Discussion for New Monthly Estimation Approach for Nowcasting GDP Growth: The Case of Japan
by Naoko Hara and Shotaro Yamane

Yohei Yamamoto
Hitotsubashi University

November 13, 2014
7th Annual ESRI-CEPREMAP Joint Workshop 2014
**Introduction**

- The GDP growth is used to draw inference on the current state of the economy. The problems are:
Introduction

- The GDP growth is used to draw inference on the current state of the economy. The problems are:

1. The data is available only at a low frequency (available on quarterly)
Introduction

- The GDP growth is used to draw inference on the current state of the economy. The problems are:

1. The data is available only at a low frequency (available on quarterly)
2. The data is released with considerable delay
Introduction

- The GDP growth is used to draw inference on the current state of the economy. The problems are:

  1. The data is available only at a low frequency (available on quarterly)
  2. The data is released with considerable delay

- This paper provides a model augmented by principal components from a large macroeconomic data set to nowcast the GDP growth. It estimates:
Introduction

- The GDP growth is used to draw inference on the current state of the economy. The problems are:

  1. The data is available only at a low frequency (available on quarterly)
  2. The data is released with considerable delay

- This paper provides a model augmented by principal components from a large macroeconomic data set to nowcast the GDP growth. It estimates

  1. monthly GDP growth
Introduction

- The GDP growth is used to draw inference on the current state of the economy. The problems are:

1. The data is available only at a low frequency (available on quarterly)
2. The data is released with considerable delay

- This paper provides a model augmented by principal components from a large macroeconomic data set to nowcast the GDP growth. It estimates

1. monthly GDP growth
2. yet unavailable GDP growth
Introduction

- The GDP growth is used to draw inference on the current state of the economy. The problems are:

  1. The data is available only at a low frequency (available on quarterly)
  2. The data is released with considerable delay

- This paper provides a model augmented by principal components from a large macroeconomic data set to nowcast the GDP growth. It estimates

  1. monthly GDP growth
  2. yet unavailable GDP growth

- The model has two components: 1) IIP & ITA and 2) principal components of 473 variables
Methodology

1. Regress 473 monthly data (mostly the source data of GDP) on $IIP$ & $ITA$ to get residuals

$$\left\{ \hat{\varepsilon}_{1m}, \ldots, \hat{\varepsilon}_{473m} \right\}$$
Methodology

1. Regress 473 monthly data (mostly the source data of GDP) on IIP & ITA to get residuals

\[ \{ \hat{\varepsilon}_{1m}, \ldots, \hat{\varepsilon}_{473m} \} \]

2. Classify the series into five categories: i) consumption (c), ii) investment (i), iii) international trade (x), iv) other demand side (o), and v) supply side (s)
Methodology

1. Regress 473 monthly data (mostly the source data of GDP) on $IIP$ & $ITA$ to get residuals

$$\left\{ \hat{\epsilon}_{tm}^1, ..., \hat{\epsilon}_{tm}^{473} \right\}$$

2. Classify the series into five categories: i) consumption ($c$), ii) investment ($i$), iii) international trade ($x$), iv) other demand side ($o$), and v) supply side ($s$)

3. Estimate the following model by OLS using quarterly data

$$y_t = \beta_0 + \beta_1 d \log(IIP_t) + \beta_2 d \log(ITA_t) + \beta_3 p_t^c + \beta_4 p_t^i + \beta_5 p_t^x + \beta_6 p_t^o + \beta_7 p_t^s + \eta_t$$
Methodology

1. Regress 473 monthly data (mostly the source data of GDP) on $IIP$ & $ITA$ to get residuals

   $$\left\{ \hat{\epsilon}_{tm}^1, ..., \hat{\epsilon}_{tm}^{473} \right\}$$

2. Classify the series into five categories: i) consumption ($c$), ii) investment ($i$), iii) international trade ($x$), iv) other demand side ($o$), and v) supply side ($s$)

3. Estimate the following model by OLS using quarterly data

   $$y_t = \beta_0 + \beta_1 d \log(IIP_t) + \beta_2 d \log(ITA_t) + \beta_3 p_t^c + \beta_4 p_t^i + \beta_5 p_t^x + \beta_6 p_t^o + \beta_7 p_t^s + \eta_t$$

4. Produce monthly GDP growth (of the recent past) using the estimated coefficients $\hat{\beta}_0, ..., \hat{\beta}_7$
Results

• The model including principal components of the grouped data significantly improves in-sample fit ($adj.R^2$)
Results

- The model including principal components of the grouped data significantly improves in-sample fit ($adj. R^2$)
  - The authors consider 6 PCs from each group and pick the best combination of $(p^c_t, p^i_t, p^x_t, p^o_t, p^s_t)$
- The fit is better than the model using 5 PCs from all series (without grouping)
- Comparison with professional forecasts (ESP)
  - Two week before: The model provides RMSE as good as ESP (slightly worse)
  - Six week before: The model provides much better RMSE than ESP
Results

- The model including principal components of the grouped data significantly improves in-sample fit ($adj. R^2$)
  - The authors consider 6 PCs from each group and pick the best combination of $(p^c_t, p^i_t, p^x_t, p^o_t, p^s_t)$
- The fit is better than the model using 5 PCs from all series (without grouping)
Results

- The model including principal components of the grouped data significantly improves in-sample fit (adj. $R^2$)
  - The authors consider 6 PCs from each group and pick the best combination of ($p_t^c, p_t^i, p_t^x, p_t^o, p_t^s$)
- The fit is better than the model using 5 PCs from all series (without grouping)
- Fig 2 shows that the principal components have large contributions throughout the estimation period
Results

- The model including principal components of the grouped data significantly improves in-sample fit ($adj.R^2$)
  - The authors consider 6 PCs from each group and pick the best combination of $(p^c_t, p^i_t, p^x_t, p^o_t, p^s_t)$
- The fit is better than the model using 5 PCs from all series (without grouping)
- Fig 2 shows that the principal components have large contributions throughout the estimation period
- Comparison with professional forecasts (ESP)
Results

- The model including principal components of the grouped data significantly improves in-sample fit ($adj.R^2$)
  - The authors consider 6 PCs from each group and pick the best combination of ($p_t^c, p_t^i, p_t^x, p_t^o, p_t^s$)
- The fit is better than the model using 5 PCs from all series (without grouping)
- Fig 2 shows that the principal components have large contributions throughout the estimation period
- Comparison with professional forecasts (ESP)
  - Two week before: The model provides RMSE as good as ESP (slightly worse)
Results

- The model including principal components of the grouped data significantly improves in-sample fit ($adj. R^2$)
  - The authors consider 6 PCs from each group and pick the best combination of $(p_t^c, p_t^i, p_t^x, p_t^o, p_t^s)$
- The fit is better than the model using 5 PCs from all series (without grouping)
- Fig 2 shows that the principal components have large contributions throughout the estimation period
- Comparison with professional forecasts (ESP)
  - Two week before: The model provides RMSE as good as ESP (slightly worse)
  - Six week before: The model provides much better RMSE than ESP
• It is well-known that using principal components substantially reduces the model dimension and improves out-of-sample forecasts (nowcasts)
Comments 1

- It is well-known that using principal components substantially reduces the model dimension and improves out-of-sample forecasts (nowcasts).
- It is interesting to group the large set of macroeconomic data and extract principal components by groups.

- Which factors contribute more to GDP growth fluctuation, supply side or demand side? (Without this model, the GDP itself can be viewed as purely demand-side index or supply-side index.)
- Which factor contributes most (or least) in terms of monthly fluctuation?
- Which factor contributes most in financial crisis?
Comments 1

• It is well-known that using principal components substantially reduces the model dimension and improves out-of-sample forecasts (nowcasts)
• It is interesting to group the large set of macroeconomic data and extract principal components by groups
• This may provide some answers to the following interesting questions, say
• It is well-known that using principal components substantially reduces the model dimension and improves out-of-sample forecasts (nowcasts).

• It is interesting to group the large set of macroeconomic data and extract principal components by groups.

• This may provide some answers to the following interesting questions, say:

  • which factors contribute more to GDP growth fluctuation, supply side or demand side? (Without this model, the GDP itself can be viewed as purely demand-side index or supply-side index.)
Comments 1

- It is well-known that using principal components substantially reduces the model dimension and improves out-of-sample forecasts (nowcasts).
- It is interesting to group the large set of macroeconomic data and extract principal components by groups.
- This may provide some answers to the following interesting questions, say
  - which factors contribute more to GDP growth fluctuation, supply side or demand side? (Without this model, the GDP itself can be viewed as purely demand-side index or supply-side index.)
  - which factor contributes most (or least) in terms of monthly fluctuation?
It is well-known that using principal components substantially reduces the model dimension and improves out-of-sample forecasts (nowcasts).

It is interesting to group the large set of macroeconomic data and extract principal components by groups. This may provide some answers to the following interesting questions, say:

- which factors contribute more to GDP growth fluctuation, supply side or demand side? (Without this model, the GDP itself can be viewed as purely demand-side index or supply-side index.)
- which factor contributes most (or least) in terms of monthly fluctuation?
- which factor contributes most in financial crisis?
Comparison with the professional forecasts is interesting and could be further explored.
Comments 2

- Comparison with the professional forecasts is interesting and could be further explored.
- The authors may compare not only RMSEs but also biases of the forecasts. I guess some professional forecasts are highly subjective and suffer from bias, while the method in this paper is quantitative and should be less biased.
Comparison with the professional forecasts is interesting and could be further explored.

The authors may compare not only RMSEs but also biases of the forecasts. I guess some professional forecasts are highly subjective and suffer from bias, while the method in this paper is quantitative and should be less biased.

The model has a strong advantage in the crisis period (Fig 5b). I wonder why professional forecasters have huge forecasting errors when the economy sharply drops.
• Comparison with the professional forecasts is interesting and could be further explored
• The authors may compare not only RMSEs but also biases of the forecasts. I guess some professional forecasts are highly subjective and suffer from bias, while the method in this paper is quantitative and should be less biased
• The model has a strong advantage in the crisis period (Fig 5b). I wonder why professional forecasters have huge forecasting errors when the economy sharply drops
• The authors may consider a testing-based forecast comparison (Diebold-Mariano test) between the proposed model and ESP forecasts
Model selection

The selection of principal components is always an issue. The authors compare the model performance of PCs with grouping and of PCs without grouping.

With data grouping: select the best combination out of 6 PCs from each group (the best out of 6 $^5 \cdot 7,776$ models!)

The criterion is AIC but is equivalent to adjR$^2$ because the numbers of regressors are the same in any model.

Without data grouping: 5 PCs from all the data set. The comparison between these two methods based on adjR$^2$ may not be very fair.

Do the results change much, if you use the first PC from each group? This is statistically more sound.
Comments 3

- Model selection
- The selection of principal components is always an issue
Model selection

The selection of principal components is always an issue

The authors compare the model performance of PCs with grouping and of PCs without grouping

With data grouping: select the best combination out of 6 PCs from each group (the best out of 6^7, 776 models!)

The criterion is AIC but is equivalent to adjR^2 because the numbers of regressors are the same in any model

Without data grouping: 5 PCs from all the data set

The comparison between these two methods based on adjR^2 may not be very fair

Do the results change much, if you use the first PC from each group? This is statistically more sound.
Model selection

The selection of principal components is always an issue.

The authors compare the model performance of PCs with grouping and of PCs without grouping.

With data grouping: select the best combination out of 6 PCs from each group (the best out of $6^5 = 7,776$ models!)

Without data grouping: 5 PCs from all the data set.

The comparison between these two methods based on adjR^2 may not be very fair.

Do the results change much, if you use the first PC from each group? This is statistically more sound.
Comments 3

- Model selection
- The selection of principal components is always an issue
- The authors compare the model performance of PCs with grouping and of PCs without grouping
  - With data grouping: select the best combination out of 6 PCs from each groups (the best out of $6^5 = 7,776$ models!)
  - The criterion is AIC but is equivalent to $adjR^2$ because the numbers of regressors are the same in any model
Model selection
The selection of principal components is always an issue
The authors compare the model performance of PCs with grouping and of PCs without grouping
  - With data grouping: select the best combination out of 6 PCs from each group (the best out of $6^5 = 7,776$ models!)
  - The criterion is AIC but is equivalent to $adjR^2$ because the numbers of regressors are the same in any model
  - Without data grouping: 5 PCs from all the data set

The comparison between these two methods based on $adjR^2$ may not be very fair. Do the results change much, if you use the first PC from each group? This is statistically more sound.
Model selection
The selection of principal components is always an issue
The authors compare the model performance of PCs with grouping and of PCs without grouping
  • With data grouping: select the best combination out of 6 PCs from each group (the best out of $6^5 = 7,776$ models!)
  • The criterion is AIC but is equivalent to $adjR^2$ because the numbers of regressors are the same in any model
  • Without data grouping: 5 PCs from all the data set
The comparison between these two methods based on $adjR^2$ may not be very fair
Comments 3

- Model selection
- The selection of principal components is always an issue
- The authors compare the model performance of PCs with grouping and of PCs without grouping
  - With data grouping: select the best combination out of 6 PCs from each groups (the best out of $6^5 = 7,776$ models!)
  - The criterion is AIC but is equivalent to $adjR^2$ because the numbers of regressors are the same in any model
  - Without data grouping: 5 PCs from all the data set
- The comparison between these two methods based on $adjR^2$ may not be very fair
- Do the results change much, if you use the first PC from each group? This is statistically more sound.
Conclusion

- This paper provides a very interesting way to nowcast not yet available GDP growth.
Conclusion

- This paper provides a very interesting way to nowcast not yet available GDP growth
  - The method uses a large data set of economic variables
Conclusion

- This paper provides a very interesting way to nowcast not yet available GDP growth
  - The method uses a large data set of economic variables
  - The method groups the large data set significantly improves the fit as well as makes the model interpretable
Conclusion

• This paper provides a very interesting way to nowcast not yet available GDP growth
  • The method uses a large data set of economic variables
  • The method groups the large data set significantly improves the fit as well as makes the model interpretable

• The professional forecasters may have serious nowcasting errors, when the economy is in a change (e.g., financial crisis), because they are more subjective (or adaptive)
Conclusion

• This paper provides a very interesting way to nowcast not yet available GDP growth
  • The method uses a large data set of economic variables
  • The method groups the large data set significantly improves the fit as well as makes the model interpretable

• The professional forecasters may have serious nowcasting errors, when the economy is in a change (e.g., financial crisis), because they are more subjective (or adaptive)

• The proposed method can show much better performance even in these period