Skill Needs and Anticipation

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The activities in the forecasting process

1. Problem definition
2. Data collection
3. Data analysis
4. Model selection and fitting
5. Model validation
6. Forecasting model deployment
7. Monitoring forecasting model performance

By Montgomery, Jennings, & Kulahci, 2015

$\hat{Y}_{T|T-1}$

Models used in this paper

- **The autoregressive models**
- **The population AR(1) model is $Y_t = \beta_0 + \beta_1 Y_{t-1} + u_t$**
- **The autoregressive distributed lag models**

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \ldots + \beta_p Y_{t-p} + \delta_1 X_{t-1} + \ldots + \delta_r X_{t-r} + u_t$$

Moving Averages MA(L)

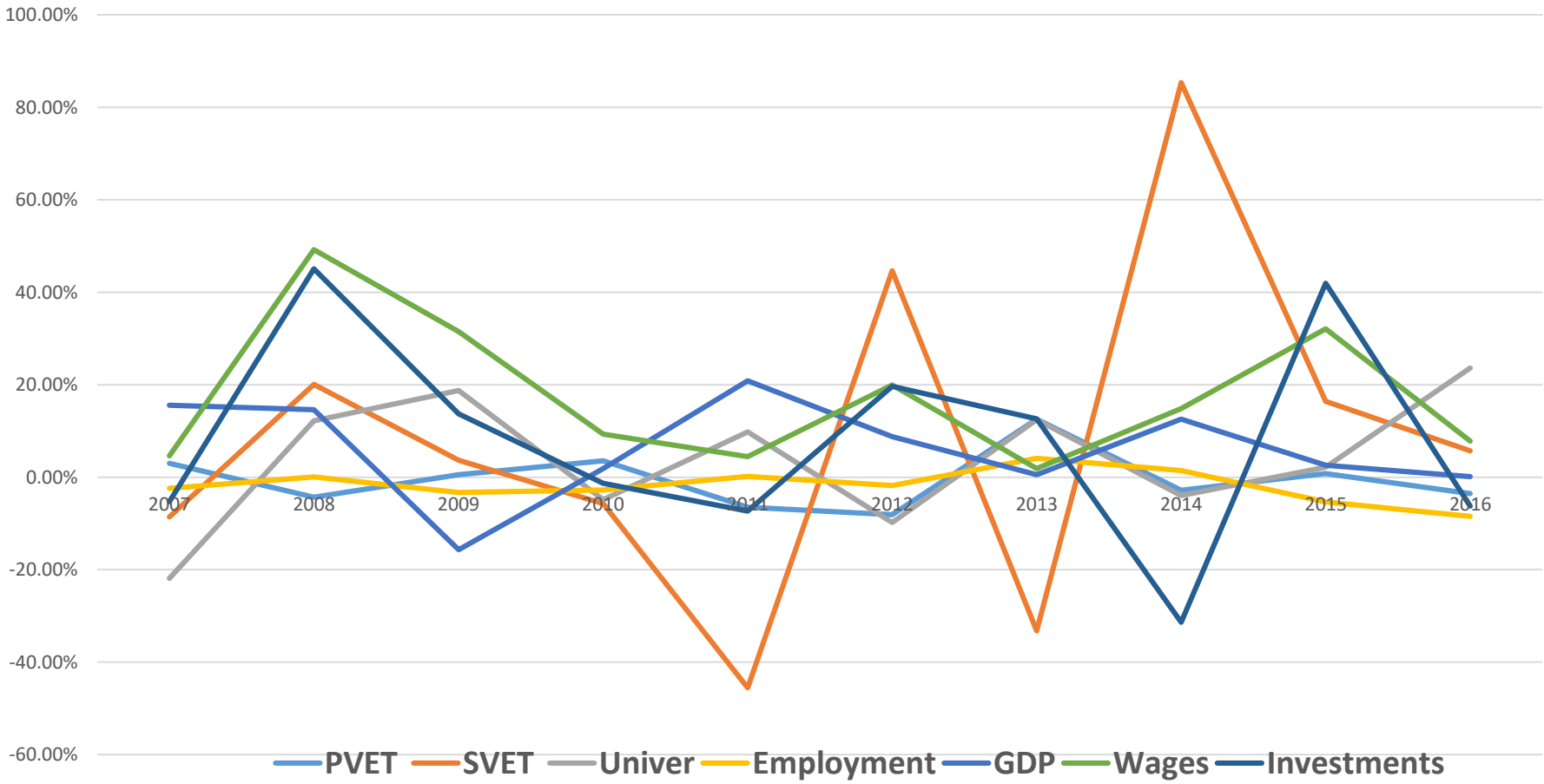
Then by building 95% confidence intervals:

Yt|t-1±1.96x(FSE/√n)

Characterization of the economy of Kyrgyzstan

GDP Components	2015			2016		
	Amount (in Mln KGS)	Growth Rate (%)	% of GDP	Amount (In Mln KGS)	Growth Rate (%)	% of GDP
GDP	430489.4	103.9	100.0	458027.4	103.8	100.0
Industry	71916.4	96.9	16.7	80027.4	105.2	17.5
Agriculture	60530.1	106.2	14.0	60588.8	103.0	13.2
Construction	36042.0	116.3	8.4	39084.7	107.4	8.5
Services	211273.7	103.7	49.1	227983.1	103.0	49.8
Net Taxes on Products	50727.2	103.9	11.8	50343.4	103.8	11.0

The growth rate (%) of variables related to Agriculture, 2006-2016



Time-series regression model for Employment in Agriculture

Employment	Coef.	Std. Err.	T	P>|t|	[95% Conf.	Interval]
GDP	.0036178	.0018944	1.91	0.129	-.0016418	.0088774
Wages	-.0390225	.0196822	-1.98	0.118	-.0936692	.0156241
Investments	.0755613	.0827527	0.91	0.413	-.154197	.3053196
PVET	.0559021	.0457597	1.22	0.289	-.0711471	.1829513
SVET	.1188779	.0940541	1.26	0.275	-.1422582	.3800139
Univer	.0956756	.259578	0.37	0.731	-.6250284	.8163797
_cons	363.247	243.0945	1.49	0.209	-311.6916	1038.186

Final Model for Employment in Agriculture

Employment	Coef.	Std. Err.	t	P>|t|	[95% Conf. In
Wages	-.0119491	.0025985	-4.60	0.001	-.0178273 -.00
_cons	766.5779	13.55998	56.53	0.000	735.9031 79

Adj R-squared = 0.6683

Final Model for GDP in Agriculture

GDP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
Wages	3.74483	.5743537	6.52	0.000	2.445552	5.0
_cons	29984.63	2997.202	10.00	0.000	23204.48	36

Adj R-squared = 0.8059

Autoregressive model AR(1) for GDP in Agriculture

GDP	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lag1GDP	.8577147	.1576214	5.44	0.001	.494239	1.22119
_cons	9365.238	7416.728	1.26	0.242	-7737.768	26468.24

- Adj R-squared = 0.7607
- GDP_{2017}=9365.328+.857*60588.8=61289.93 Agricultural GDP in mln KGS;
  GDP_{2018}=9365.328+.857*61289.93=61890.80 Agricultural GDP in mln KGS;
  GDP_{2019}=9365.328+.857*61890.80=62405.74 Agricultural GDP in mln KGS;
  GDP_{2020}=9365.328+.857*62405.74=62847.04 Agricultural GDP in mln KGS;
  GDP_{2021}=9365.328+.857*62847.04=63225.25 Agricultural GDP in mln KGS;

95% confidence levels:

- GDP_{2017}=61289.93±3828.98;Agricultural GDP between 57460.94 and 65118.92 mln K
- GDP_{2018}=61890.80±3828.98;Agricultural GDP between 58061.81 and 65719.79 mln K
  GDP_{2019}=62405.74±3828.98; Agricultural GDP between 58576.75 and 66234.73 mln
- GDP_{2020}=62847.04±3828.98; Agricultural GDP may between 59018.06 and 66676.04

Moving averages MA(L) model

- PVET did not show any statistically significant relationships with none of these independent variables. Neither it exhibited a relationship with its own lag1 or so in running the Autoregressive (AR(1)) model. Therefore, I used MA(5) Model: MA(5)=Y_1+ Y_2+ Y_3+ Y_4+ Y_5/5
- $PVET_{2017}$=3736 low-skilled graduates;
- $PVET_{2018}$=3794 low-skilled graduates;
- $PVET_{2019}$=3771 low-skilled graduates;
- $PVET_{2020}$=3765 low-skilled graduates;
- $PVET_{2021}$=3752 low-skilled graduates;

95% Confidence level

- $PVET_{2017}$=3736±70.32; low-skilled graduates in 2017 may lay b
  3665 and 3806.
- $PVET_{2018}$=3794±45.95;low-skilled graduates in 2018 may lay b
  3748 and 3839
- $PVET_{2019}$=3771±43.94;low-skilled graduates in 2019 may lay b
  3727 and 3815
- $PVET_{2020}$=3765±32.14;low-skilled graduates in 2020 may lay b
  3733 and 3797

All models are wrong, some are useful.

Thank you