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In search of fluctuations - Another look at China's incredibly stable real GDP growth

Conference on China's Economic Reforms: Where Do We Stand

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Outline

- 1. Motivation and introduction
- 2. Data and estimations
- 3. Discussion of results



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Official real GDP growth rate, % 20 15Q2 15Q3 15Q4 16Q2 16Q3 16Q4 16Q1 15Q1 7.0 6.9 6.8 6.7 6.7 6.7 6,8 7.0 16 12 4 0 1998q3 2000q3 2002q3 2004q3 2006q3 2008q3 2010q3 2012q3 2014q3 2016q3 2018q3 2015-2016:

Stock market rally ended with a crash in the summer. Capital outflows increased and put depreciation pressures on the yuan. Structural change in the economy was further driven by weakness in export demand and slowing construction and fixed asset investment growth. Confidence surveys pointed to exceptionally weak economic performance in late 2015 and early 2016, as well as a substantial rebound thereafter





2017:

It appeared that economic conditions
were improved compared to 2015-2016
on the recovery of the external demand
and steady growth in domestic
consumption. China used economic
stimulus and pursued expansionary
policies. The accommodative monetary
policy stance fueled indebtedness,
which continued to rise rapidly.





2018:

Uncertainty is again reflected in **plunging** prices of stock exchanges and yuan depreciation. Many indicators suggest an economic slowdown is underway, with weak growth in fixed investment, a key driver of demand. In H1, there were still news about efforts to curb indebtedness by freezing projects already in progress. By summer, however, local gov'ts were being encouraged to hurry up and raise funds to complete their projects to support growth and provide jobs.





- These developments are not visible by looking at the official real GDP growth rate
- After 2014, growth rate became much more stable than before
- For 12 successive quarters (2015Q3–2018Q2) real GDP growth fluctuated +/- 0.1 %-points



Chinese GDP figures have raised a wide and long debate

- For ex. Rawski (2001), Maddison (2006), Maddison & Wu (2007), Young (2003) find that Chinese economy might have been growing slower than the official figures would suggest
- However, among others Holz (2006a, 2006b and 2014), Clark et al. (2007) and Perski & Rawski (2008) find that the official data is generally accurate or can be understating the true economic growth
- Chinese GDP has been estimated e.g. from outer space (Henderson et al., 2012), by combining trading partner export data (Fernald et al., 2015) and various alternative measures have emerged: e.g. Li Keqiang index, The Conference Board alternative Chinese GDP, Barclay's index, Bloomberg index, Capital Economic index, Lombard Street index etc..



Why data discrepancies are problematic?

- Economic statistics influence policy analysis, political discussions and decisions
- China is the world's second largest economy in nominal GDP, largest by PPP
- Data discrepancies can distort assessments of the economic situation, lead to inappropriate economic policies and bad business decisions
- Lack of fluctuations in recent years has blurred the situation further, masking all changes in economic acitivity



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Aim is to reveal the hidden fluctuations after 2014



- Stable growth might be at least partly related to China's ambitious official real GDP doubling target set in 2012
- Smoothing could have been obtained by adjusting the inflation metric used to convert between nominal and real growth, the GDP deflator
- Chinese official data does not include price deflators



NBS uses price indices to deflate the nominal series

GDP by kind of economic activity			
Nominal series	Official deflator		
Agriculture, animal husbandry, forestry and fishery	Agriculture product price index		
Industry (mining, manufacturing, production and supply of electricity, gas and water)	РРІ		
Construction	Fixed-asset investment price index		
Wholesale and retail trade	Retail price indices		
Transport, storage and posts	Related price index in CPI		
Hotels and catering services	Related price index in CPI		
Real estate	Real estate sale's price index, land exchanging price index, real estate and		
	leasing price index and CPI		
Financial intermediation	CPI and IPI, etc.		
Other services	Average wage index and the service sub-indices of the CPI		

- Also the quality of deflators is put into question
- Klein & Özmucur (2002-03): deflators are overestimated, while Movshuk (2003) and Young (2003) find the opposite
- Holz (2014) uses combinations of price indices and finds that the derived real GDP growth rate deviates no more than 1 %-point in either direction



Idea:

- Take the nominal GDP growth, nominal sectoral value added and price index series as given. Focus on the production side.
- Compute alternative deflators to deflate the nominal series with:
 - 1. Use published price index data to deflate the nominal value added data separately for each sector, aggregate and compute the real growth rate
 - 2. Regress the official implicit GDP deflator by sectoral price indices, and use this estimated deflator to construct an alternative real GDP growth rate
 - 3. Construct principal components from a relatively large set of price indices. Use these principal components as explanatory variables in estimating the implicit GDP deflator, and deflate the nominal GDP growth rate
- Data: quarterly observations, time span 1998Q1–2018Q3



1. Use published price index data to deflate the nominal value added data separately for each sector, aggregate and compute the real growth rate



- Service sector: consumer price index
- Agriculture: agriculture product price index
- Industry: producer price index
- Construction: fixed assets investment price index



1. Use published price index data to deflate the nominal value added data separately for each sector, aggregate and compute the real growth rate





$$\begin{split} \text{Implicit deflator}_{t} &= \text{Constant} + \\ & \frac{Ser_VA}{TVA_{t}} * CPI_{t} + \frac{Ind_VA}{TVA_{t}} * PPI_{t} \\ & + \frac{Cons_VA}{TVA_{t}} * IPI_{t} + \frac{Agr_VA}{TVA_{t}} * APPI_{t} + \varepsilon_{t} \end{split}$$





	whole time span	
Service Pl	0.638**	
	(0.23)	
Industry PI	0.866***	
	(0.11)	
Construction PI	2.491*	
	(0.99)	
Agriculture PI	1.371***	
	(0.23)	
Constant	1.735***	
	(0.18)	
Adj.R-square	0.906	
dfres	78	
Dependent variable price indices weigh	e: official implicit Gl nted by the sectoral s)P deflator. Independent variables a hare of total value added.
Standard errors in	n parenthesis.	
* p<0.05, ** p<0.0)1, *** p<0.001	





	whole time span	1998Q1-2013Q4	
Service PI	0.638**	1.051***	
	(0.23)	(0.24)	
Industry PI	0.866***	0.734***	
	(0.11)	(0.12)	
Construction PI	2.491*	2.828*	
	(0.99)	(1.30)	
Agriculture PI	1.371***	1.012***	
	(0.23)	(0.26)	
Constant	1.735***	1.796***	
	(0.18)	(0.19)	_
Adj.R-square	0.906	0.925	
dfres	78	59	
Dependent variabl price indices weig	e: official implicit GD hted by the sectoral s	P deflator. Independ hare of total value a	ent variables are dded.
Standard errors	in parenthesis.		
* p<0.05, ** p<0.	01, *** p<0.001		





	whole time span	1998Q1-2013Q4	1998Q1-2011Q4		
Service PI	0.638**	1.051***	1.309***		
	(0.23)	(0.24)	(0.31)		
Industry PI	0.866***	0.734***	0.644***		
	(0.11)	(0.12)	(0.14)		
Construction PI	2.491*	2.828*	2.361		
	(0.99)	(1.30)	(1.39)		
Agriculture PI	1.371***	1.012***	0.936**		
	(0.23)	(0.26)	(0.28)		
Constant	1.735***	1.796***	1.805***		
	(0.18)	(0.19)	(0.19)		
Adj.R-square	0.906	0.925	0.926		
dfres	dfres 78 59 51				
Dependent variable: official implicit GDP deflator. Independent variables are					
price indices weighted by the sectoral share of total value added.					
Standard errors	Standard errors in parenthesis.				
* p<0.05. ** p<0.01. *** p<0.001					









3. Construct principal components from a relatively large set of price indices. Use these principal components as explanatory variables in estimating the implicit GDP deflator, and deflate the nominal GDP growth rate

Implicit deflator_t = Constant + Principal component_{i,t} + ε_t





3. Construct principal components from a relatively large set of price indices. Use these principal components as explanatory variables in estimating the implicit GDP deflator, and deflate the nominal GDP growth rate

	whole time span	1998Q1-2013Q4	1998Q1-2011Q4		
Comp1	0.561***	0.604***	0.629***		
	(0.02)	(0.02)	(0.02)		
Comp2	0.313***	0.221***			
	(0.04)	(0.04)			
Comp3			0.138**		
			(0.05)		
Сотр6	-0.246**				
	(0.08)				
Comp9		-0.253*	-0.313**		
		(0.12)	(0.10)		
Constant	3.384***	3.827***	4.011***		
	(0.12)	(0.12)	(0.12)		
Adj.R-square	0.903	0.93	0.939		
dfres	79	60	52		
Dependent variable: official implicit GDP deflator. Standard errors in parenthesis.					
* p<0.05, ** p<0.01, *** p<0.001					





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Range and simple average of alternative real growth rates





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These fluctuations match better observations on the **Chinese economy**



2015-2016:

...exceptionally weak economic performance in late 2015 and early 2016, as well as a substantial rebound thereafter

2017:

- It appeared that economic conditions were improved compared to 2015-**2016** on the recovery of the external demand and steady growth in domestic consumption.
- Many indicators suggest an economic slowdown is underway, with weak growth in fixed investment, a key driver of demand.



And some indicators point towards similar development





To conclude

- Saying little about the level of the real GDP growth rate, I manage to identify fluctuations extending year 2014
- Based on constructed growth series, there was a drop in 2015–2016, a pick-up in 2017 and another decrease in 2018
- Findings are consistent with some of the available indicators and with observed changes in the Chinese economy



Thank you!



Price indices used in regressions





Share of sectoral value added and independent variables



Table 4: Proportion of variance explained by 10 first principal components, three different time sname

whole time span		1998Q1-2013Q4		1998Q1-2011Q4		
	Proportion,%	Cumulative, %	Proportion,%	Cumulative, %	Proportion, %	Cumulative, %
Comp1	0.435	0.435	0.475	0.475	0.506	0.506
Comp2	0.141	0.577	0.120	0.595		0.606
comps	0.075	0.656	0.000	0.688	0.093	0.699
Comp4	0.070	0.726	0.065	0.753	0.054	0.752
- i, i		0.781	0.041	0.794	0.044	0.796
Сотрб	0.033	0.814	0.037	0.831	0.042	0.838
Comn7	0.021	0.845	0.032	0.863	0.026	0.864
Comp8	0.026	0.871	0.022	0.885	0.022	0.887
Сотр9	0.022	0.893	0.022	0.907	0.021	0.908
Comp10	0.019	0.912	0.018	0.924	0.018	0.926
Principal c	components anal	lysi s				

Figure 6: First principal component and the official implicit deflator



Highest factor loadings: Whole time span:

PC 1: Consumer goods' and machine manufacturing producer PI, retail PI, aggregate CPI both urban & rural
PC 2: Industrial and raw material indices, producer PI for petroleum and producer goods, purchasing PI
PC 6: Agricultural raw material index, CPI on food, textile and tailoring producer PI

<u>1998Q1-2013Q4:</u>

PC 1: Consumer goods' producer PI, retail PI, aggregate CPI
PC 2: Industrial and raw material indices, producer PI for metallurgical and producer goods, purchasing PI
PC 9: Tailoring, textile, leather and cultural articles' producer PI

<u>1998Q1-2011Q4:</u>

PC 1: Consumer goods' producer PI, retail PI, aggregate CPI
PC 3: Energy and industrial raw material indices, rural recreational
CPI, producer goods' producer PI
PC 9: Industrial and agricultural raw material indices, Tailoring,

culture articles', and coal producer PI, transport and communications' CPI



Deviations from official real GDP growth rate

