



Introduction/Overview

Purpose:

- 1. To investigate whether an incomplete VAT-declaration dataset can be used for GDP flash estimation.
- 2. To estimate VAT turnover growth rates, the expected revisions should be considered.

Assumption: The dataset could be finalized after six months after the reference year.

Background/Need

- Need of economic policy for an early indicator
- VAT is a possible early indicator, but
 - Revisions
 - Incomplete dataset due the late submissions
- Estimation of GDP should be robust and must meet the requirements of timeliness an accuracy

Method and results

Vintage matrix of VAT

- VAT turnover are available in vintage structure
- Revisions can be calculated also for a vintage structure
- Revision=final value/original value

Estimation of VAT 'final' value

- Using state space model to forecast VAT turnover after expected revision
- Depending variable is log value of VAT

Estimation of GDP at current prices

- MIDAS to forecast GDP
- Depending variable is dlog value of quarterly GDP
- Independent variable is dlog value of monthly VAT forecasted and smoothed by state space model

Vintage matrix

Vintage/period	01. 2015	02. 2015	03. 2015	04. 2015	05. 2015	06. 2015	07. 2020	08. 2020	09. 2020
January 2015	X									
February 2015	X	X								
March 2015	X	X	X							
April 2015	X	X	X	X						
...			
July 2020	X	X	X	X	X	X	X	X		
August 2020	X	X	X	X	X	X	X	X	X	
September 2020	X	X	X	X	X	X	X	X	X	X

- The columns contain the reference month, and the rows include each data submissions.
- The rows of the matrix contain the data revision relating to the last data submission.
- Using the vintage matrix, the revisions for all data submissions are calculated.
- The revision matrix (W) contains VAT data revision from January 2015 to September 2020.

The state space model:

1. State equation: $y_t = \mu + \sum_{i=1}^q \alpha_i y_{t-i} + \eta_t$

where y_t is the log value of final VAT turnover data for reference month t , which cannot be observed. According to the state equation the log value of final VAT data is a q ordered autoregressive process (AR(2)) with expected value μ and expected error η_t .

2. Measurement equation:

$$y_t^T = y_t + c^{T-t} + \varepsilon_t^T$$

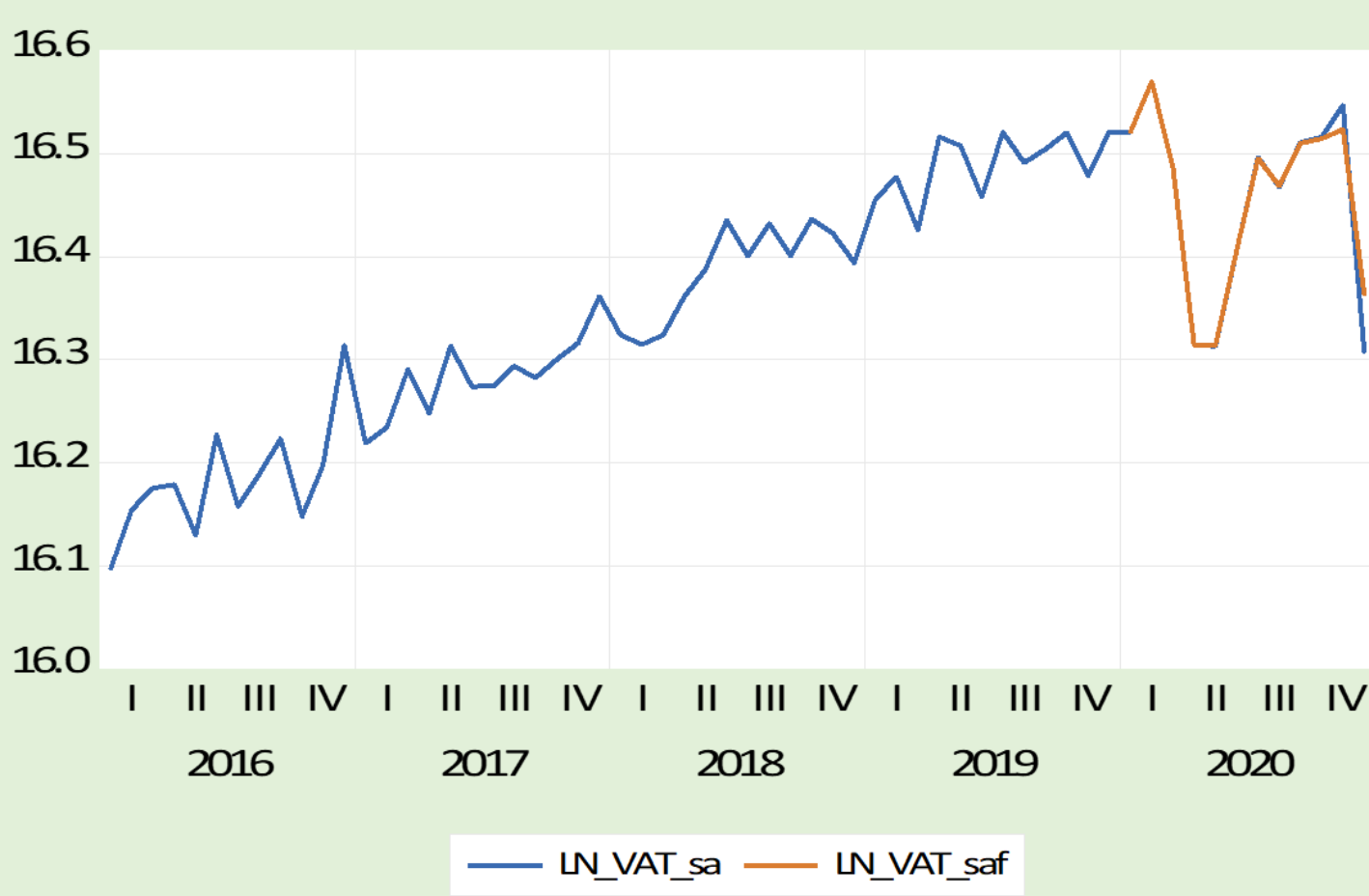
where y_t^T is the submitted VAT turnover data in T month for the reference month t . c^{T-t} shows the log value of revision bias (log value of the ratio of final value and original VAT value) and the measurement error. VAT data are seasonal adjusted using X-12.

The MIDAS model for GDP

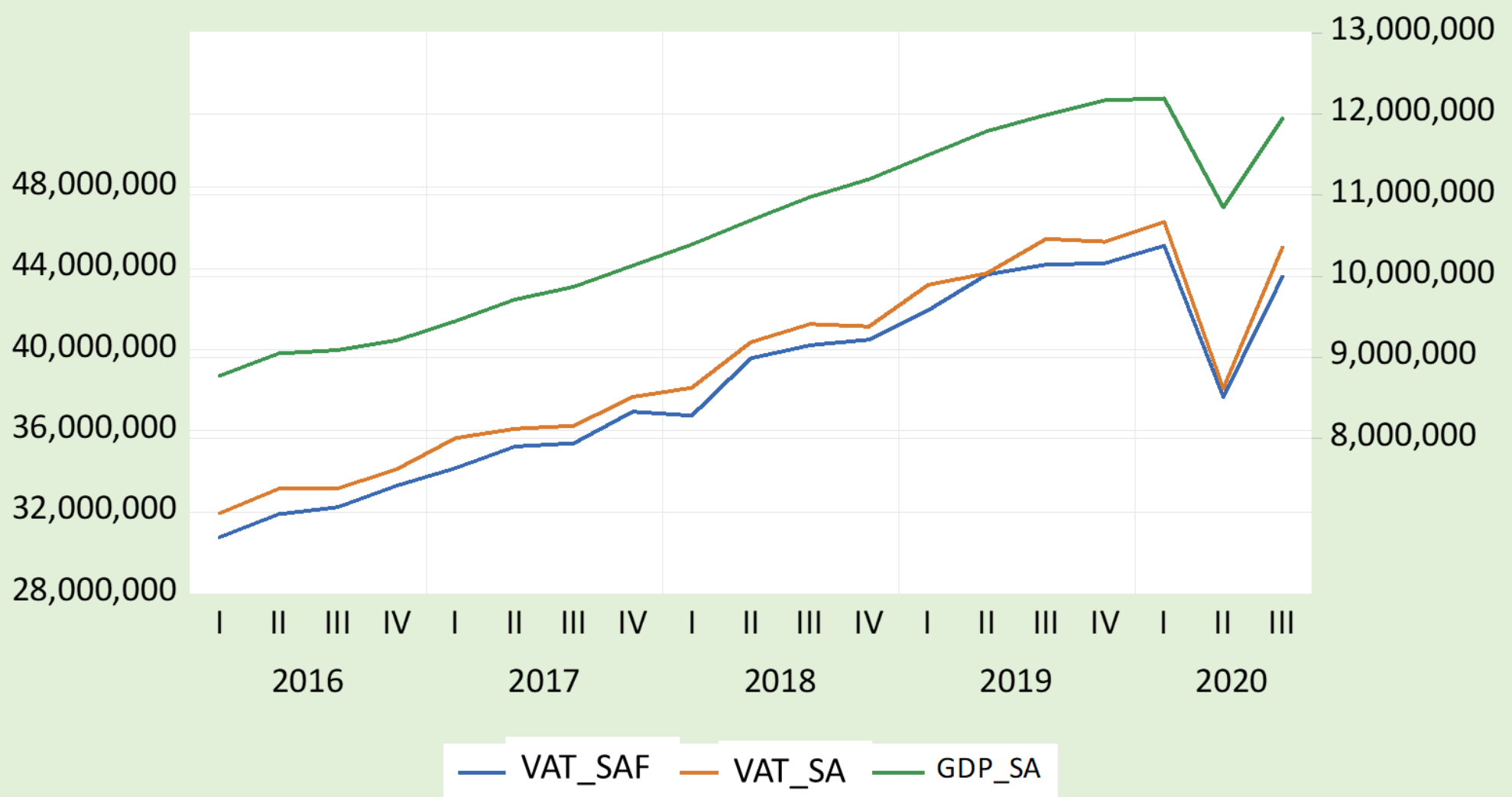
The model estimates the VAT revisions and so the 'final' VAT turnover for the total economy for the period January 2020-December 2020.

Dependent Variable: DLOG(GDP_CUP_SA)				
Method: MIDAS				
Date: 02/19/21 Time: 00:19				
Sample: 2016Q2 2020Q3				
Included observations: 18				
Method: PDL/Almon (polynomial degree: 3)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.008635	0.004548	1.898790	0.0784
Page: VAT Series: D(VAT_SAF) Lags: 4				
PDL01	-0.353457	0.168877	-2.118076	0.0525
PDL02	0.564544	0.185563	3.042326	0.0088
PDL03	-0.093381	0.041403	-2.255401	0.0406
R-squared	0.838127	Mean dependent var		0.017158
Adjusted R-squared	0.838127	S.D. dependent var		0.038734
S.E. of regression	0.015584	Akaike info criterion		-5.097866
Sum squared resid	0.004129	Schwarz criterion		-4.900006
Log likelihood	49.88080	Hannan-Quinn criter.		-5.070584
Durbin-Watson stat	2.198026			
VATID(VAT_SAF)	Lag	Coefficient	Distribution	
	0	0.117706		
	1	0.402107		
	2	0.499746		
	3	0.410623		

Smoothed, estimated VAT data



Forecasted GDP at current prices



Conclusions and future work

Conclusions:

1. This state space model presents a method to forecast VAT revision.
2. To estimate VAT turnover growth rates, the expected revisions should be taken into account.
3. The model
 - is able to forecast VAT revisions
 - helps provide better quality of growth rates and
 - causing smaller revisions in GDP index.

Future work:

- Implicit price index of Output should be forecasted by model in order to using as a deflator of VAT turnover
- In this case, not only GDP value index, but also GDP growth value can be forecasted directly