

Response to Nicholas R. Lardy and Tianlei Huang's “Is China's Growth Overstated? Don't Rely on Lower Tax Revenue Growth as Evidence”

In their comments on our paper “A Forensic Examination of China’s National Accounts”, Nicholas R. Lardy and Tianlei Huang investigated a potential issue in inferring value added growth by value-added tax (VAT) revenue growth. They argued that such inference is inconclusive because (i) much of the fixed-asset investment (FAI) in machinery and equipment is deductible from VAT and (ii) FAI grew much faster than VAT revenue according to the *official statistics*. As a result, VAT revenue growth should be lower than value added growth. They found that that our estimate of GDP growth overreporting would go down from 1.8 percentage points to 1 percentage point. This response letter makes two points. First, we document that official statistics on FAI have become wildly inflated after 2008. Before 2008, this was less the case, so measuring investment using FAI severely overstates the real investment rate in China after 2008. The central NBS acknowledges as much – the official series on aggregate national investment (Fixed Capital Formation) is significantly lower than the series on FAI after 2008. Second, our estimates on China’s GDP overreporting are robust to the deduction of investment from VAT when using the adjusted investment growth in our paper or even the official investment growth (fixed capital formation) in China’s national accounts.

Our benchmark case does assume a stable proportion of investment in value added. The assumption actually stacks cards against ourselves because FAI has been severely inflated in the official data. In the paper, we documented the huge discrepancy between FAI (the raw data) and fixed capital formation (FCF) compiled by China’s National Bureau of Statistics (NBS), indicating that NBS heavily discounts FAI. According to the official statistics, FAI was very close to FCF in the early 2000s but 90% more than FCF in 2016. In our paper, the estimated investment growth is even lower than value added growth. If we take into account deduction of investment from VAT, our estimated GDP growth would be even lower.

The rest of the letter is organized as follows. We first document, in addition to the well-known gap between FAI and FCF, the huge discrepancy between industrial FAI and the investment

data from industrial firm surveys. We then show that using our estimates of investment, deducting investment from VAT would actually lead to lower estimates of industrial value added growth and, hence, GDP growth. Finally, we show that using the official FCF data compiled by NBS to infer investment growth and following the same procedure in Lardy and Huang, our estimates on GDP growth would not be affected significantly. The annual GDP growth overreporting would be 1.6%, merely 0.2 percentage points lower than the estimate in the paper. We regard this as a lower bound of GDP growth correction since even the official FCF data is likely to be inflated for the reasons stated in our paper.

Don't Rely on Fixed Asset Investment

There is no evidence that industrial FAI in machinery and equipment is more reliable than the other components in FAI. As shown in Table 1, the share of machinery and equipment in FAI didn't change much in most years between 2009 and 2016. More importantly, using total fixed-asset investment of above-scale industrial firms, which is compiled by NBS, the average annual investment growth is 5.2% between 2009 and 2016 (see Table 2), far below the growth of 14% by FAI but very close to the industrial VAT revenue growth (5.3%) in that period. Column 3 in Table 2 also refutes a upward trend of investment rate since 2009.

Use Our Estimated Investment

Our paper also adjusted FCF in national accounts. NBS doesn't publicize FCF in machinery and equipment. So, we have to use the share of industrial FAI in machinery and equipment in total FAI to infer industrial FCF in machinery and equipment, which is reported in Table 3. Recall that the industrial VAT revenue growth is 5.3%. The inferred 3% growth of industrial investment in machinery and equipment would actually lead to an even lower industrial value-added growth when controlling for deduction of investment from VAT.

Use Fixed Capital Formation

For those who take our adjusted FCF as a lower bound estimate of China's investment, we can also use the official FCF data, which we take as an upper bound estimate of China's investment. We can again use the share of industrial FAI in machinery and equipment in total FAI and the official FCF to estimate industrial investment in machinery and equipment in each year. The

same calculation is also done for the wholesale and retail sector. Then, we can back out value added growth in the two sectors. Applying the same procedures in our paper, we find that the average GDP growth was over-reported by 1.6 percentage points, 0.2 percentage points lower than the number in the paper (see Table 4 and 5 for details).

Conclusion

We appreciate Lardy and Huang's very detailed and careful documentation of the 2009 VAT reform and their work on the effects of the reform on VAT revenue by investment deduction. Nevertheless, their conclusion about the inconclusiveness of using VAT revenue growth to infer value added growth is based on the data that severely overstates China's investment. Using the adjusted investment growth in our paper would imply an even lower GDP growth. If we trust the official investment growth in China's national accounts, the estimated GDP growth would be increased by barely 0.2 percentage points. We conclude that our findings are robust to investment deduction from VAT.

Table 1: Share of Machinery and Equipment in Total Investment

	Industrial FAI in Machinery and Equipment (100 million yuan)	Industrial FAI (100 million yuan)	Share of Machinery and Equipment
2009	33,205	80,422	0.41
2010	40,421	98,771	0.41
2011	51,055	128,972	0.40
2012	60,045	154,375	0.39
2013	70,381	181,862	0.39
2014	76,276	204,260	0.37
2015	82,518	219,913	0.38
2016	82,923	227,892	0.36
Average Growth	13.97%	16.04%	

Source: National Bureau of Statistics

Table 2: Investment Data from Annual Survey of Industrial Firms

	Fixed Assets (100 million yuan)	Investment (100 million yuan)	Value added (100 million yuan)	Investment Rate
2009	278,541	33,188	119,324	0.278
2010	334,839	56,298	150,624	0.374
2011	386,087	51,247	186,703	0.274
2012	434,474	48,388	210,355	0.230
2013	499,404	64,930	224,344	0.289
2014	563,860	64,456	233,070	0.277
2015	603,274	39,414	225,291	0.175
2016	650,593	47,319	234,341	0.202

Source: National Bureau of Statistics

Note: The second column is the original value of fixed assets of above-scale industrial enterprises. The fourth column is the industrial value added inferred from input-output table, which is presented as the dotted line in Figure 3 in our BPEA paper.

Table 3: Estimation of Fixed Capital Formation (FCF)

Year	Official FCF	BPEA Results (Without Tax Deduction)		
		Adjusted FCF	Adjusted Industrial FCF	Adjusted Industrial Machinery and Equipment
2009	156,735	155,933	64,668	26,700
2010	185,827	176,078	72,035	29,479
2011	219,671	196,197	83,678	33,125
2012	244,601	211,875	89,647	34,869
2013	270,924	226,074	94,354	36,515
2014	290,053	230,249	93,824	35,050
2015	301,503	225,115	89,751	33,677
2016	318,084	235,230	89,869	32,701
Average Growth, 2009-2016 (%)	10.64	6.05	4.81	2.94

Note: The unit is 100 million yuan.

Table 4: Estimation of GDP Growth Rate (%)

		BPEA Results (Without Tax Deduction)			Results With Tax Deduction		
	Official Data	Adjusting Industry	Adjusting Industry, Wholesale and Retail	Adjusting Industry, Construction, Wholesale and Retail	Adjusting Industry	Adjusting Industry, Wholesale and Retail	Adjusting Industry, Construction, Wholesale and Retail
2009	9.25	9.25	9.25	9.25	9.25	9.25	9.25
2010	18.32	15.02	15.36	14.86	15.41	15.72	15.28
2011	18.47	16.37	15.86	15.36	16.91	16.39	16.00
2012	10.44	11.38	10.00	9.88	11.31	9.99	9.87
2013	10.16	9.29	8.89	8.63	9.67	9.30	9.15
2014	8.19	7.54	6.70	6.39	7.33	6.53	6.32
2015	7.00	6.55	6.20	6.02	6.74	6.46	6.18
2016	7.91	6.46	6.69	6.43	6.28	6.47	6.17
Average Growth, 2010-2016 (%)	11.50	10.37	9.96	9.65	10.52	10.12	9.85

Table 5: Estimated Industrial Investment of Machinery and Equipment from FCF

Year	Total FAI	Industrial FAI in Machinery and Equipment	Official FCF	Estimated Industrial Investment of Machinery and Equipment
2009	193,920	33,205	156,735	26,838
2010	241,431	40,421	185,827	31,112
2011	302,396	51,055	219,671	37,088
2012	364,854	60,045	244,601	40,254
2013	435,747	70,381	270,924	43,759
2014	501,265	76,306	290,053	44,154
2015	551,590	82,518	301,503	45,105
2016	596,501	82,923	318,084	44,219
Average Growth, 2009-2016 (%)	17.41	13.97	10.64	7.39

Note: The unit is 100 million yuan.