Comments on: "A Retrospective Look at the U.S. Productivity Growth Resurgence" by J-H-S

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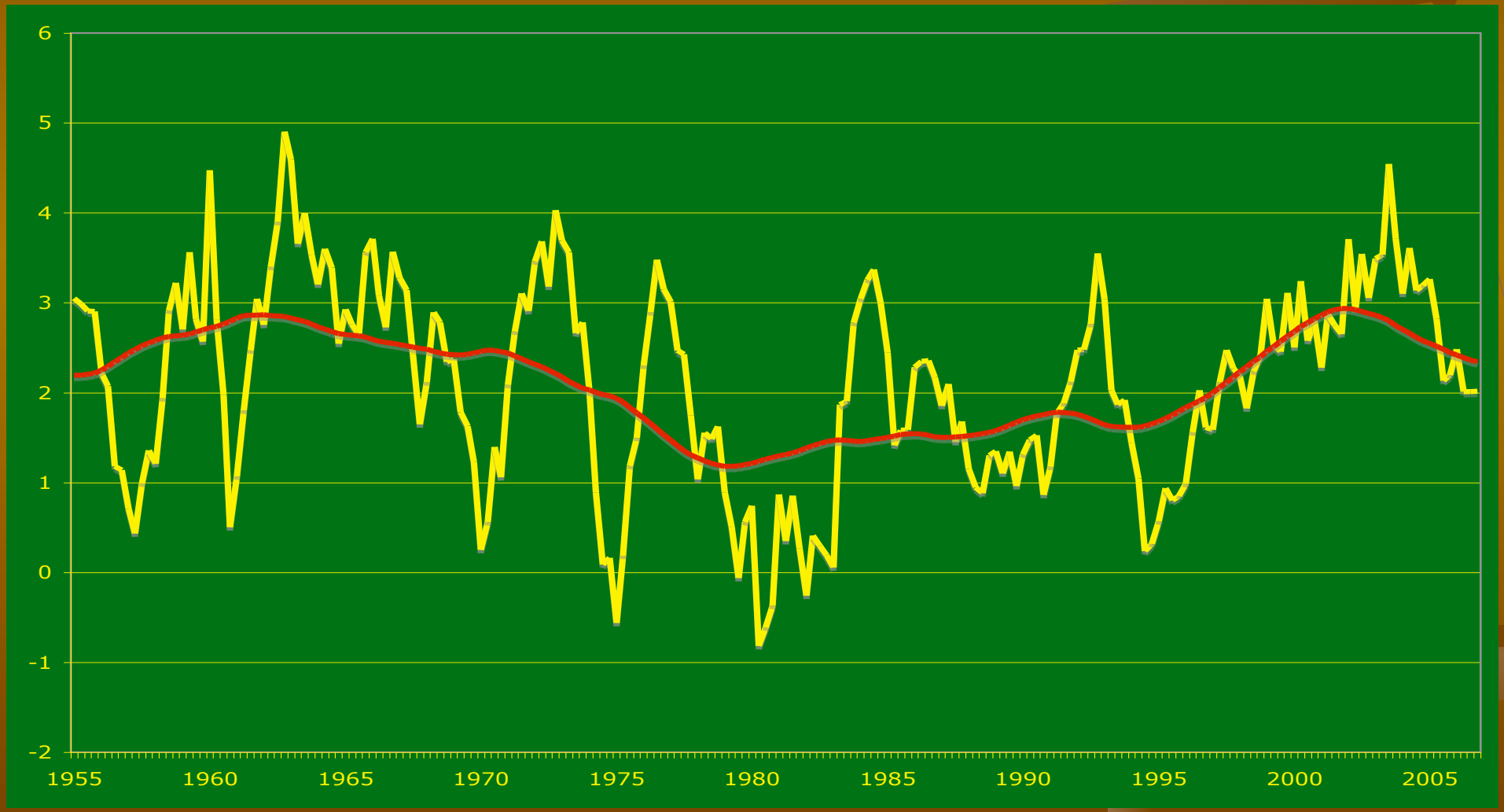
A Reunion of Productivity Researchers "Ten Years After"

- Honor and privilege to discuss this paper
- An extra honor to be at this podium with so many of the people who have made macro productivity research "happen" over the past decade
- The new paper by J-H-S is unique by retracing how we learned what we learned and when about the post-1995 revival.

Before Reviewing Their History Let's Look at the Numbers

- What You're About to See
- 1955-2006 Change in NFPB Output per Hour
- Actual: 8 quarter percent change
- Trend: Average of Two Trends Estimated from Actual 1-quarter change
  - Hodrick-Prescott with 6400 smoothing parameter
  - Kalman with similar smoothing parameter but filtering out influence of current and four lagged changes in GDP gap

8-quarter Actual LP Change vs. the Average Trend (through 2006:Q4)



Hints of Disagreement Even in the Introduction

- J-H-S: "U. S. Productivity Growth has remained very robust through 2005, but the sources have changed"
- In contrast, Actual U. S. Productivity Growth has Exhibited a Sharp Downshift
  - 10 Quarters 2001:Q4-2004:Q2 3.65
  - 10 Quarters 2004:Q2-2006:Q4 1.68
  - Coming March 07 employment revision will reduce the 1.68 to 1.44, well below the 1995 value of the trend
- Which is Most Relevant for the Next 10 Years?

The J-H-S History is Fascinating, Here are Some of the Most Interesting Aspects

- Between early 1997 and early 2001 the CBO more than doubled its 10-year forecast of NFB productivity growth from 1.2 to 2.7 percent
- Note that the trend using current data was already 1.8 by 1995:Q4, so part of the subsequent CBO changes were driven by data revisions
- J-H-S detail how productivity growth *for the year 1996* was revised in steps from 0.8 in early 1997 to 2.7 in the latest data
  - Important to note that revisions in the late 1990s were mainly upwards and revisions since 2002 have been mainly downwards, with more to come

Rewind to Chicago AEA Meetings January 1998

- Everybody including Jack Triplett, not to mention me, was still talking about the Solow paradox
- Nobody was talking about the productivity growth revival, when and why
- Yet *Business Week* had seen it coming in late 1995, not to mention Alan Greenspan's wise remarks in 1996
- As late as June 1998 in a paper quoted by J-H-S, I was still trying to argue that "there is something wrong with the computers".

Perceptions Totally Changed between mid 1998 and mid 1999

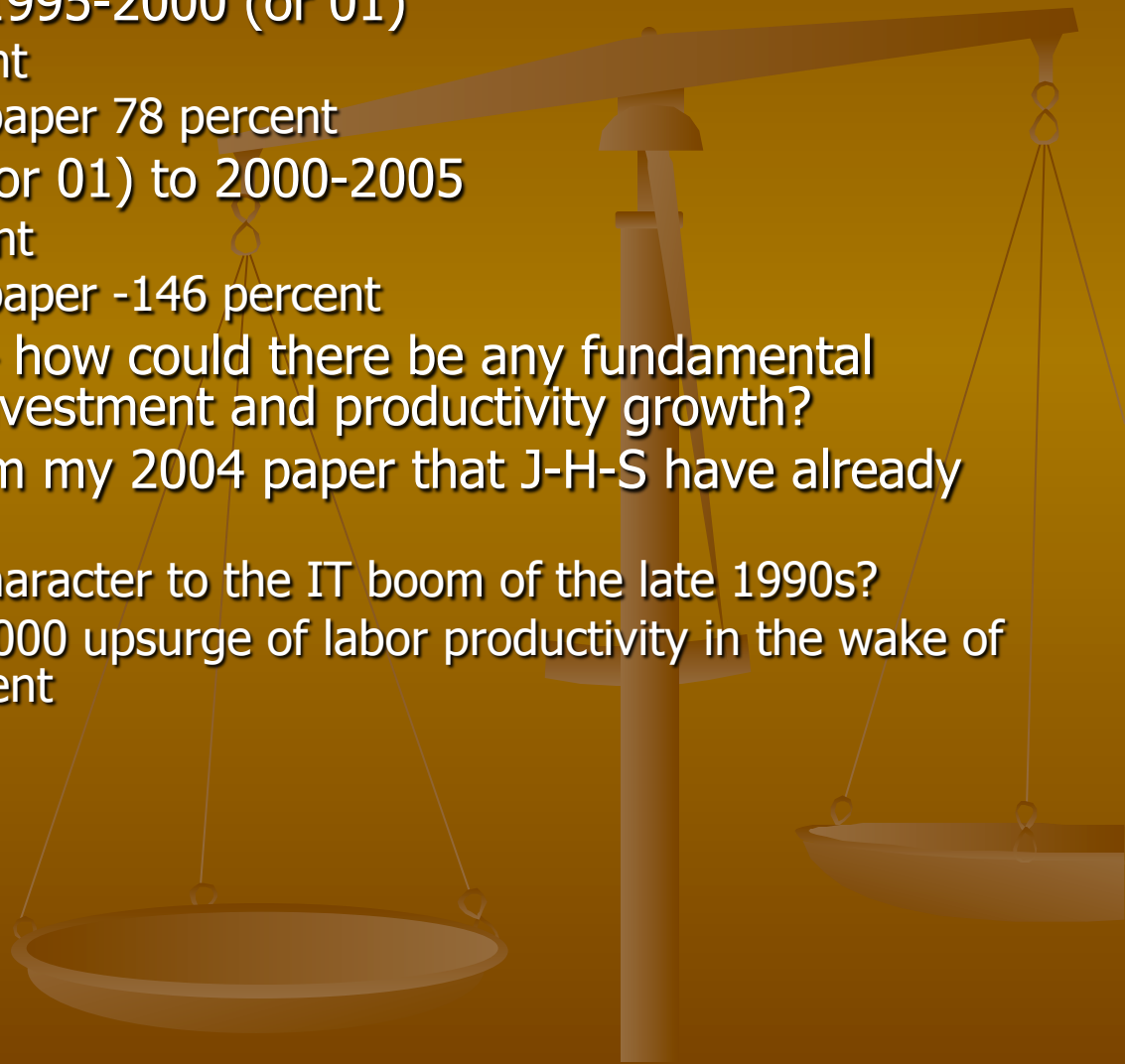
- My first decomposition (still on my web site) June 14, 1999
- Then-available data showed an acceleration from 1.13 in 1972:Q2-1995:Q4 to 2.15 in 1995:Q4-1999:Q1
  - (Current data 1.45 to 2.53)
- Of the 1.02 acceleration, I divided it in thirds
  - TFP contribution of computers, price measurement revisions, cyclical effect
  - Upward revisions in October 1999 weakened my conclusion, and my subsequent work shows there was no cyclical effect 1995-99
    - Price measurement revisions largely eliminated by benchmark NIPA revision of October, 1999

Mea Culpa Vintage 2000

- My published 2000 paper cited by J-H-S recognized both increased TFP in IT manufacturing and the effect of capital deepening
- But still no structural acceleration in non-IT TFP, due to a large cyclical effect that in retrospect wasn't there
- For 1995-2000 my 2006 paper fully endorses the 2006 decompositions of Oliner-Sichel and J-H-S.

What are Those Current Decompositions of IT Role?

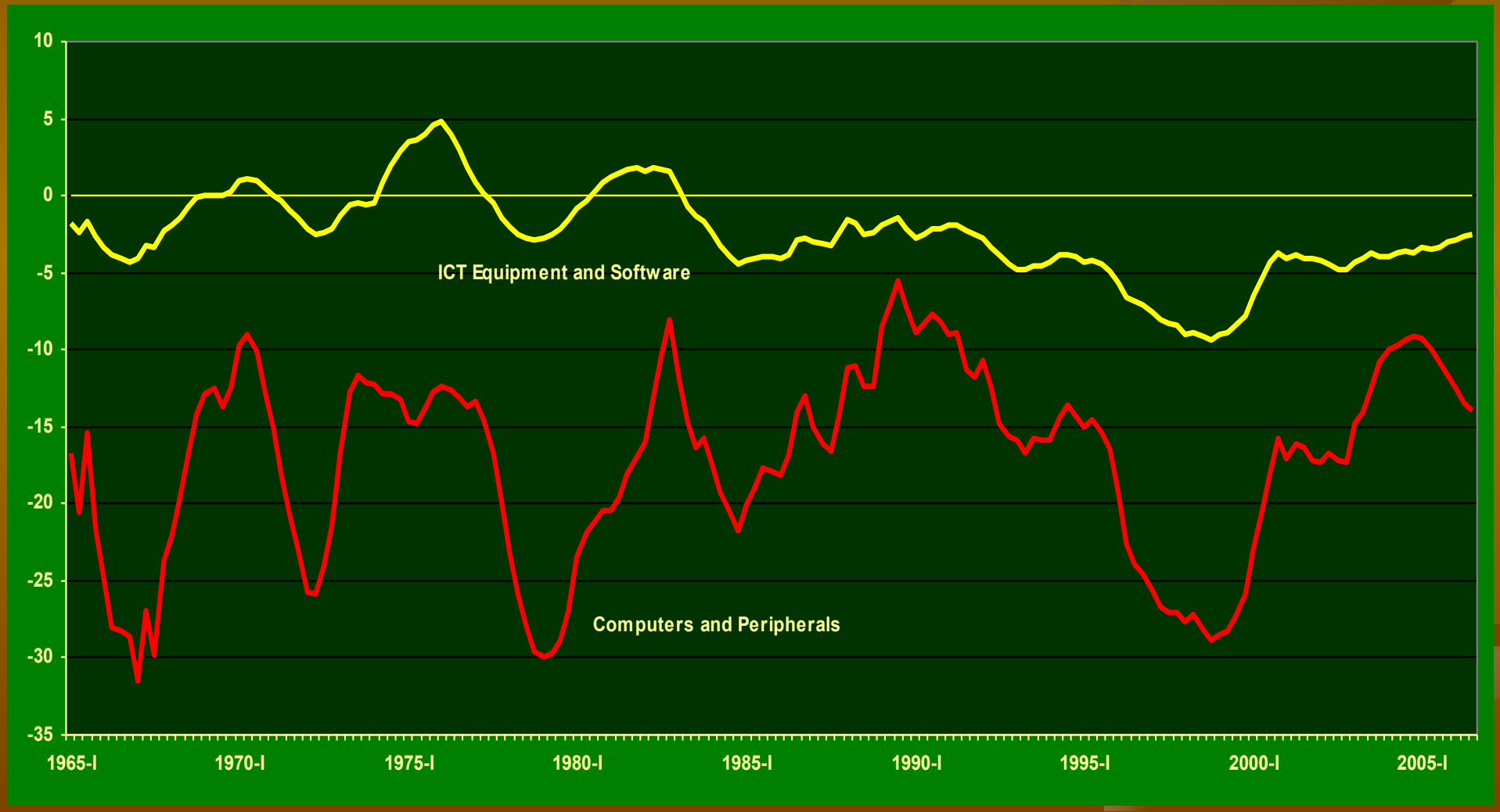
- Acceleration 1973-95 to 1995-2000 (or 01)
  - IT Share O-S 112 percent
  - IT Share J-H-S current paper 78 percent
- Acceleration 1995-2000 (or 01) to 2000-2005
  - IT Share O-S -80 percent
  - IT Share J-H-S current paper -146 percent
- Something is fishy here – how could there be any fundamental connection between IT investment and productivity growth?
- This raises the issues from my 2004 paper that J-H-S have already summarized
  - Was there a one-shot character to the IT boom of the late 1990s?
  - What caused the post-2000 upsurge of labor productivity in the wake of a collapse in IT investment



What Was Unique about 1995-2000: Computer Prices and the IT Share

- The chart for the rate of decline of computer prices shows the distinctly one-shot nature of the late 1990s boom
- The chart for the share of IT investment in GDP shows the same thing
- This raises profound questions:
  - What has happened to Moore's Law? (J-H-S assume continues at rate between 1995-2000 and post-2000)
  - Is the 1995-2000 period even *relevant* for projections out to 2015 or 2025?
  - What caused the 2000-04 acceleration and is that period relevant for future projections?

Inflation Rates, BEA Deflators for Computer Hardware and ICT Equip & Software, 1965-2006



Nominal Share of ICT Hardware and Software Investment in GDP, 1965-2006

Hypotheses Reviewed by J-H-S

- Cyclical Dynamics (RJG, Sichel)
- Increased Competitive Pressures in IT
- Technical Progress Outside IT
- Spillovers from IT as a GPT
- Unmeasured Investments in R&D and Organizational Change
- Intangible Capital (Corrado, Hulten, Sichel)
- Authors Take No Position and indeed provide no citations for several of these hypotheses

My 2003 BPEA Paper Proposed Three Explanations

- Cyclical Dynamics
  - Productivity Always Grows Fastest in the Early Part of the Expansion
  - Due to the Lag of Hours Behind Output
  - "Early Recovery Productivity Bubble"
- Savage Corporate Cost Cutting, Elements Unique to 2001-03 (compare to 1991-93), many citations to Nordhaus
  - Collapse of stock market and profits
  - Restatement of profits due to accounting scandals
  - Sharp divergence NIPA profits from S&P Profits 1997-2000
  - Extremely low ratio 2001-02 of S&P Reported Earnings to S&P Operating Earnings (One-time charges)
  - Much higher ratio of executive compensation based on stock options, hence pressure to boost share price by cutting costs

Third Explanation, Delay and Intangible Capital

- O-S and J-H-S Growth Accounting Requires that Full Productivity Payoff from Computers Occurs the Instant they Are Produced, before they are even Installed
- Basu *et. Al.* and Yang-Brynjolfsson have emphasized complementary, unmeasured, and delayed investments in intangible capital (including reorg, new business practices, general acquisition of human capital)
- Makes sense that a big invention, the late 90s marriage of computers and communication, would take time to have its full prody impact
  - My favorite example, airport check-in e-kiosks
  - Immelt of GE and Chambers of Cisco, "learning curve 3, 5, even 7 years"

My Conclusions About the Relevance of 1995-2000 and 2000-04

- The ICT boom of 1995-2000 was a unique event created by the invention of the internet. The fast decline in computer prices and high share of ICT investment will not happen again
- The full productivity payoff of the ICT investment bubble plausibly had a lag of three years or more, same timing as cost cutting
- Thus fast productivity and slow employment growth in 2001-03 were flip sides of the two big explanations, cost-cutting and intangible delay
- Layered on top of a standard cyclical early recovery bubble

Where Then Does that Leave Us?

- We can't base future projections on simple averages that are dominated by 1995-2004
- We should pay attention to what's happening to the trend as the actual numbers after 2004:Q2 roll in
- Cyclical "Payback is Complete": Excess of Actual > Trend LP Growth 01:Q4-04:Q2 now has been completely offset by Actual < Trend 04:Q2 – 06:Q4
- Any further actual numbers < trend will pull down the trend
- My current trend of 2.34 is below J-H-S projection out ten years from now

Important Extra Element in Future Forecasts

- J-H-S have been predicting for years that growth in labor quality will slow to near-zero in the future
- Their current estimates are different:
  - 1973-95 0.25
  - 1995-2000 0.19
  - 2000-2005 0.36 (Why?)
  - 2005-2015 0.15

Last Slide, Let's Summarize their Projections in Table 3 as Compared to Mine

- Labor Productivity Growth
  - Base-Case J-H-S 2.49 percent over 10 years
  - Gordon 2.1 percent over 25 years
- Potential GDP Growth
  - Can't Find J-H-S estimate of Total GDP Productivity (I assume 0.4 slower than NFPB)
  - Since hours growth projection is about the same as mine, their implied potential GDP projection is 2.9 compared to my 2.5
- As *The Economist* reported on Oct. 28, current American potential GDP growth already is slower than at any point in its recorded history and will slow further

And That's the News from Lake Wobegon

- Oops, sorry . . .
- and that's the news from Lake Michigan
  - where the productivity pundits are pessimistic
  - their wives are good-looking
  - and all the the weather is above average