CHARACTERISTICS AND IMPLICATIONS OF CHINESE MACROECONOMIC DATA REVISIONS

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Chinese Macroeconomic Data

• Typically we trust macroeconomic data provided from official sources.
• However, “winds of falsification” surround the Chinese macroeconomic data (Heston, 2001).
• The quality of data released by the National Bureau of Statistics of China (NBS), China’s statistical authority, has regularly been questioned by both the media and researchers.
  • e.g. The Economist, 2008; Holz, 2003 and 2006; Huang, 2011; Keidel, 2001 and 2007; Maddison, 1998 and 2006; Orlik, 2012; Rawski, 1976 and 2001; Rawski and Xiao, 2001; Ren, 2002; Wu, 2000; Xu, 2002; Young, 2003).
Today’s Focus: Chinese Data Revisions

• The presence of revisions in Chinese data is not in itself evidence of lower data quality.
  • Almost all macroeconomic data are revised.
  • The timeliness/accuracy trade-off means that early data releases are “based on source data that are incomplete or subject to further revision by the source agency” (U.S. Bureau of Economic Analysis).
  • In fact, it may even be evidence in favor of the reliability of data that it is revised.

• It is, however, important to detail the characteristics of these revisions so that policymakers that rely on the early data know what to expect in terms of revisions.
  • Note: We will assume that the latest available data are the “truth”.

Today’s questions

1. What do the revisions to Chinese real GDP estimates look like?
2. Are these revisions “well-behaved” according to the criteria of Aruoba, 2008?
3. How do they compare to the “gold standard” of U.S. macroeconomic data?
4. What about the role of provincial data revisions? (work in progress)
U.S. Data Are Far From Perfect

• Croushore (2009) finds that the mean absolute revision in the growth rate of U.S. real GDP has been around one percentage point.
• Revisions to U.S. macroeconomic data are substantial and “not well-behaved.”
  • Various early U.S. macroeconomic data releases show bias and have large and predictable revisions (e.g. Kennedy, 1990; Croushore, 2008; Aruoba, 2008; Sinclair and Stekler).
  • Large revisions are, for some series, more likely in recessions than in expansions (Dynan and Elmendorf, 2001; Swanson and van Dijk, 2006).
The Chinese Macroeconomic Data

- Official annual macroeconomic data estimates.
  - Printed in the China Statistical Yearbook.
  - Published by the National Bureau of Statistics of China.
  - Released annually from 1981 through 2011.
    - Cover the sample from 1978 to the year before the yearbook date.
- Five series all in real terms and reported in annual growth rates:
  - GDP, GNP, and the three main sectors.
    - Focusing on the official production approach to calculating GDP.
      - Primary: generally agriculture.
      - Secondary: the processing of primary products.
      - Tertiary: broadly the service sector.
The new real-time dataset for China

• We have compiled a new real-time dataset for Chinese real GDP, GNP, and the three underlying sectors (primary, secondary, and tertiary).
  • The dataset is available at [http://home.gwu.edu/~tsinc/china_rtd.xlsx](http://home.gwu.edu/~tsinc/china_rtd.xlsx)
• Constructed in a similar manner to the real-time dataset for the U.S. introduced by Croushore and Stark (2001).
• We also have a similar dataset for all the provinces, thanks to Shirley Hsieh:
Data Availability

- Real GDP data were first reported starting in the 1994 statistical yearbook, therefore the first release sample for that variable starts in 1993.
- All final revisions series end in 2008 so that they incorporate the benchmark revisions from the two national economic censuses.
  - The First National Economic Census was conducted in 2004 and incorporated in the 2006 Yearbook.
  - The Second National Economic Census was conducted in 2009 and incorporated in the 2010 Yearbook.
- “Latest available” data is from 2012 Yearbook.
Chinese Real GDP Growth Releases

First Release Real GDP
Second Release Real GDP
Latest Available Real GDP

Diagram showing Chinese Real GDP growth releases from 1994 to 2010.
Chinese Real GNP Growth Releases

First Release Real GNP
Second Release Real GNP
Latest Available Real GNP
Chinese Primary Growth Releases

First Release Primary Industry
Second Release Primary Industry
Latest Available Primary Industry
Chinese Secondary Growth Releases

- First Release Secondary Industry
- Second Release Secondary Industry
- Latest Available Secondary Industry
Chinese Tertiary Growth Releases

Revisions from First to Final Release

<table>
<thead>
<tr>
<th></th>
<th>GDP</th>
<th>GNP</th>
<th>PRIM.</th>
<th>SEC.</th>
<th>TERT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revisions</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>(NW SE)</td>
<td>Absolute</td>
<td>Absolute</td>
<td>Absolute</td>
<td>Absolute</td>
</tr>
<tr>
<td>Mean (NW SE)</td>
<td>0.82***</td>
<td>0.65***</td>
<td>-0.18</td>
<td>0.19</td>
<td>2.25***</td>
</tr>
<tr>
<td></td>
<td>(0.17)</td>
<td>(0.15)</td>
<td>(0.20)</td>
<td>(0.18)</td>
<td>(0.19)</td>
</tr>
<tr>
<td>Mean Absolute</td>
<td>0.82</td>
<td>0.89</td>
<td>0.27</td>
<td>0.37</td>
<td>2.25</td>
</tr>
<tr>
<td>Median</td>
<td>0.63</td>
<td>0.62</td>
<td>0.00</td>
<td>0.01</td>
<td>2.21</td>
</tr>
<tr>
<td>Maximum</td>
<td>2.23</td>
<td>1.99</td>
<td>0.68</td>
<td>1.67</td>
<td>3.43</td>
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<tr>
<td>Minimum</td>
<td>0.03</td>
<td>-1.16</td>
<td>-4.55</td>
<td>-0.33</td>
<td>0.76</td>
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<tr>
<td>Std. Dev.</td>
<td>0.55</td>
<td>0.87</td>
<td>0.95</td>
<td>0.56</td>
<td>0.79</td>
</tr>
<tr>
<td>Skewness</td>
<td>1.10</td>
<td>-0.34</td>
<td>-4.33</td>
<td>1.46</td>
<td>-0.29</td>
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<tr>
<td>Kurtosis</td>
<td>3.89</td>
<td>2.42</td>
<td>20.64</td>
<td>4.44</td>
<td>2.26</td>
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<td>Observations</td>
<td>16</td>
<td>27</td>
<td>24</td>
<td>15</td>
<td>16</td>
</tr>
</tbody>
</table>
Comparing with the U.S.

- We constructed a U.S. dataset similar to the Chinese based on annual data available each July.
- For a similar sample the U.S. GDP estimates appear unbiased.
  - But other research suggests we shouldn’t always expect that.
- The mean absolute final revision is also smaller than for the Chinese data.
  - But the mean absolute first revision is of similar size to China.
- The size of the revisions relative to the growth of the economy, however, suggests the U.S. has much larger absolute revisions relative to its growth rate.
Relative Comparison with the U.S.

<table>
<thead>
<tr>
<th></th>
<th>U.S. First Revision</th>
<th>China First Revision</th>
<th>U.S. Final Revision</th>
<th>China Final Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean absolute Revision/ Mean Initial Release</strong></td>
<td>0.14</td>
<td>0.03</td>
<td>0.22</td>
<td>0.09</td>
</tr>
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</table>
Are Chinese Macroeconomic Data Revisions “Well-Behaved”?

• Aruoba (2008) proposes three properties of “well-behaved” revisions:
  1. The estimates are unbiased (i.e. the revisions have a zero mean).
  2. The noise to signal ratio, measured as the ratio of the standard deviation of the revision over the standard deviation of the final value, should be “small.”
  3. The forecast revisions are unpredictable.

• Aruoba found that the U.S. macroeconomic data are not well-behaved.
### Well-Behaved Final Revisions?

<table>
<thead>
<tr>
<th>Mean (NW SE)</th>
<th>China</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>0.82*** (0.17)</td>
<td>2.25*** (0.19)</td>
</tr>
<tr>
<td>GNP</td>
<td>0.65*** (0.15)</td>
<td>0.10 (0.10)</td>
</tr>
<tr>
<td>PRIM.</td>
<td>-0.18 (0.20)</td>
<td></td>
</tr>
<tr>
<td>SECOND.</td>
<td>0.19 (0.18)</td>
<td></td>
</tr>
<tr>
<td>TERT.</td>
<td>2.25*** (0.19)</td>
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</table>

<table>
<thead>
<tr>
<th>sd(revision) sd(final data)</th>
<th>China</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>0.20</td>
<td>0.23</td>
</tr>
<tr>
<td>GNP</td>
<td>0.32</td>
<td>0.31</td>
</tr>
<tr>
<td>PRIM.</td>
<td>0.35</td>
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<tr>
<td>SECOND.</td>
<td>0.13</td>
<td></td>
</tr>
<tr>
<td>TERT.</td>
<td>0.23</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Revision Predictable?</th>
<th>China</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>Lag of revision First release</td>
<td>First release Lag of revision</td>
</tr>
<tr>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n/a</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Role of Provincial Data

- National estimates are not simply the summation of provincial numbers – they are separately collected and aggregated (Holz, 2002).
  - But both the provinces and the national accounts rely on common sources of data.
  - “Despite all the hype only a few years ago about data falsification by local statistical authorities in China, the 2004 economic census results validate the provincial aggregate output values and invalidate the center’s national ones” (Holz, 2008).
    - Did the provincial data have a better estimate of services or was it just luck?
- Do the provincial data predict revisions in national data?
  - Work in progress.
Conclusions

- Chinese macroeconomic data generally fail Aruoba’s (2008) tests for well-behaved data revisions.
- The problems, however, are not at all unique for China, since even U.S. data fail most of Aruoba’s tests.
- It is not necessarily an indictment of the statistical authorities that the revisions are not well-behaved, but rather a call for further research to improve data gathering processes for all countries.
- It is also a reminder to firms and policymakers dependent on the early data to expect there to be substantial revisions in future releases.
A Final Thought

• “understanding the macroeconomics of China is too important to wait until the ‘high-quality data’ are available”
  • (Curtis and Mark, 2010).