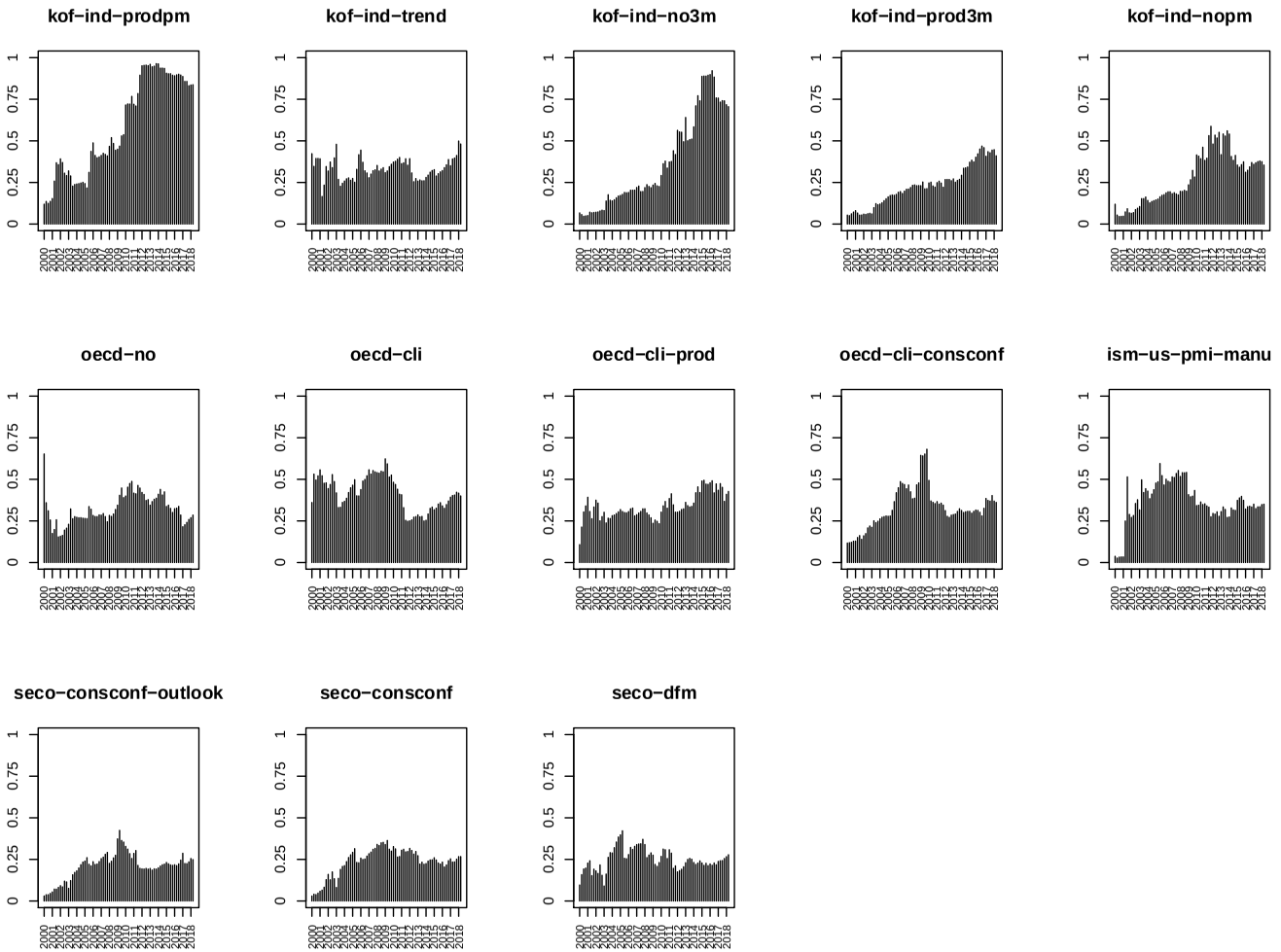


Figure 23: VA-Second (y-y)



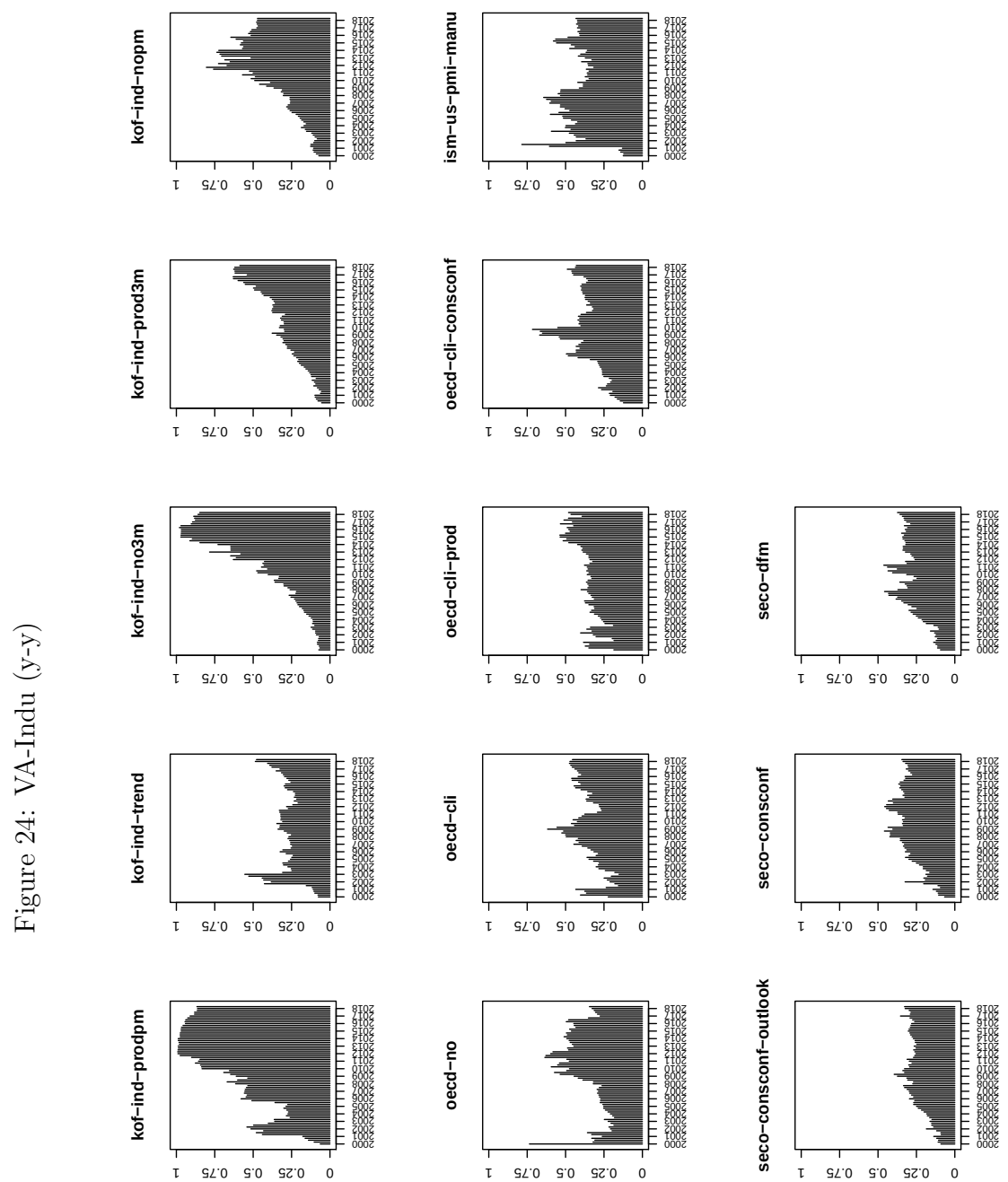


Figure 24: VA-Indu (y-y)

Figure 25: VA-Serv-Priv (q-q)

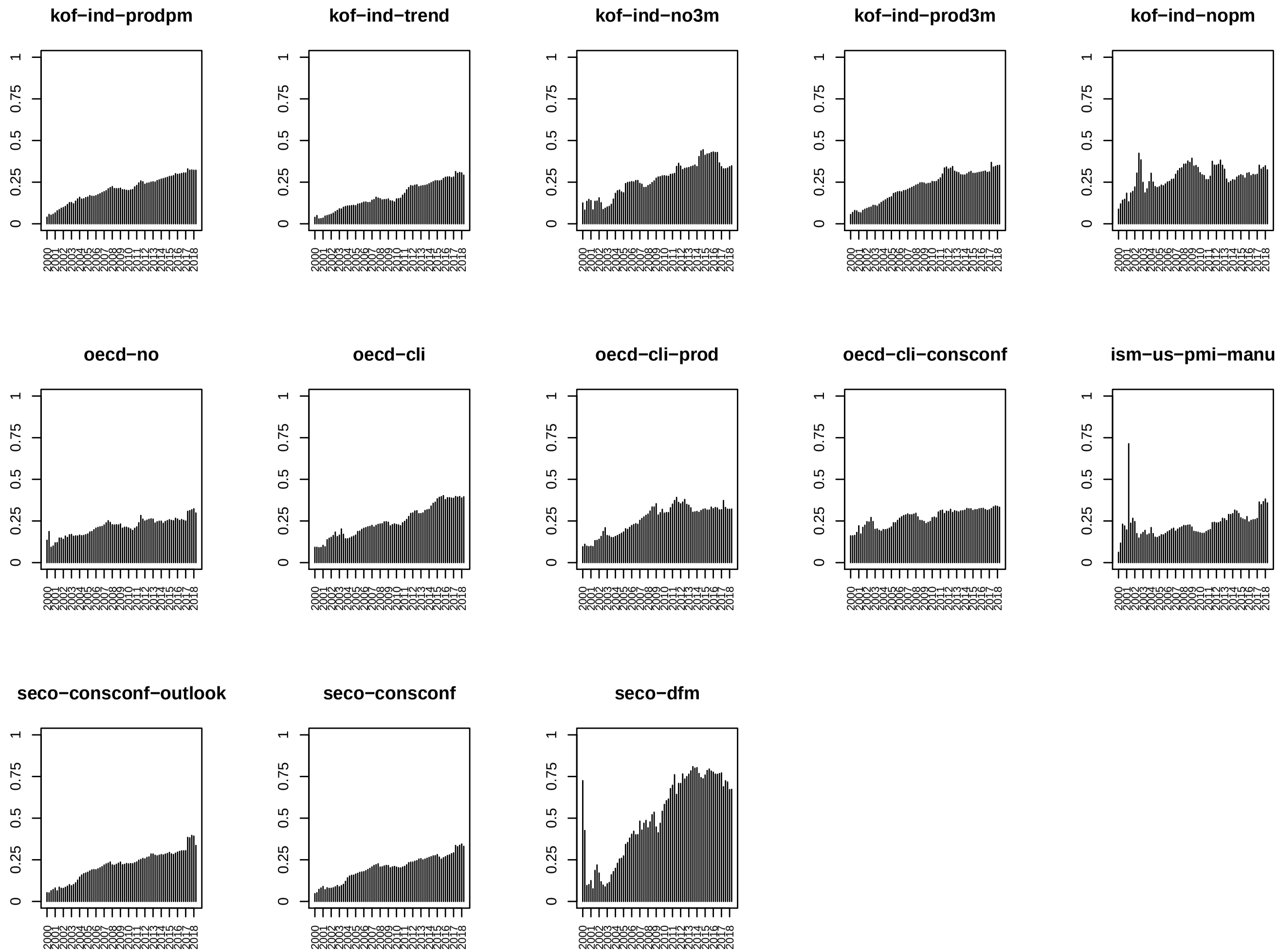


Figure 26: VA-Serv-Priv (y-y)

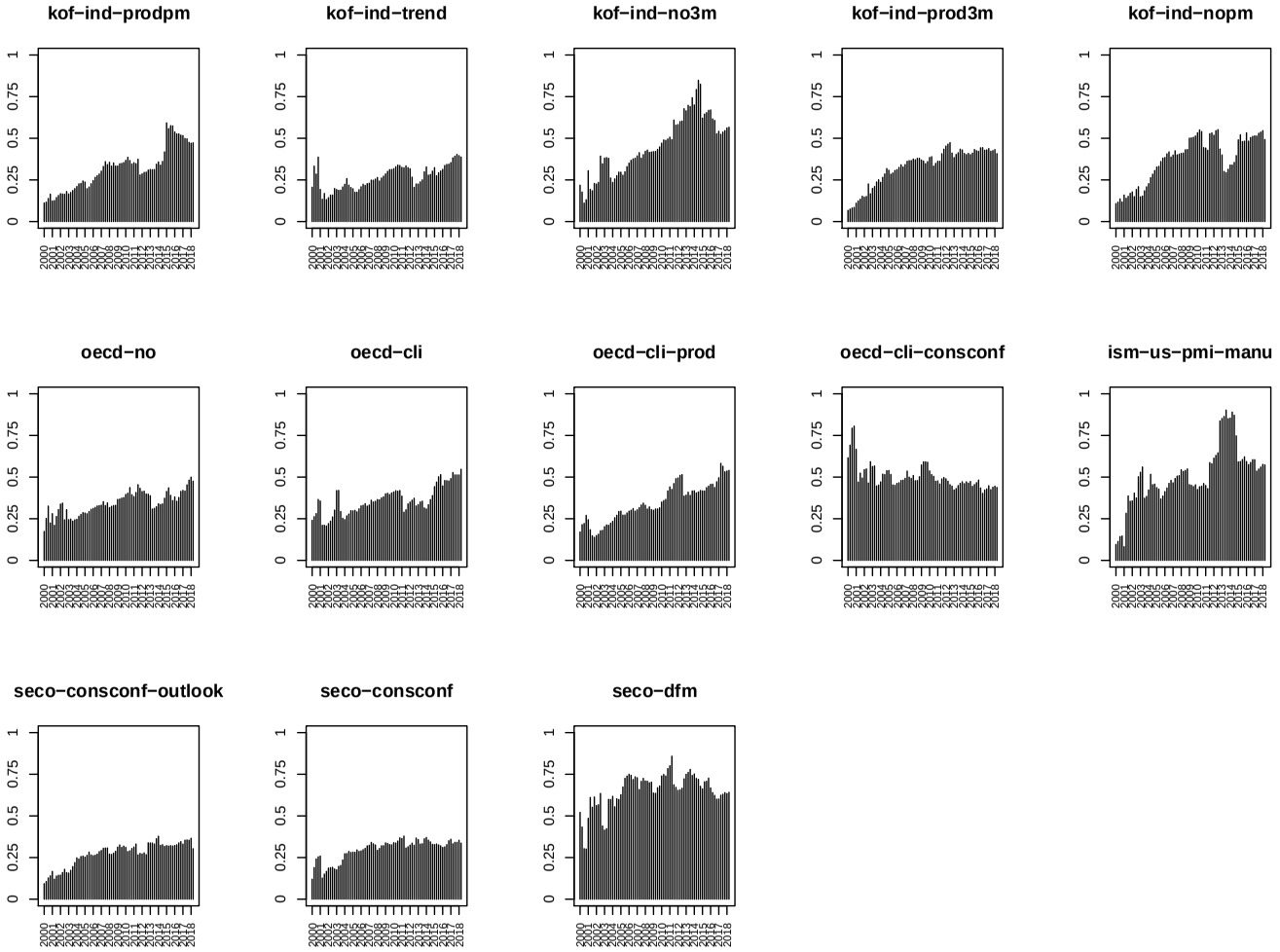
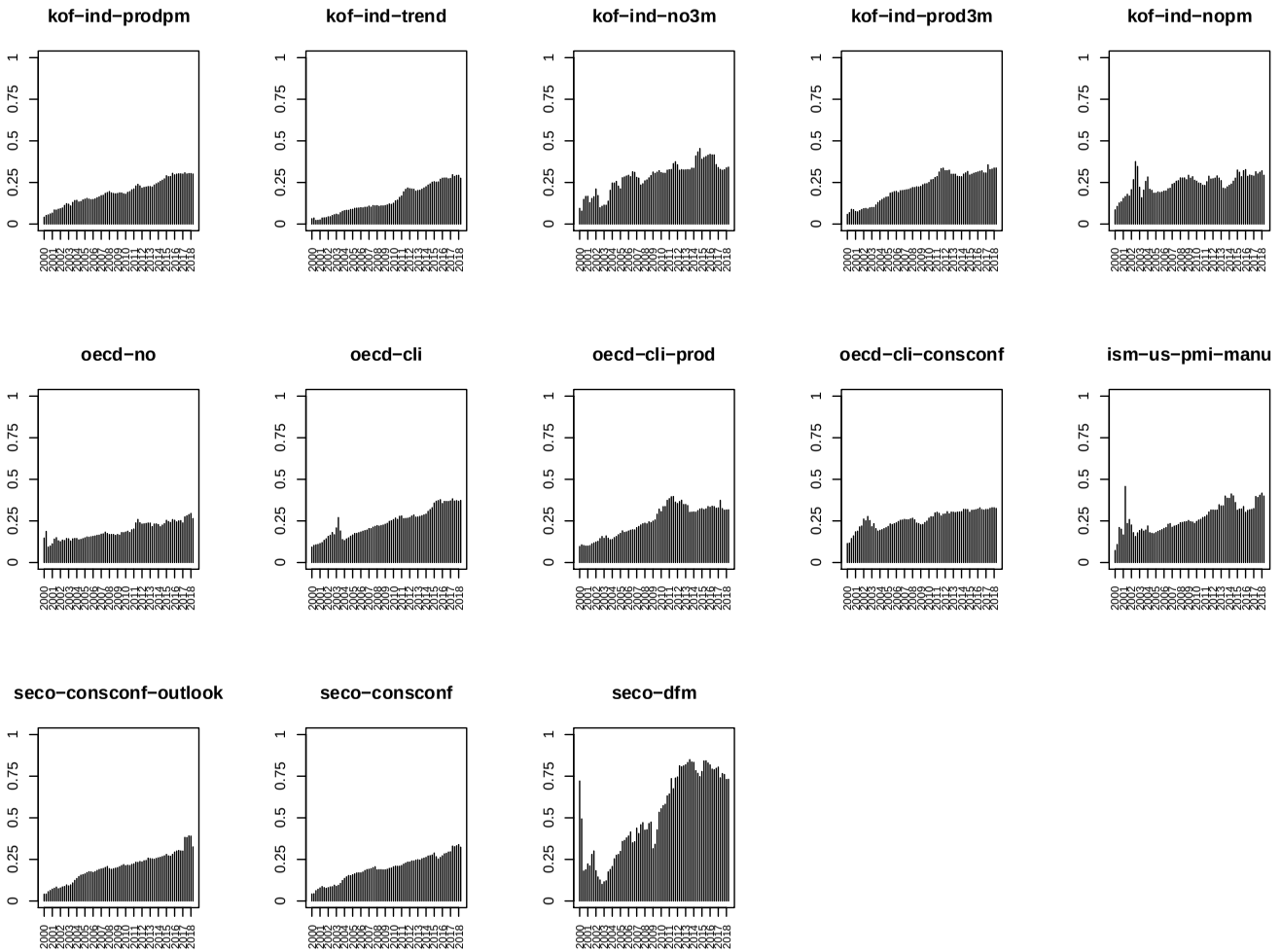


Figure 27: VA-Tert (q-q)



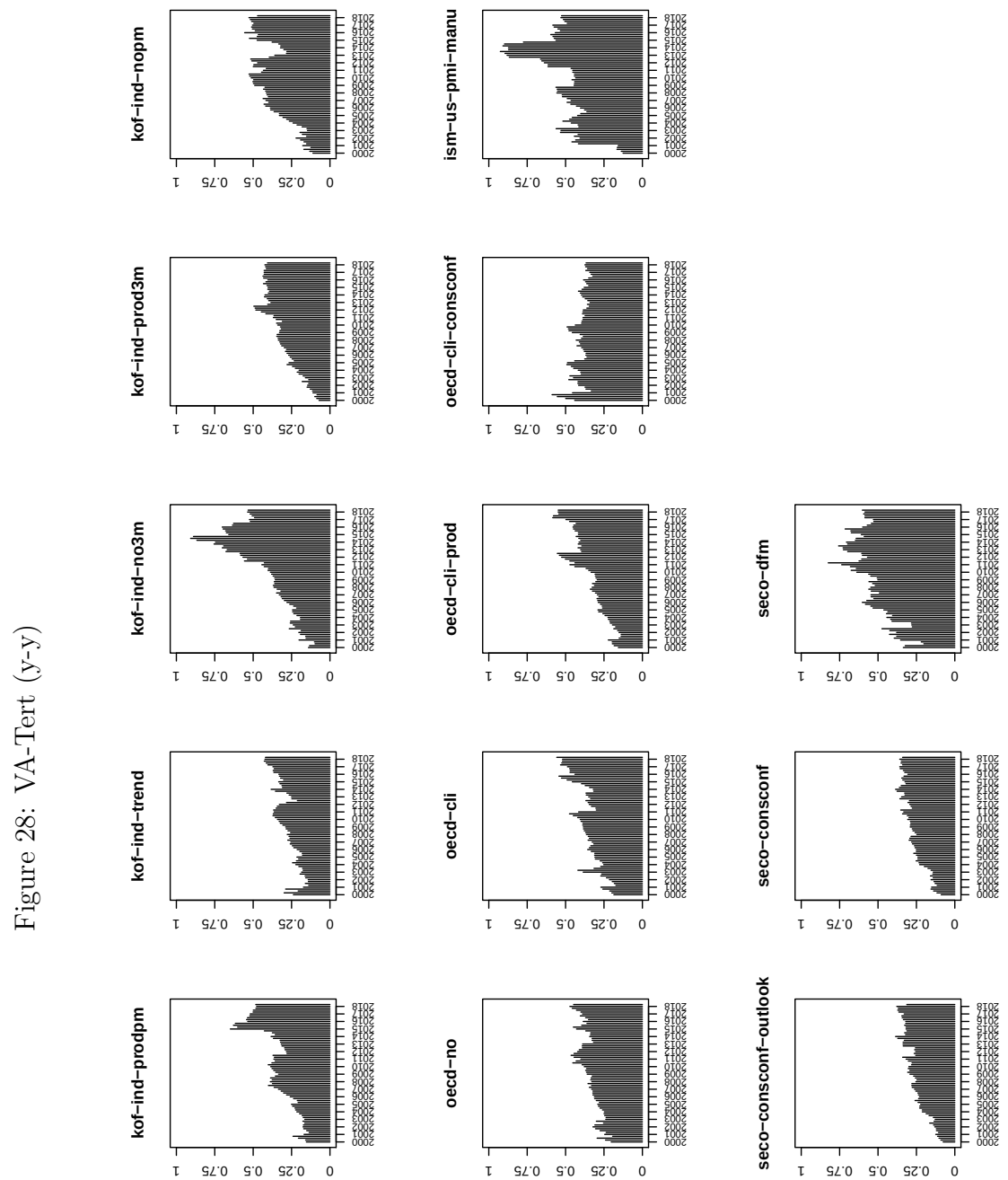


Figure 28: VA-Tert (y-y)

Figure 29: VA-Priv (q-q)

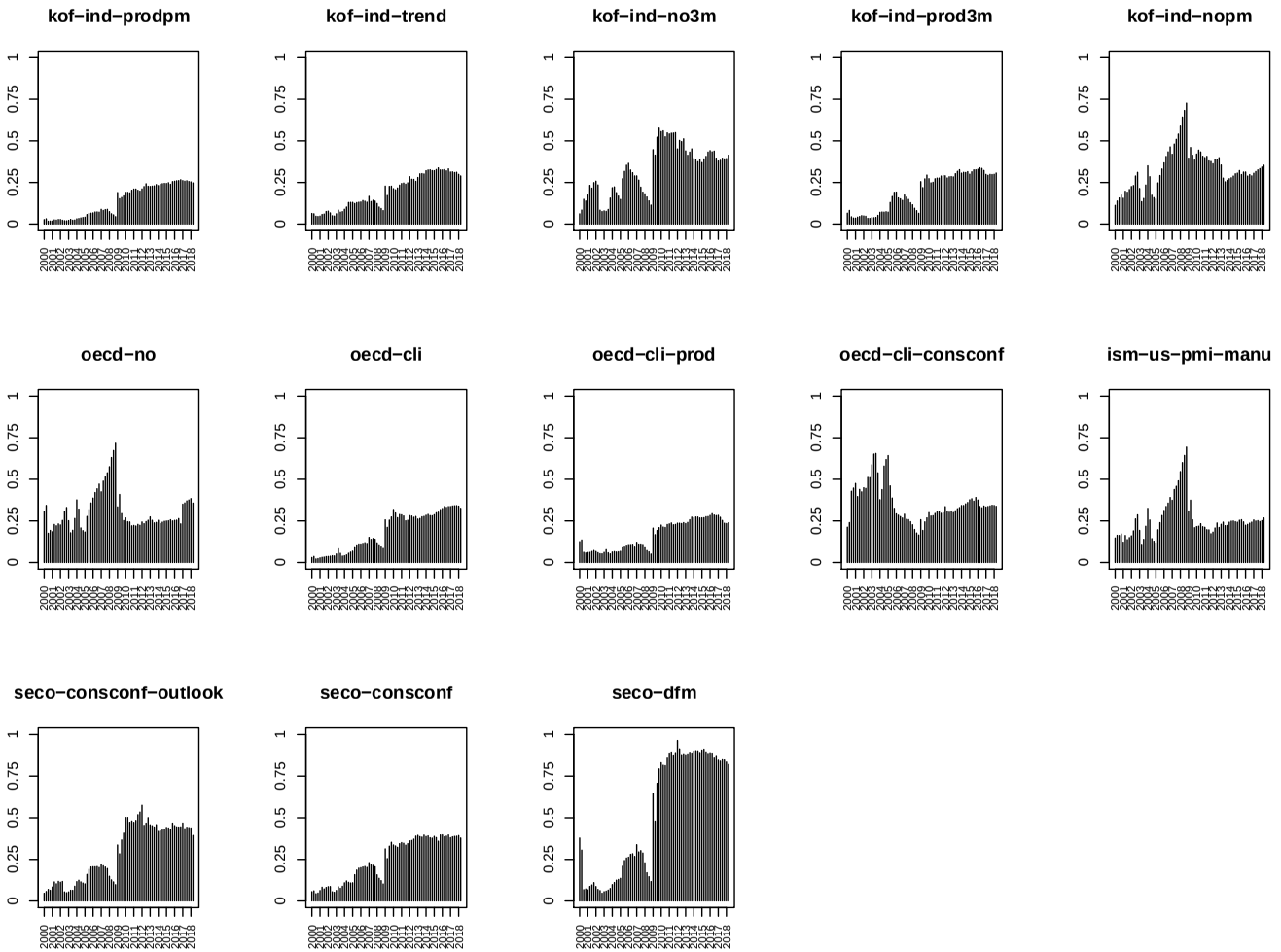
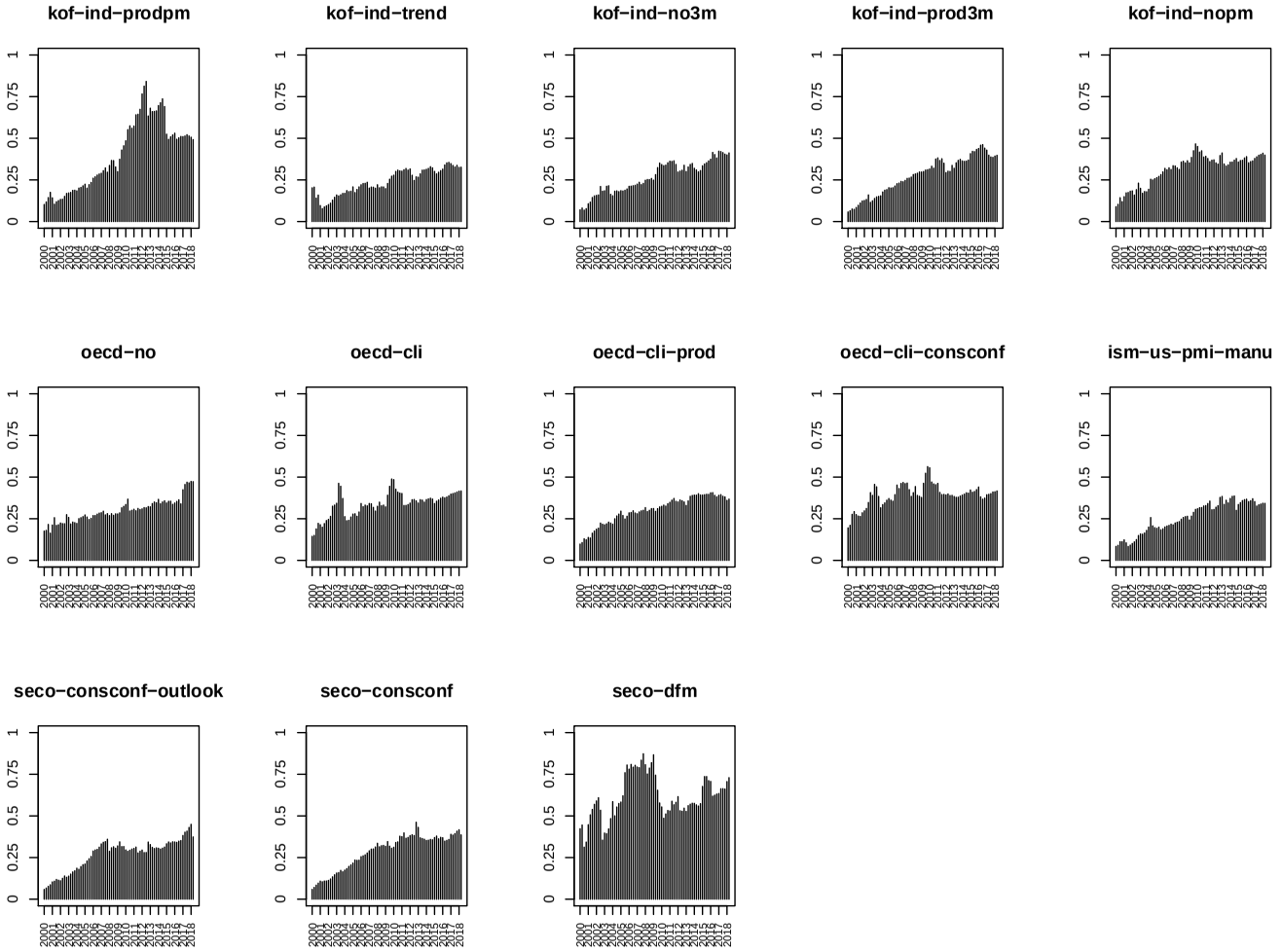


Figure 30: VA-Priv (y-y)



I Tables: MIDAS analysis–Whole sample

Table 23: RMSE of MIDAS Q-Q (nowcast)

	gdp	gdp-nosports	va-manu	va-indu	va-second	va-serv-priv	va-tert	va-priv
snb-bci	0.014	0.013	0.06	0.057	0.042	0.017	0.014	0.015
seco-dfm	0.013	0.013	0.06	0.058	0.041	0.017	0.014	0.014
kof-econ-bar	0.013	0.013	0.059	0.057	0.041	0.017	0.014	0.014
kof-ind-nopm	0.015	0.014	0.06	0.057	0.042	0.017	0.014	0.015
kof-ind-prodpm	0.014	0.013	0.059	0.056	0.041	0.017	0.014	0.015
kof-ind-trend	0.014	0.013	0.059	0.057	0.042	0.018	0.015	0.015
kof-ind-no3m	0.014	0.012	0.06	0.057	0.042	0.017	0.014	0.015
kof-ind-prod3m	0.013	0.012	0.059	0.057	0.042	0.017	0.014	0.015
cs-ind-pmi	0.014	0.013	0.058	0.055	0.04	0.018	0.014	0.015
cs-ind-pmi-prod	0.014	0.013	0.059	0.056	0.041	0.018	0.014	0.016
cs-ind-pmi-bo	0.013	0.012	0.058	0.055	0.041	0.017	0.014	0.015
oecd-no	0.013	0.013	0.06	0.057	0.042	0.017	0.014	0.015
oecd-cli	0.013	0.012	0.059	0.056	0.041	0.018	0.015	0.015
oecd-cli-prod	0.014	0.013	0.059	0.057	0.041	0.018	0.015	0.015
oecd-cli-consconf	0.013	0.012	0.059	0.056	0.042	0.018	0.014	0.014
ism-us-pmi-manu	0.015	0.014	0.06	0.057	0.042	0.017	0.014	0.016
ifo-de-climate	0.014	0.014	0.058	0.055	0.04	0.018	0.014	0.016
ifo-de-manu-sit	0.014	0.013	0.057	0.054	0.04	0.018	0.014	0.015
ec-ea-sent	0.014	0.014	0.059	0.057	0.042	0.019	0.016	0.016
ec-ea-ind-conf	0.014	0.013	0.059	0.056	0.041	0.018	0.015	0.015
ec-eu-sent	0.015	0.014	0.058	0.057	0.042	0.019	0.016	0.016

Table 24: RMSE of MIDAS Q-Q (one quarter ahead)

	gdp	gdp-nosports	va-manu	va-indu	va-second	va-serv-priv	va-tert	va-priv
snb-bci	0.024	0.022	0.106	0.101	0.074	0.03	0.025	0.026
seco-dfm	0.022	0.022	0.104	0.1	0.073	0.03	0.024	0.025
kof-econ-bar	0.023	0.022	0.103	0.099	0.072	0.031	0.025	0.025
kof-ind-nopm	0.025	0.024	0.107	0.101	0.075	0.03	0.025	0.026
kof-ind-prodpm	0.024	0.022	0.106	0.1	0.074	0.03	0.025	0.026
kof-ind-trend	0.024	0.023	0.106	0.102	0.075	0.031	0.026	0.027
kof-ind-no3m	0.024	0.021	0.106	0.1	0.074	0.03	0.024	0.025
kof-ind-prod3m	0.023	0.022	0.106	0.1	0.074	0.03	0.024	0.026
cs-ind-pmi	0.024	0.022	0.104	0.097	0.072	0.031	0.025	0.026
cs-ind-pmi-prod	0.025	0.023	0.105	0.098	0.073	0.031	0.025	0.028
cs-ind-pmi-bo	0.023	0.022	0.103	0.097	0.072	0.03	0.024	0.025
oecd-no	0.023	0.022	0.107	0.102	0.075	0.029	0.024	0.026
oecd-cli	0.023	0.022	0.106	0.1	0.074	0.031	0.026	0.027
oecd-cli-prod	0.024	0.023	0.105	0.101	0.074	0.032	0.026	0.027
oecd-cli-consconf	0.023	0.021	0.105	0.1	0.074	0.031	0.025	0.025
ism-us-pmi-manu	0.026	0.024	0.107	0.102	0.076	0.03	0.025	0.027
ifo-de-climate	0.024	0.023	0.103	0.098	0.072	0.031	0.025	0.027
ifo-de-manu-sit	0.024	0.023	0.101	0.095	0.071	0.031	0.025	0.026
ec-ea-sent	0.025	0.024	0.106	0.101	0.075	0.033	0.027	0.027
ec-ea-ind-conf	0.025	0.023	0.105	0.1	0.073	0.032	0.026	0.026
ec-eu-sent	0.026	0.024	0.104	0.101	0.074	0.034	0.027	0.028

Table 25: RMSE of MIDAS Y-Y (nowcast)

	gdp	gdp-nosports	va-manu	va-indu	va-second	va-serv-priv	va-tert	va-priv
snb-bci	0.023	0.023	0.109	0.101	0.067	0.037	0.032	0.025
seco-dfm	0.024	0.024	0.106	0.106	0.069	0.037	0.031	0.023
kof-econ-bar	0.022	0.025	0.102	0.106	0.072	0.036	0.031	0.026
kof-ind-nopm	0.041	0.043	0.106	0.096	0.07	0.048	0.041	0.04
kof-ind-prodpm	0.036	0.035	0.097	0.085	0.06	0.045	0.04	0.033
kof-ind-trend	0.034	0.032	0.086	0.075	0.052	0.048	0.042	0.032
kof-ind-no3m	0.029	0.031	0.122	0.12	0.087	0.032	0.028	0.032
kof-ind-prod3m	0.022	0.023	0.112	0.108	0.076	0.031	0.028	0.023
cs-ind-pmi	0.029	0.028	0.084	0.078	0.055	0.043	0.036	0.033
cs-ind-pmi-prod	0.028	0.028	0.092	0.089	0.062	0.042	0.034	0.033
cs-ind-pmi-bo	0.031	0.03	0.097	0.095	0.067	0.043	0.035	0.036
oecd-no	0.024	0.028	0.112	0.11	0.076	0.032	0.029	0.024
oecd-cli	0.019	0.018	0.109	0.099	0.067	0.034	0.03	0.02
oecd-cli-prod	0.023	0.024	0.119	0.116	0.083	0.03	0.027	0.022
oecd-cli-consconf	0.018	0.015	0.099	0.094	0.066	0.034	0.031	0.018
ism-us-pmi-manu	0.032	0.028	0.113	0.114	0.077	0.037	0.032	0.032
ifo-de-climate	0.047	0.048	0.17	0.178	0.13	0.046	0.035	0.064
ifo-de-manu-sit	0.041	0.041	0.14	0.138	0.098	0.045	0.035	0.052
ec-ea-sent	0.04	0.04	0.083	0.09	0.061	0.058	0.048	0.044
ec-ea-ind-conf	0.036	0.035	0.101	0.103	0.07	0.048	0.039	0.039
ec-eu-sent	0.044	0.044	0.091	0.1	0.069	0.057	0.047	0.047

Table 26: RMSE of MIDAS Y-Y (one quarter ahead)

	gdp	gdp-nosports	va-manu	va-indu	va-second	va-serv-priv	va-tert	va-priv
snb-bci	0.041	0.042	0.19	0.177	0.119	0.064	0.055	0.045
seco-dfm	0.040	0.041	0.189	0.18	0.14	0.064	0.054	0.04
kof-econ-bar	0.039	0.044	0.178	0.185	0.126	0.062	0.054	0.046
kof-ind-nopm	0.072	0.075	0.183	0.167	0.123	0.082	0.071	0.069
kof-ind-prodpm	0.062	0.061	0.167	0.147	0.104	0.078	0.069	0.057
kof-ind-trend	0.059	0.055	0.148	0.13	0.089	0.083	0.072	0.057
kof-ind-no3m	0.051	0.054	0.213	0.21	0.154	0.055	0.049	0.056
kof-ind-prod3m	0.038	0.039	0.194	0.188	0.132	0.053	0.048	0.04
cs-ind-pmi	0.05	0.048	0.145	0.136	0.096	0.075	0.063	0.058
cs-ind-pmi-prod	0.048	0.049	0.159	0.154	0.107	0.074	0.059	0.058
cs-ind-pmi-bo	0.054	0.053	0.168	0.165	0.116	0.074	0.061	0.063
oecd-no	0.042	0.048	0.195	0.192	0.133	0.056	0.051	0.041
oecd-cli	0.033	0.032	0.188	0.172	0.117	0.06	0.052	0.035
oecd-cli-prod	0.04	0.041	0.206	0.202	0.144	0.051	0.048	0.038
oecd-cli-consconf	0.032	0.026	0.172	0.163	0.116	0.06	0.054	0.032
ism-us-pmi-manu	0.057	0.05	0.196	0.197	0.133	0.066	0.056	0.057
ifo-de-climate	0.083	0.084	0.295	0.308	0.225	0.084	0.062	0.112
ifo-de-manu-sit	0.074	0.073	0.244	0.24	0.169	0.082	0.062	0.092
ec-ea-sent	0.07	0.069	0.143	0.155	0.106	0.1	0.082	0.077
ec-ea-ind-conf	0.062	0.062	0.174	0.178	0.121	0.084	0.068	0.068
ec-eu-sent	0.075	0.075	0.157	0.172	0.119	0.099	0.081	0.081

J Tables: MIDAS analysis–Pre-crisis sample

Table 27: RMSE of MIDAS Q-Q (nowcast)

	gdp	gdp-nosports	va-manu	va-indu	va-second	va-serv-priv	va-tert	va-priv
snb-bci	0.022	0.022	0.05	0.047	0.04	0.028	0.021	0.026
seco-dfm	0.020	0.021	0.05	0.047	0.04	0.031	0.022	0.025
kof-econ-bar	0.024	0.024	0.052	0.051	0.042	0.029	0.022	0.029
kof-ind-nopm	0.021	0.021	0.049	0.046	0.038	0.028	0.02	0.026
kof-ind-prodpm	0.024	0.024	0.047	0.047	0.039	0.033	0.024	0.03
kof-ind-trend	0.026	0.026	0.046	0.044	0.036	0.037	0.027	0.032
kof-ind-no3m	0.022	0.022	0.052	0.05	0.041	0.029	0.021	0.028
kof-ind-prod3m	0.025	0.025	0.051	0.05	0.041	0.033	0.024	0.031
cs-ind-pmi	0.025	0.025	0.049	0.047	0.041	0.03	0.024	0.031
cs-ind-pmi-prod	0.026	0.026	0.053	0.049	0.043	0.033	0.024	0.032
cs-ind-pmi-bo	0.022	0.022	0.05	0.047	0.041	0.031	0.022	0.028
oecd-no	0.024	0.024	0.05	0.049	0.041	0.03	0.022	0.029
oecd-cli	0.025	0.025	0.052	0.051	0.043	0.03	0.022	0.03
oecd-cli-prod	0.025	0.025	0.053	0.051	0.043	0.03	0.022	0.031
oecd-cli-consconf	0.024	0.024	0.051	0.051	0.043	0.029	0.022	0.03
ism-us-pmi-manu	0.025	0.025	0.053	0.051	0.043	0.032	0.024	0.03
ifo-de-climate	0.025	0.025	0.049	0.046	0.039	0.033	0.023	0.031
ifo-de-manu-sit	0.024	0.024	0.049	0.046	0.038	0.033	0.024	0.03
ec-ea-sent	0.025	0.025	0.052	0.051	0.044	0.027	0.02	0.03
ec-ea-ind-conf	0.025	0.025	0.051	0.049	0.041	0.031	0.023	0.031
ec-eu-sent	0.025	0.025	0.052	0.051	0.043	0.027	0.02	0.031

Table 28: RMSE of MIDAS Q-Q (one quarter ahead)

	gdp	gdp-nosports	va-manu	va-indu	va-second	va-serv-priv	va-tert	va-priv
snb-bci	0.038	0.038	0.081	0.075	0.067	0.046	0.036	0.045
seco-dfm	0.037	0.038	0.080	0.073	0.067	0.053	0.037	0.043
kof-econ-bar	0.042	0.042	0.084	0.081	0.07	0.05	0.038	0.051
kof-ind-nopm	0.038	0.038	0.08	0.074	0.063	0.049	0.036	0.046
kof-ind-prodpm	0.043	0.043	0.078	0.075	0.065	0.059	0.043	0.053
kof-ind-trend	0.046	0.046	0.077	0.072	0.061	0.065	0.047	0.057
kof-ind-no3m	0.04	0.04	0.084	0.08	0.068	0.05	0.036	0.049
kof-ind-prod3m	0.044	0.044	0.084	0.081	0.069	0.058	0.042	0.054
cs-ind-pmi	0.044	0.044	0.081	0.077	0.069	0.051	0.041	0.054
cs-ind-pmi-prod	0.045	0.045	0.088	0.078	0.072	0.056	0.041	0.056
cs-ind-pmi-bo	0.039	0.039	0.082	0.077	0.068	0.051	0.037	0.048
oecd-no	0.042	0.042	0.082	0.08	0.069	0.053	0.038	0.051
oecd-cli	0.044	0.044	0.084	0.082	0.071	0.053	0.039	0.054
oecd-cli-prod	0.044	0.044	0.085	0.083	0.073	0.053	0.039	0.054
oecd-cli-consconf	0.044	0.044	0.084	0.082	0.072	0.052	0.039	0.054
ism-us-pmi-manu	0.045	0.045	0.085	0.081	0.071	0.056	0.043	0.053
ifo-de-climate	0.043	0.043	0.082	0.075	0.066	0.056	0.04	0.053
ifo-de-manu-sit	0.042	0.042	0.081	0.076	0.065	0.058	0.043	0.053
ec-ea-sent	0.044	0.043	0.084	0.082	0.073	0.048	0.036	0.053
ec-ea-ind-conf	0.045	0.045	0.083	0.08	0.069	0.056	0.041	0.056
ec-eu-sent	0.044	0.044	0.084	0.081	0.072	0.05	0.037	0.054

Table 29: RMSE of MIDAS Y-Y (nowcast)

	gdp	gdp-nosports	va-manu	va-indu	va-second	va-serv-priv	va-tert	va-priv
snb-bci	0.036	0.035	0.104	0.106	0.095	0.043	0.031	0.048
seco-dfm	0.042	0.042	0.098	0.099	0.088	0.059	0.042	0.055
kof-econ-bar	0.068	0.067	0.135	0.146	0.125	0.073	0.052	0.086
kof-ind-nopm	0.046	0.046	0.117	0.121	0.099	0.053	0.039	0.057
kof-ind-prodpm	0.045	0.045	0.102	0.102	0.084	0.061	0.042	0.058
kof-ind-trend	0.054	0.054	0.104	0.103	0.087	0.079	0.051	0.068
kof-ind-no3m	0.056	0.056	0.124	0.133	0.112	0.062	0.045	0.069
kof-ind-prod3m	0.052	0.052	0.113	0.117	0.099	0.066	0.045	0.066
cs-ind-pmi	0.054	0.054	0.108	0.112	0.101	0.071	0.051	0.068
cs-ind-pmi-prod	0.059	0.059	0.106	0.113	0.106	0.079	0.059	0.073
cs-ind-pmi-bo	0.05	0.05	0.103	0.108	0.101	0.068	0.05	0.063
oecd-no	0.053	0.053	0.122	0.13	0.111	0.06	0.042	0.069
oecd-cli	0.062	0.062	0.114	0.121	0.109	0.078	0.056	0.08
oecd-cli-prod	0.06	0.059	0.119	0.126	0.11	0.073	0.051	0.077
oecd-cli-consconf	0.065	0.065	0.129	0.137	0.117	0.08	0.054	0.085
ism-us-pmi-manu	0.081	0.08	0.14	0.149	0.125	0.1	0.074	0.097
ifo-de-climate	0.055	0.055	0.102	0.105	0.095	0.073	0.055	0.069
ifo-de-manu-sit	0.06	0.06	0.108	0.11	0.095	0.084	0.056	0.076
ec-ea-sent	0.075	0.075	0.131	0.141	0.124	0.091	0.065	0.096
ec-ea-ind-conf	0.063	0.063	0.119	0.126	0.107	0.079	0.055	0.081
ec-eu-sent	0.073	0.073	0.129	0.138	0.121	0.088	0.063	0.092

Table 30: RMSE of MIDAS Y-Y (one quarter ahead)

	gdp	gdp-nosports	va-manu	va-indu	va-second	va-serv-priv	va-tert	va-priv
snb-bci	0.061	0.061	0.172	0.173	0.154	0.068	0.051	0.083
seco-dfm	0.072	0.072	0.164	0.165	0.146	0.093	0.067	0.081
kof-econ-bar	0.115	0.115	0.221	0.237	0.202	0.129	0.094	0.147
kof-ind-nopm	0.081	0.081	0.193	0.197	0.159	0.094	0.07	0.101
kof-ind-prodpm	0.08	0.079	0.171	0.169	0.136	0.103	0.073	0.101
kof-ind-trend	0.093	0.093	0.178	0.174	0.146	0.133	0.085	0.116
kof-ind-no3m	0.098	0.098	0.206	0.217	0.18	0.112	0.081	0.121
kof-ind-prod3m	0.092	0.092	0.19	0.195	0.163	0.116	0.08	0.117
cs-ind-pmi	0.092	0.092	0.183	0.188	0.168	0.115	0.084	0.117
cs-ind-pmi-prod	0.103	0.102	0.176	0.185	0.172	0.133	0.1	0.126
cs-ind-pmi-bo	0.085	0.084	0.175	0.182	0.167	0.106	0.079	0.106
oecd-no	0.093	0.092	0.201	0.211	0.178	0.107	0.075	0.12
oecd-cli	0.108	0.108	0.191	0.201	0.18	0.133	0.096	0.138
oecd-cli-prod	0.104	0.104	0.2	0.21	0.182	0.125	0.088	0.133
oecd-cli-consconf	0.113	0.113	0.214	0.226	0.19	0.14	0.096	0.147
ism-us-pmi-manu	0.14	0.139	0.233	0.245	0.203	0.176	0.13	0.168
ifo-de-climate	0.095	0.094	0.172	0.176	0.159	0.118	0.089	0.118
ifo-de-manu-sit	0.102	0.102	0.184	0.188	0.162	0.141	0.092	0.129
ec-ea-sent	0.13	0.13	0.218	0.233	0.203	0.157	0.113	0.165
ec-ea-ind-conf	0.11	0.11	0.202	0.211	0.177	0.136	0.095	0.141
ec-eu-sent	0.125	0.125	0.214	0.227	0.198	0.152	0.108	0.159

Table 31: Business cycle indicators

Acronym	Series	Mbnd-Label	Frequency	Starting date	Source	Release
cfo-econ-outlook	Switzerland, Business Surveys, CFO Survey, Economic Outlook for Switzerland Over the Next 12 Months, Net	chsurv1540	quarterly (semi annual)	Q3:2009	Deloitte	
seco-consconf-outlook	Switzerland, Consumer Surveys, Consumer Confidence, General Economic Situation Outlook, Index	chsurv0003	quarterly	Q4:1972	SECO	Mid of quarter (t)
seco-consconf	Switzerland, Consumer Surveys, Consumer Confidence, Total, Index	chsurv0100	quarterly	Q4:1972	SECO	Mid of quarter (t)
ifo-expect-world-gdp	Switzerland, Economic Situation Surveys, World Economic Climate, Expected Growth of Real GDP in the Current Year	chifo_gdpnchei	annual	Q1:1990	ifo	
ifo-expect-world-sit	Switzerland, Economic Situation Surveys, World Economic Climate, Economic Situation in the Next 6 Months, Overall Economy	chifo_gsofchei	quarterly	Q1:1989	ifo	Mid of quarter (t)
kof-caputil	Switzerland, Capacity Utilization, Industry, Total, SA	chprod0090	quarterly	Q2:1967	KOF	Mid of quarter (t)
snb-bci	Switzerland, Business Cycle Inde, standardised		monthly	M1:1990	SNB	End of month (t-2)
kn-bci	Switzerland, Business Cycle Index		monthly	M1:2005	KN	
seco-dfm	Switzerland, Composite leading indicator		monthly	M1:1980	SECO	
snb-foreign-pmi	Switzerland, Manufacturing PMI abroad (exportweighted)		monthly	M10:1997	SNB	
sentix-econ-expect	Switzerland, Economic Sentiment Surveys, Economic Indices, Headline Index (Expectations)	sntechh6	monthly	M1:2009	Sentix	Beginn of month (t)
sentix-econ-sit	Switzerland, Economic Sentiment Surveys, Economic Indices, Headline Index (Current Situation)	sntechh0	monthly	M1:2009	Sentix	Beginn of month (t)

Table 31: Business cycle indicators

Acronym	Series	Mbnd-Label	Frequency	Starting date	Source	Release
sentix-econ	Switzerland, Economic Sentiment Surveys, Economic Indices, Overall Index	sntechgx	monthly	M1:2009	Sentix	Beginn of month (t)
cs-econ-sit	Switzerland, Economic Sentiment Surveys, Current Economic Situation, Balance	chsurv0012	monthly	M6:2006	CS & CFA	End of month (t)
cs-econ-expect	Switzerland, Economic Sentiment Surveys, Economic Expectations, Balance	chsurv0013	monthly	M6:2006	CS & CFA	End of month (t)
kof-econ-bar	Switzerland, Business Surveys, Economic Barometer, Total	chsurv0042	monthly	M1:1991	KOF	End of month (t)
kof-privsec-sit	Switzerland, Business Surveys, Business Situation, Private Sector (Overall), SA	chsurv1451	monthly	M4:2009	KOF	Beginn of month (t-1)
kof-ind-nopm	Switzerland, Business Surveys, Industry, Total, New Orders, Compared to Previous Month, Balance, SA	chsurv0055	monthly	M11:1966	KOF	Beginn of month (t-1)
kof-ind-prodpm	Switzerland, Business Surveys, Industry, Total, Production, Compared to Previous Month, Balance, SA	chsurv0063	monthly	M11:1966	KOF	Beginn of month (t-1)
kof-manu-sit	Switzerland, Business Surveys, Business Situation, Manufacturing, SA	chsurv1454	monthly	M1:2004	KOF	Beginn of month (t-1)
kof-ind-trend	Switzerland, Business Surveys, Industry, Total, Business Trend Indicator, SA	chsurv0056	monthly	M9:1955	KOF	Beginn of month (t-1)
kof-ind-no3m	Switzerland, Business Surveys, Industry, Total, Expected New Orders, Next 3 Months, Balance, SA	chsurv0054	monthly	M2:1967	KOF	Beginn of month (t-1)
kof-ind-prod3m	Switzerland, Business Surveys, Industry, Total, Expected Production, Next 3 Months, Balance, SA	chsurv0061	monthly	M2:1967	KOF	Beginn of month (t-1)
cs-ind-pmi	Switzerland, Business Surveys, Purchasing Managers' Index, Total, SA, Index	chsurv0030	monthly	M1:1995	CS & Procure	Beginn of month (t-1)

Table 31: Business cycle indicators

Acronym	Series	Mbnd-Label	Frequency	Starting date	Source	Release
cs-ind-pmi-prod	Switzerland, Business Surveys, Purchasing Managers' Index, Output, SA, Index	chsurv0031	monthly	M1:1995	CS & Procure	Beginn of month (t-1)
cs-ind-pmi-bo	Switzerland, Business Surveys, Purchasing Managers' Index, Backlog of Orders, SA, Index	chsurv0032	monthly	M1:1995	CS & Procure	Beginn of month (t-1)
cs-serv-pmi	Switzerland, Business Surveys, Service Purchasing Managers Index, Total, SA, Index	chsurv1444	monthly	M1:2014	CS & Procure	Beginn of month (t-1)
oecd-no	Switzerland, Leading Indicators, Component Series, BTS - Demand or Orders Inflow, Normalised, SA, Index	oecd_mei_00434193	monthly	M11:1966	OECD	Mid of month (t+1)
oecd-cli	Switzerland, Leading Indicators, Leading Indicators, Composite Leading Indicators, Normalised, SA, Index	oecd_mei_00434205	monthly	M1:1967	OECD	Mid of month (t-2)
oecd-cli-prod	Switzerland, Leading Indicators, Component Series, BTS - Production, Normalised, SA, Index	oecd_mei_00434196	monthly	M10:1965	OECD	Mid of month (t+1)
oecd-cli-consconf	Switzerland, Leading Indicators, Component Series, CS - Confidence Indicator, Normalised, SA, Index	oecd_mei_00434198	monthly	M11:1972	OECD	Mid of month (t-1)
ism-us-pmi-serv	United States, Business Surveys, Non-Manufacturing, Purchasing Managers' Index, SA	ussurv1044	monthly	M7:1997	ISM	Beginn of month (t-1)
ism-us-pmi-manu	United States, Business Surveys, Manufacturing, Purchasing Managers' Index, SA	ussurv1055	monthly	M1:1948	ISM	Beginn of month (t-1)
ifo-de-climate	Germany, Business Surveys, Trade & Industry, Business Climate, SA, Index	desurv0001	monthly	M1:1991	ifo	End of month (t)
ifo-de-manu-sit	Germany, Business Surveys, Manufacturing Industry, Total, Business Situation, Balance, SA, Index	desurv1009	monthly	M1:1991	ifo	End of month (t)

Table 31: Business cycle indicators

Acronym	Series	Mbnd-Label	Frequency	Starting date	Source	Release
ifo-de-manu-bo	Germany, Business Surveys, Manufacturing Industry, Total, Orders on Hand Compared to the Previous Month, Balance, SA	desurv1132	monthly	M1:1991	ifo	End of month (t)
ec-ea-sent	Euro Area, Economic Sentiment Surveys, Total, Balance, SA	euecfin0001	monthly	M1:1985	EC	End of month (t)
ec-ea-ind-conf	Euro Area, Business Surveys, Industrial Confidence Indicator, Total Sector, Monthly, Balance, SA	euecfin0002	monthly	M1:1985	EC	End of month (t)
ec-ea-serv-conf	Euro Area, Service Surveys, Services Confidence Indicator, Total Service Sector, Balance, SA	euecfin0020	monthly	M1:1996	EC	End of month (t)
ec-eu-sent	EU, Economic Sentiment Surveys, Total, Balance, SA	eueuecfin0001	monthly	M1:1985	EC	End of month (t)
ec-at-manu-prodsit	Austria, Business Surveys, Industrial Confidence Indicator, Total Sector, Monthly, Production Trend Observed in Recent Months, Balance, SA	atecfin0003	monthly	M1:1985	EC	End of month (t)
ec-at-manu-prodexp	Austria, Business Surveys, Industrial Confidence Indicator, Total Sector, Monthly, Production Expectations for the Months Ahead, Balance, SA	atecfin0007	monthly	M1:1985	EC	End of month (t)
ec-at-serv-sit	Austria, Service Surveys, Services Confidence Indicator, Total Service Sector, Business Situation Development over the Past 3 Months, Balance, SA	atecfin0021	monthly	M10:1996	EC	End of month (t)
ec-at-serv-dem3m	Austria, Service Surveys, Services Confidence Indicator, Total Service Sector, Expectation of the Demand over the Next 3 Months, Balance, SA	atecfin0023	monthly	M10:1996	EC	End of month (t)

Table 31: Business cycle indicators

Acronym	Series	Mbnd-Label	Frequency	Starting date	Source	Release

Notes: CFA ... CFA Society Switzerland, CS ... Credit Suisse, EC ... European Commission (DG ECFIN), ifo ... Institute for Economic Research, ISM ... Institute for Supply Management, KN ... Kuehne+Nagel, KOF ... Swiss Economic Institute, OECD ... Organisation for Economic Co-operation & Development, SECO ... Swiss State Secretariat for Economic Affairs, SNB ... Swiss National Bank