Market Quality, Financial Crises, and TFP Growth in the US: 1840 – 2014

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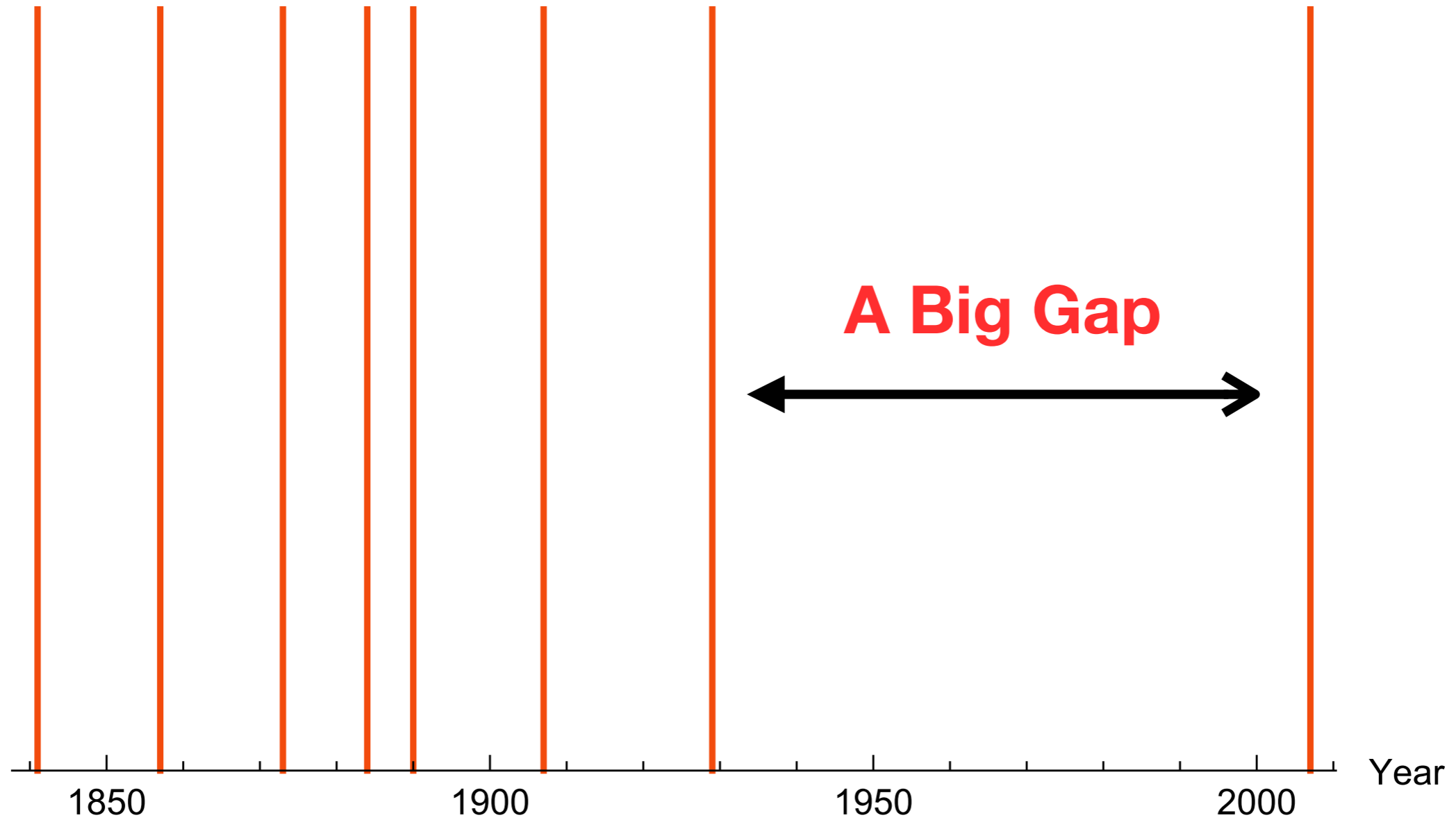
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Two puzzles in search of an explanation

US Financial Crises

Year

1850   1900   1950   2000

A Big Gap
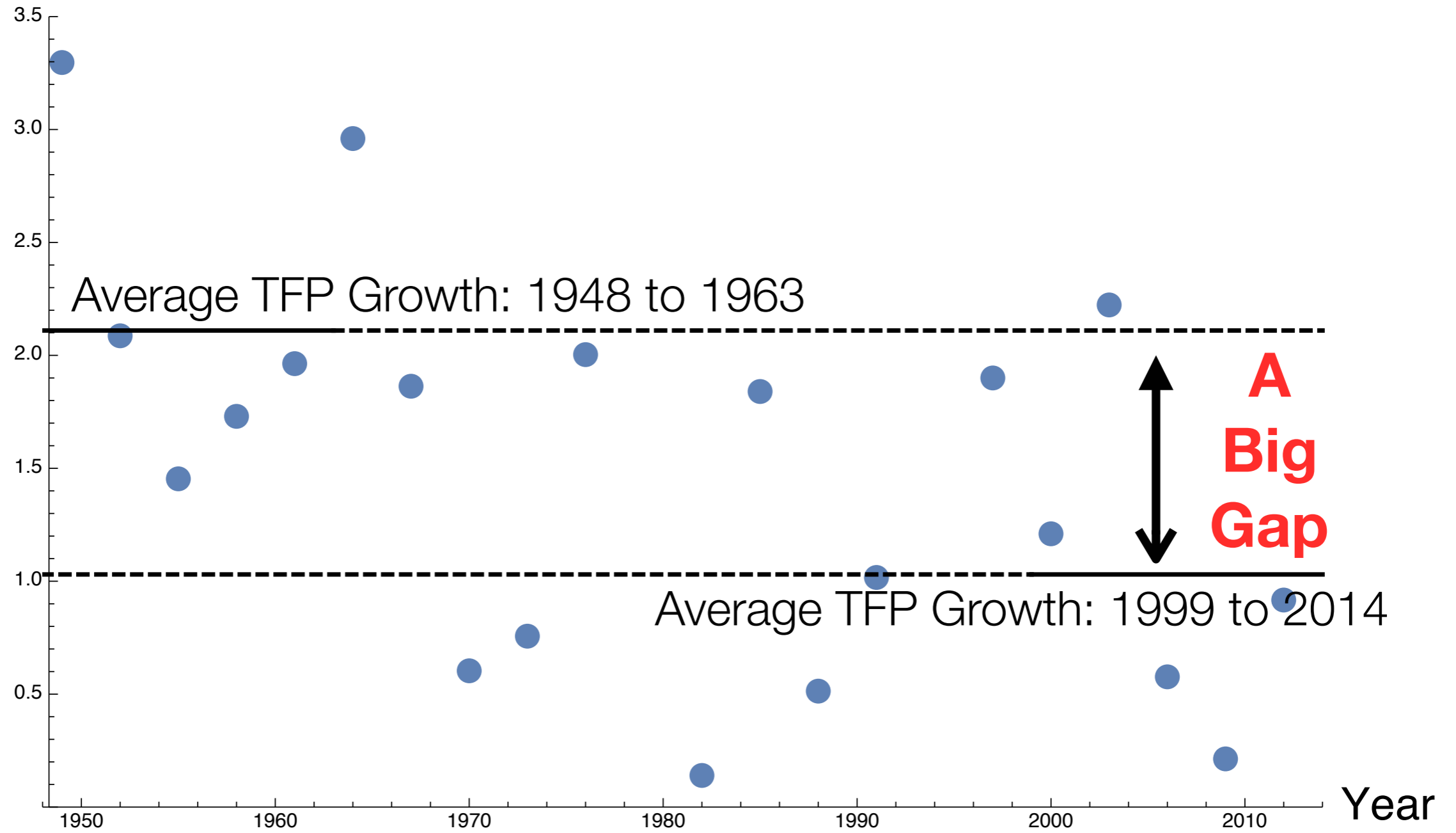
Crisis Date Series: Reinhart and Rogoff (2010), Major Banking Crises dropping those related to wars (1861, 1864, 1914)

US TFP Growth

TFP Growth

Average TFP Growth: 1948 to 1963

A
Big
Gap

Average TFP Growth: 1999 to 2014

Year

Source: Fernald (2012, updated), San Francisco Fed

Our hypothesis

- All firms maximize long-run value; but…

- To get to the long-run, firms must first survive the short-run;

- When market quality is poor (operationally: when market opacity is high), firms need to signal their quality and do so by pursuing **Flash** strategies that deliver immediate returns;

    - Management neglects longer term risks and opportunities, leading to higher crisis risk and lower Total Factor Productivity (TFP) growth

- When market quality is high, firms do not need to signal their quality to the same extent and so can pursue **Substance** strategies (lower crisis risk, higher TFP growth);

- So, as market quality declines, crisis risk goes up and TFP growth goes down.

Market Quality Over Time
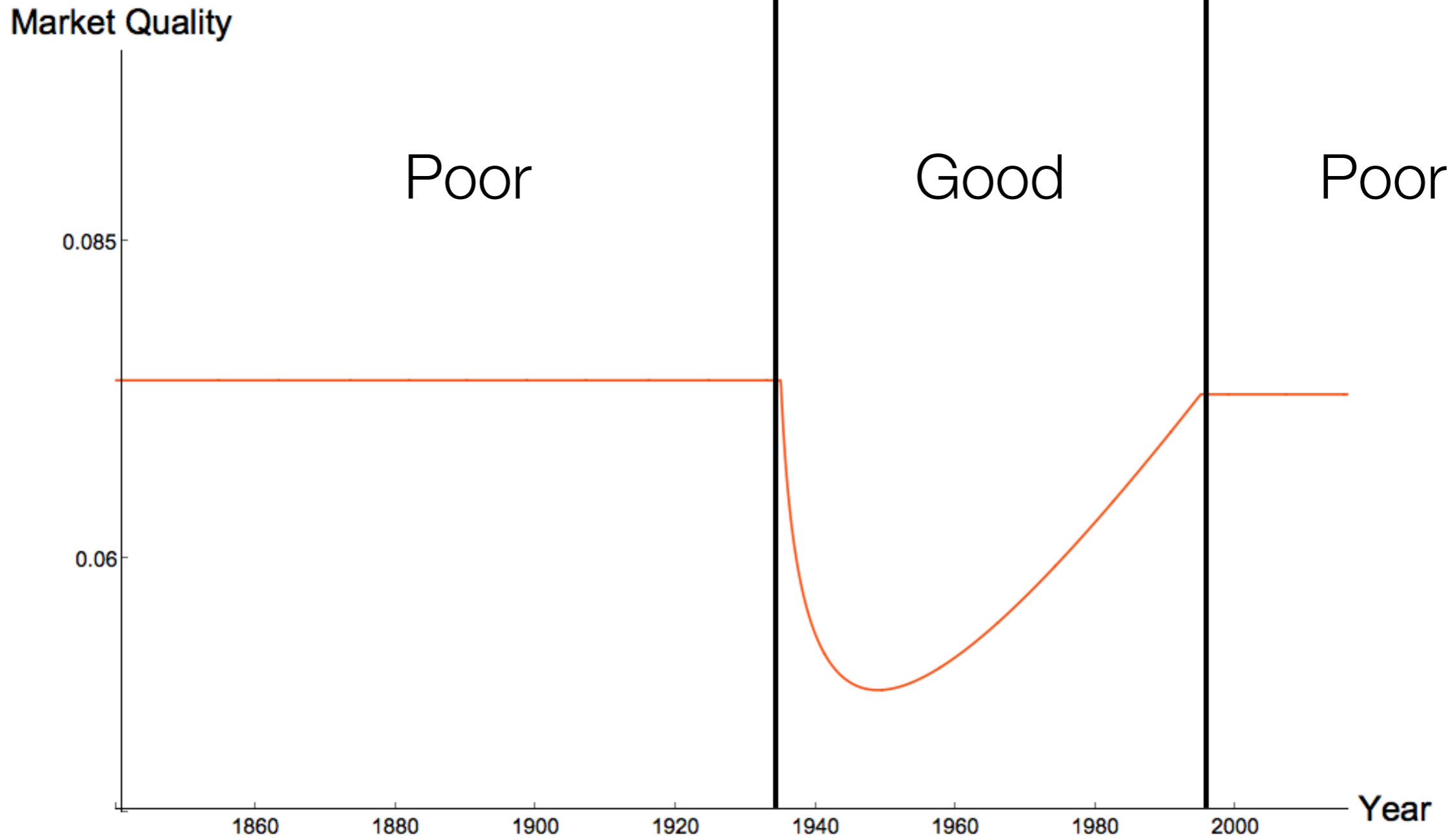
Credit booms, market quality, and crises
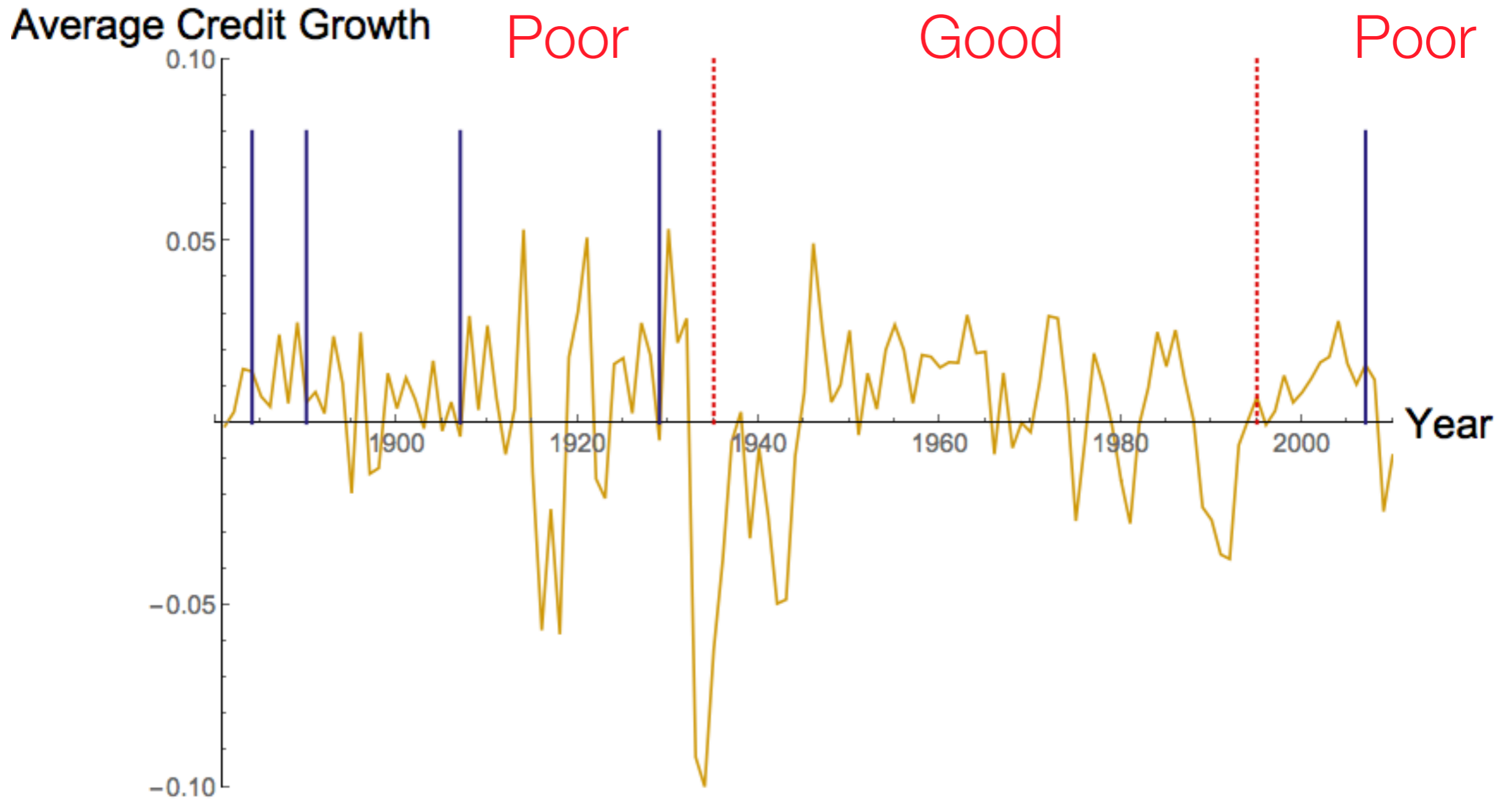
Credit Data: Jorda, Schularick and Taylor Macrohistory Database

Market Quality and TFP Growth
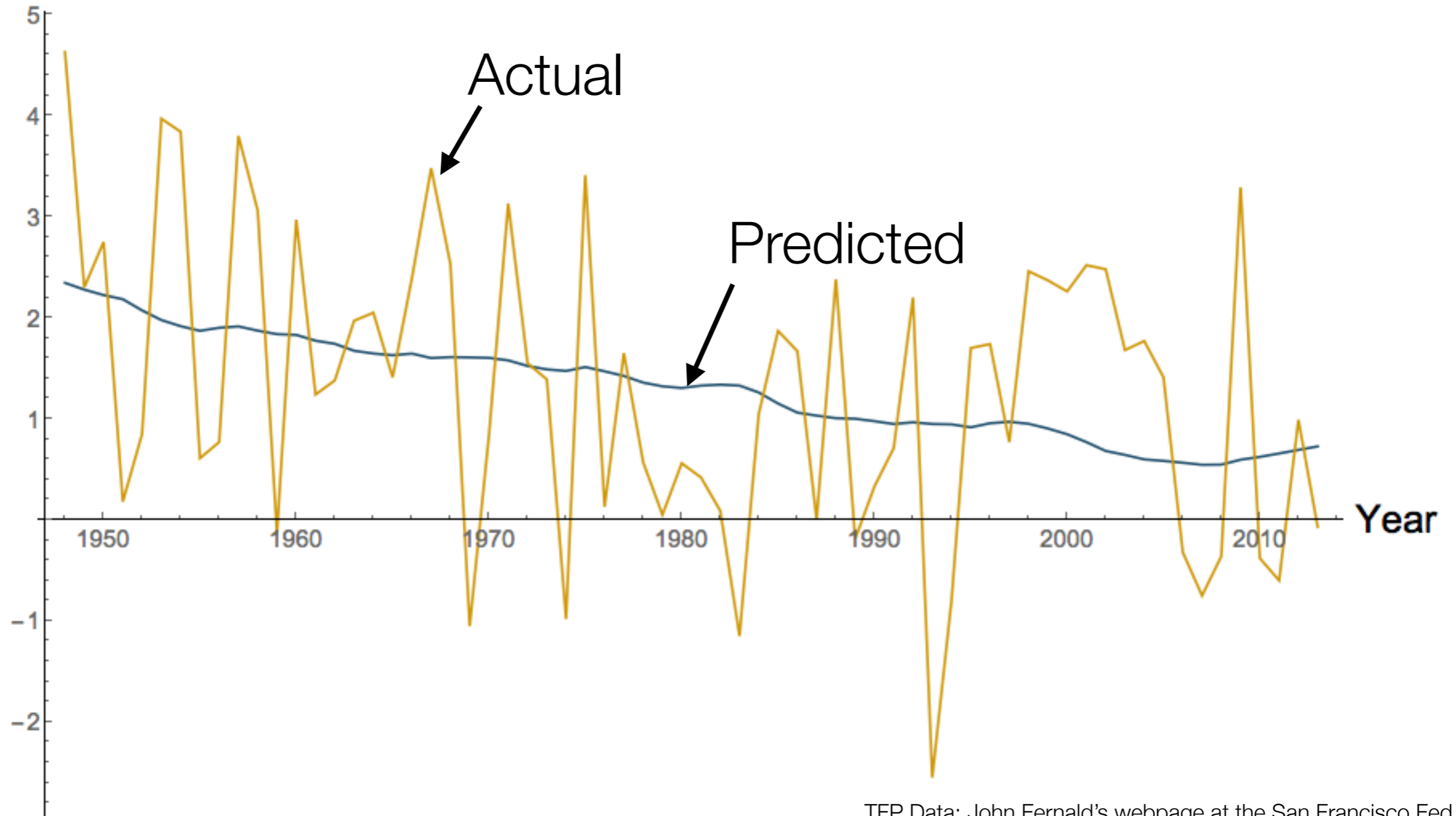
TFP Data: John Fernald's webpage at the San Francisco Fed

Organization

- Derive: i) the relationship between market quality and economy performance; and ii) an empirical measure of market quality;

- Estimate this measure;

- Explore the relationship between market quality and crisis risk;

- Explore the relationship between market quality and TFP growth;

- Caveats

- Conclusion

The Relationship Between Market Quality, TFP Growth, and Financial Stability

The Motivating Idea: No Firm Is An Island

- To be successful in the long-run, a firm needs to attract firm specific investments from outside parties in the short-run;

    - It could be specific human capital investments from employees, and/or firm specific consumption investments by customers (Android or Apple?), and/or firm specific investments by suppliers;

- Outsiders want to be sure that these firm specific investments will be worthwhile;

- So, they only make these investments if they think the firm has a Good project;

- To maximize long-term value, firms therefore have to *signal* that they have a good project in the short-run (that the firm is a Good type);
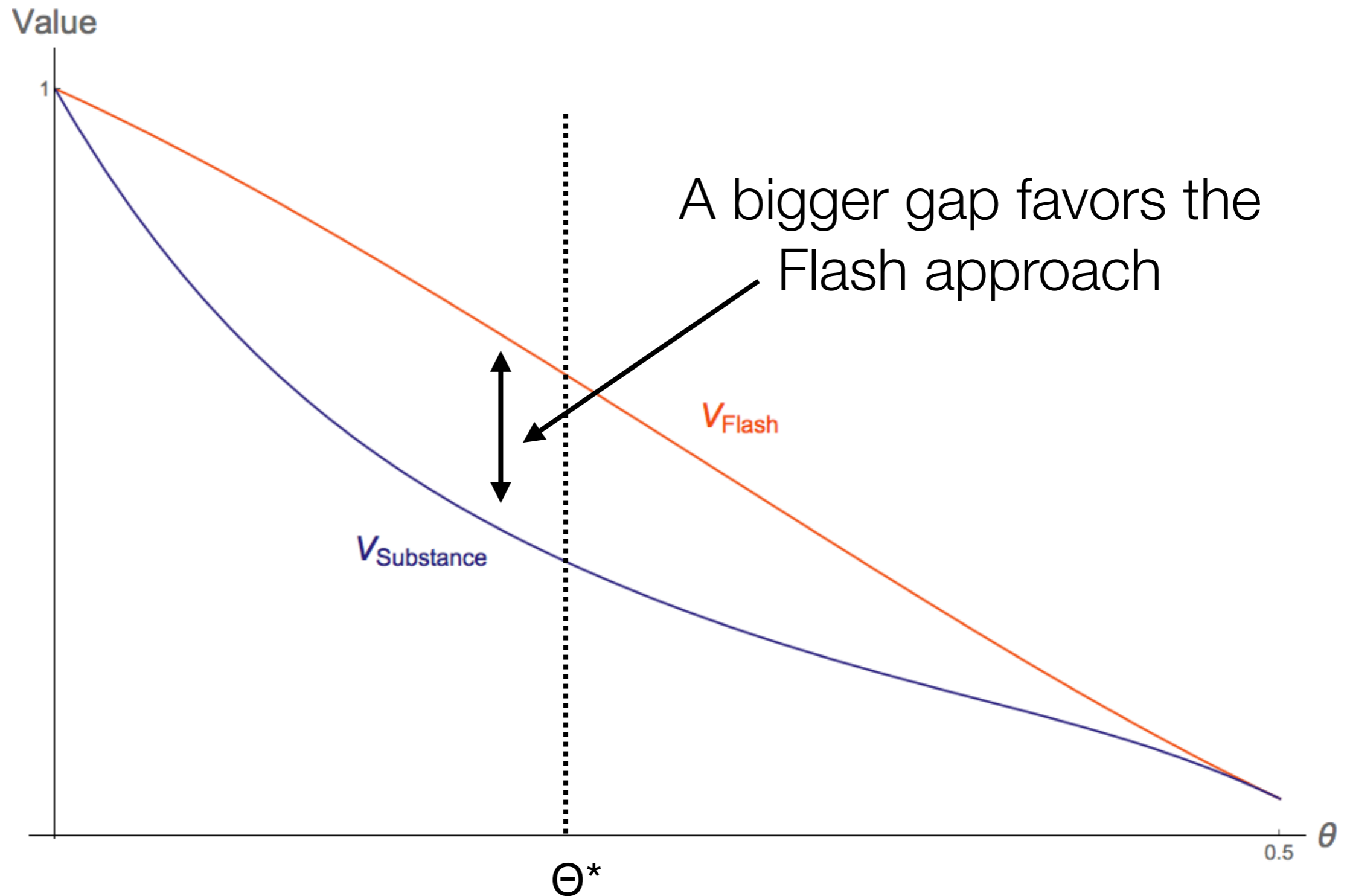
The Firm's Choice: Flash or Substance?

- Each firm generates 1 signal when it is created, and must then choose between a **Flash** approach and a **Substance** approach;

  - Flash: Management focuses upon producing immediate results (in model terms: more signals of project type) while ignoring longer term consequences (more risk, fewer fundamental innovations).

  - Substance: Management focuses upon project value assuming it clears the short-run hurdle, so fewer signals of project type but less long term risk and more fundamental innovation;

  - We assume that the Flash strategy involves an extra effort cost by management, so all else equal firms choose the Substance approach;

- All firms choose the approach that maximizes the PDV of future profit (so, people are not idiots);

Market Quality

- We summarize market quality by the opacity parameter Θ;

    - Θ = the probability that a signal **incorrectly** reveals the firm's type;

    - $0 \leq \Theta \leq 1/2$

    - $\Theta = 0$: Markets are perfectly transparent

    - $\Theta = 1/2$: Markets are perfectly opaque (signals are random);

Market Quality, Expected Firm Value, and Firm Approach

Market Quality And the Flash/Substance Choice

- When markets are perfectly transparent, firms do not need to signal, so firms choose the Substance approach;

- When markets are totally opaque, signaling has no effect;

- When markets are partially opaque, the extra signal the Flash strategy produces is valuable;

- So, assuming that opacity is below a critical level Θ*, the proportion of firms that follow a Flash strategy increases as market quality decreases.

Implications

· As market opacity increases, firms are more likely to pursue Flash strategies;

· As more firms pursue Flash strategies,

- The risk of a crisis increases;

- Productivity growth falls.

Our Measure of Opacity: The Standard Deviation of Idiosyncratic Firm Returns
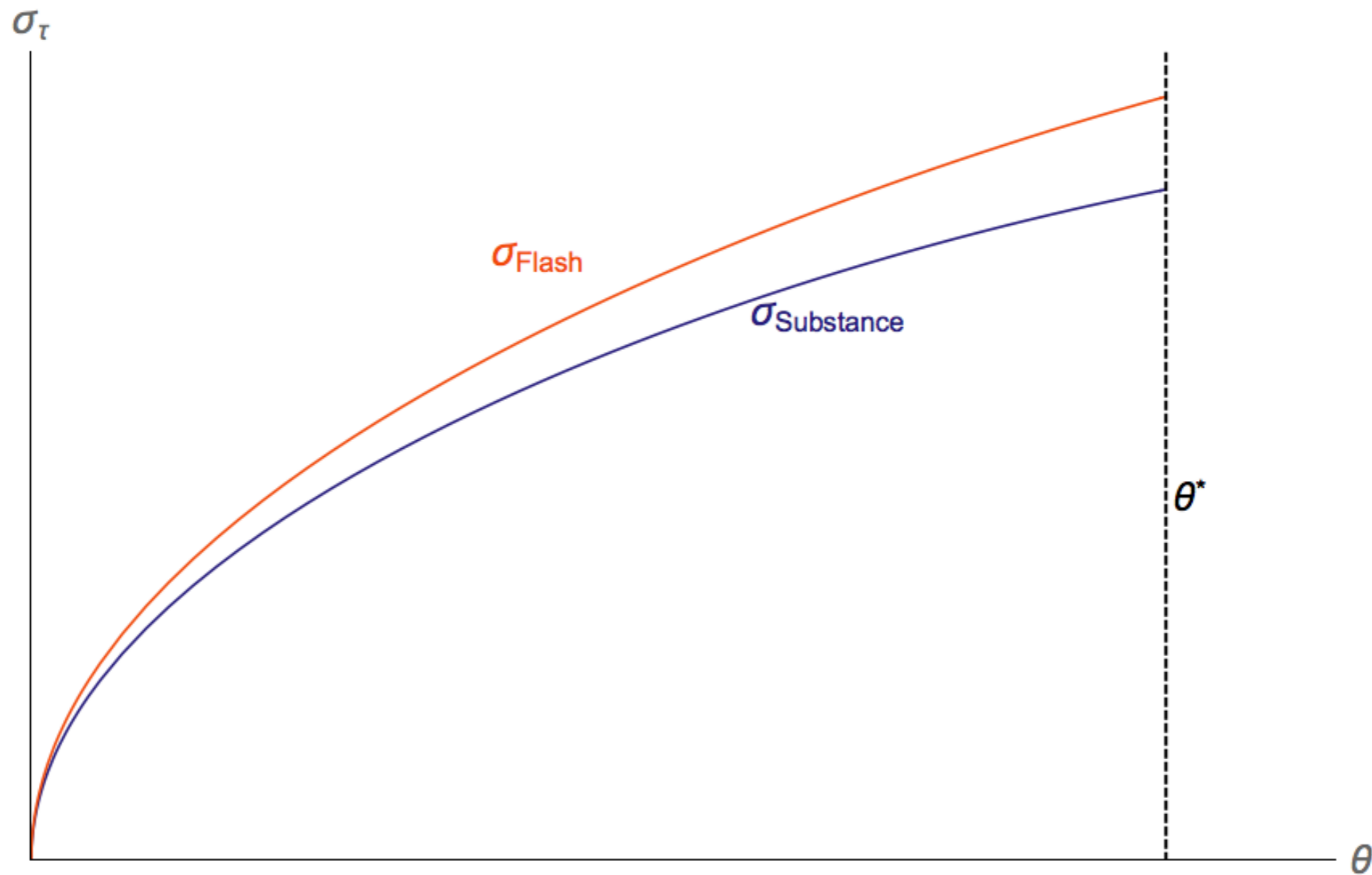
Measuring Opacity

- When markets are opaque, a Good signal increases firm value (by making it more likely that outside parties will make the firm specific investment) and a Bad signal decreases firm value;

- As signals become more important, the impact on firm value increases:

    - Implication: The Standard Deviation of Firm Returns Increases

    - The Flash approach involves more signals and so an even higher Standard Deviation of returns;

- So, as Opacity increases, the sigma increases for all firms and firms shift from lower sigma Substance approaches to higher sigma Flash approaches;

- Our Measure of Opacity: The standard deviation of idiosyncratic firm returns;

Measuring Market Quality

Θ: Our proposed measure

Θ = The standard deviation of idiosyncratic firm returns (σ) net of transitory market effects

The standard deviation of idiosyncratic firm returns

- A firm's idiosyncratic return equals its return net of the median return of comparable firms to eliminate any impact from industry/market shocks;

  - Comparable firms: Same 3 digit SIC code, same size decile, some combination of size and industry;

  - We use monthly returns;

Transitory market effects

- Market wide volatility

  - Control: the St. Dev. of the market index return over the past year;

- Market upswings and downswings

  - Control: Market Return

- Time series effects

  - We use a Garch (1,1), AR 3 specification
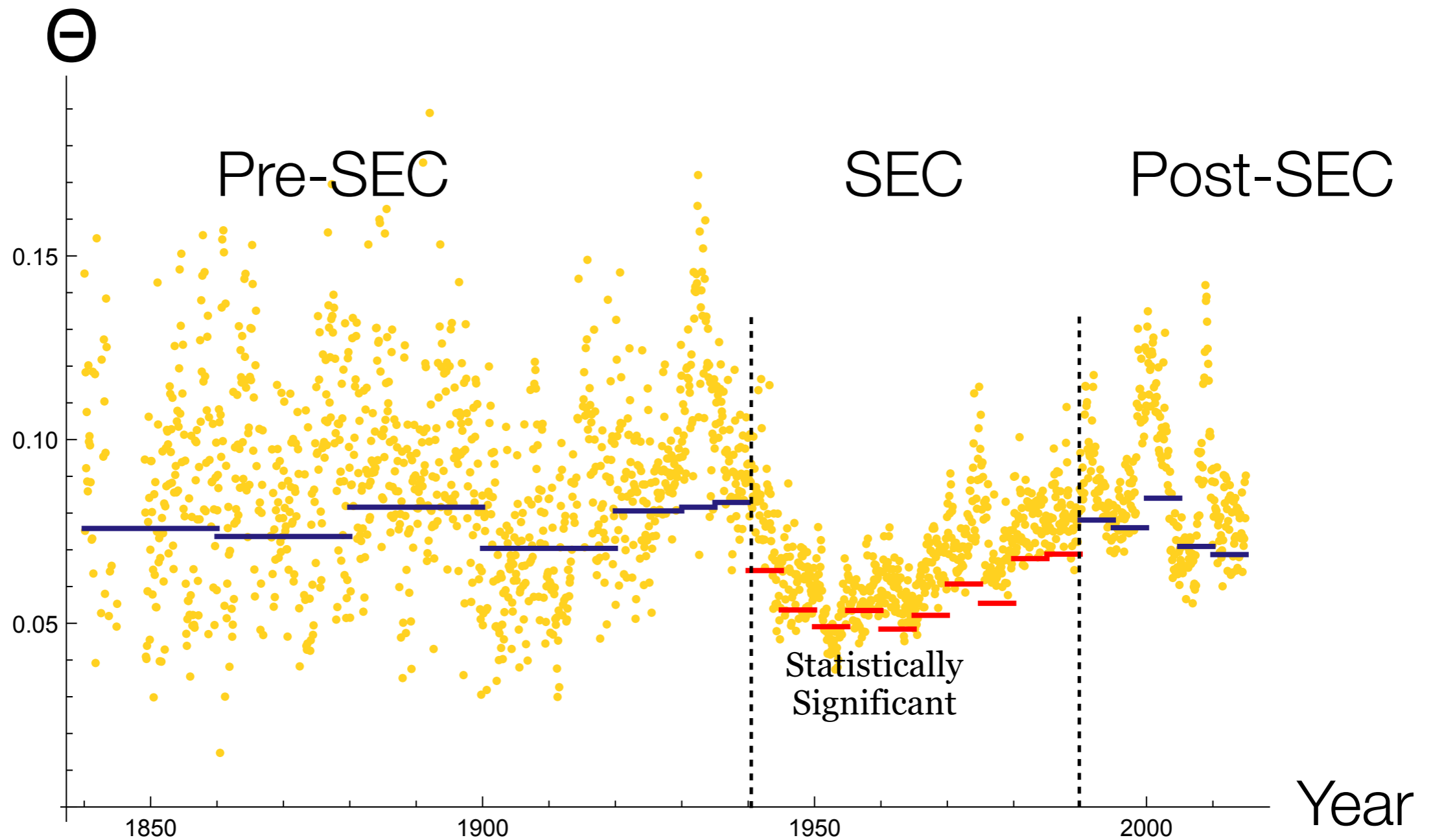
Possible factors affecting Θ

- The SEC reforms of 1934:

    - The SEC was created in 1934 with the express aim of reducing market opacity;

        - The SEC reforms built upon and extended post-crash reform efforts begun by the NYSE;

    - We can see if these reforms mattered.

Data

- Sample: NYSE listed firms, monthly returns;

    - 1840 – 1925: Old New York Stock Exchange Project, Yale School of Management

    - 1926 – 2016: CRSP

- Why the US?

  - We have a long Pre- and Post-Regulation series;

  - With 177 years of data we have enough crises to do some exploratory empirical work;

  - We do not have to figure out how to control for country differences;

The evolution of σ: Time dummies Alone

Θ

Pre-SEC   SEC   Post-SEC

0.15

0.10

0.05

Statistically
Significant

Year

1850   1900   1950   2000

A. No Long Term Trend   B. The SEC Reforms Mattered

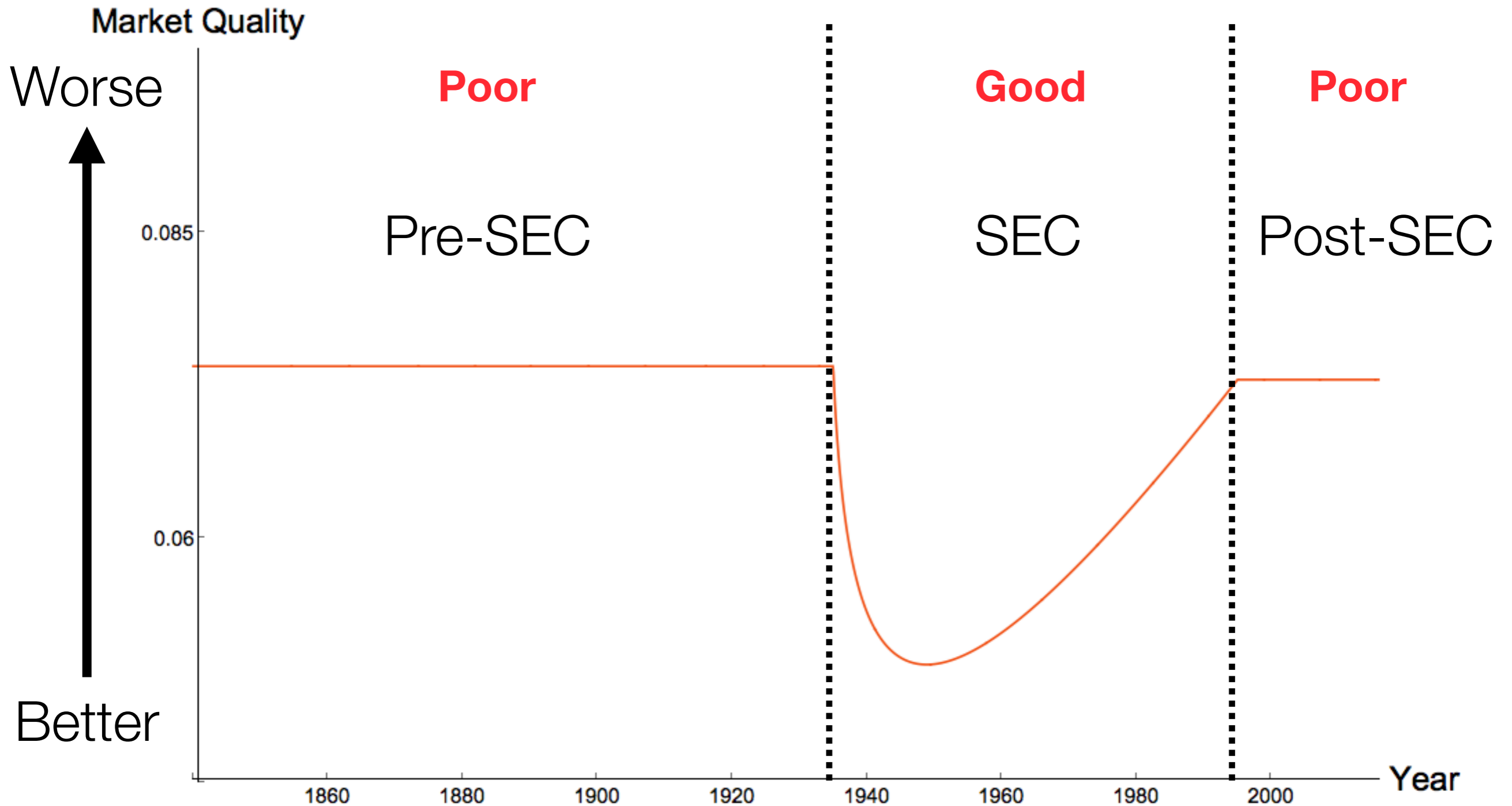# The evolution of Θ and the SEC

- We can model the evolution of σ parsimoniously by replacing all the time dummies with an SEC effect:

    - LogSECTime = Log[1 + Years Since 1935]; and

    - SECTime: Years Since 1935

    - We cap the Years at 65 as the SEC regime has then reached its terminal state;

The evolution of Θ
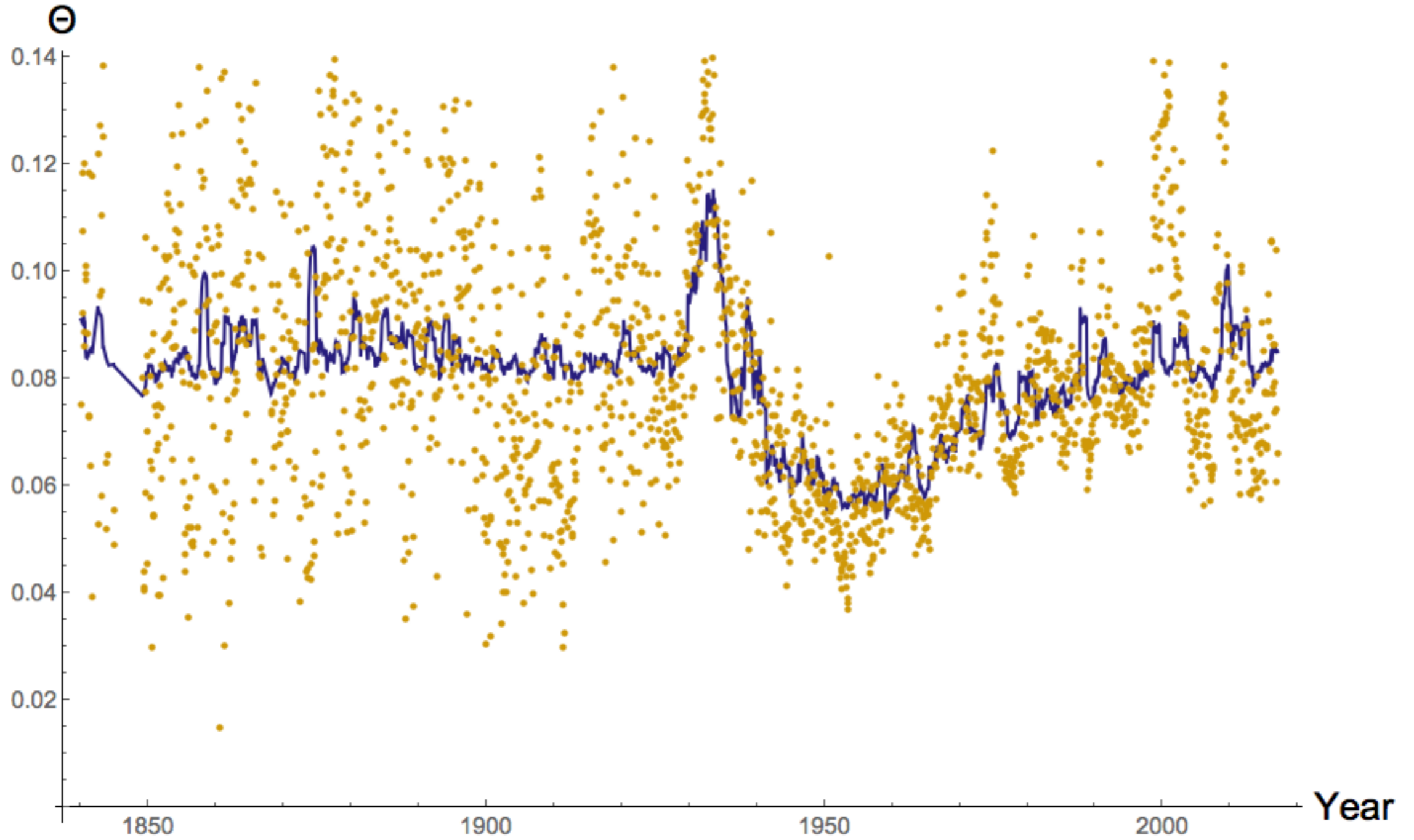
Fundamental Opacity (Subtracting Out Market and Time Series Effects)

The evolution of Θ and market performance

- Our model implies that changes in market quality will have a profound impact upon overall economic performance by changing optimal strategies;

- We have a significant amount of variation in market quality over our sample period;

- So, let's see what happens.

Credit Booms Don't Cause Crises, People Cause Crises

Our hypothesis

- The current view: Financial crises occur when a credit boom goes bad;

  - Schularick and Taylor (2012)

- Our take: Credit booms increase crisis risk only when firms pursue Flash strategies;

- Test:

  - Does the probability of a crisis depend upon Θ?;

Credit booms, market quality, and crises: Non-Parametric Test
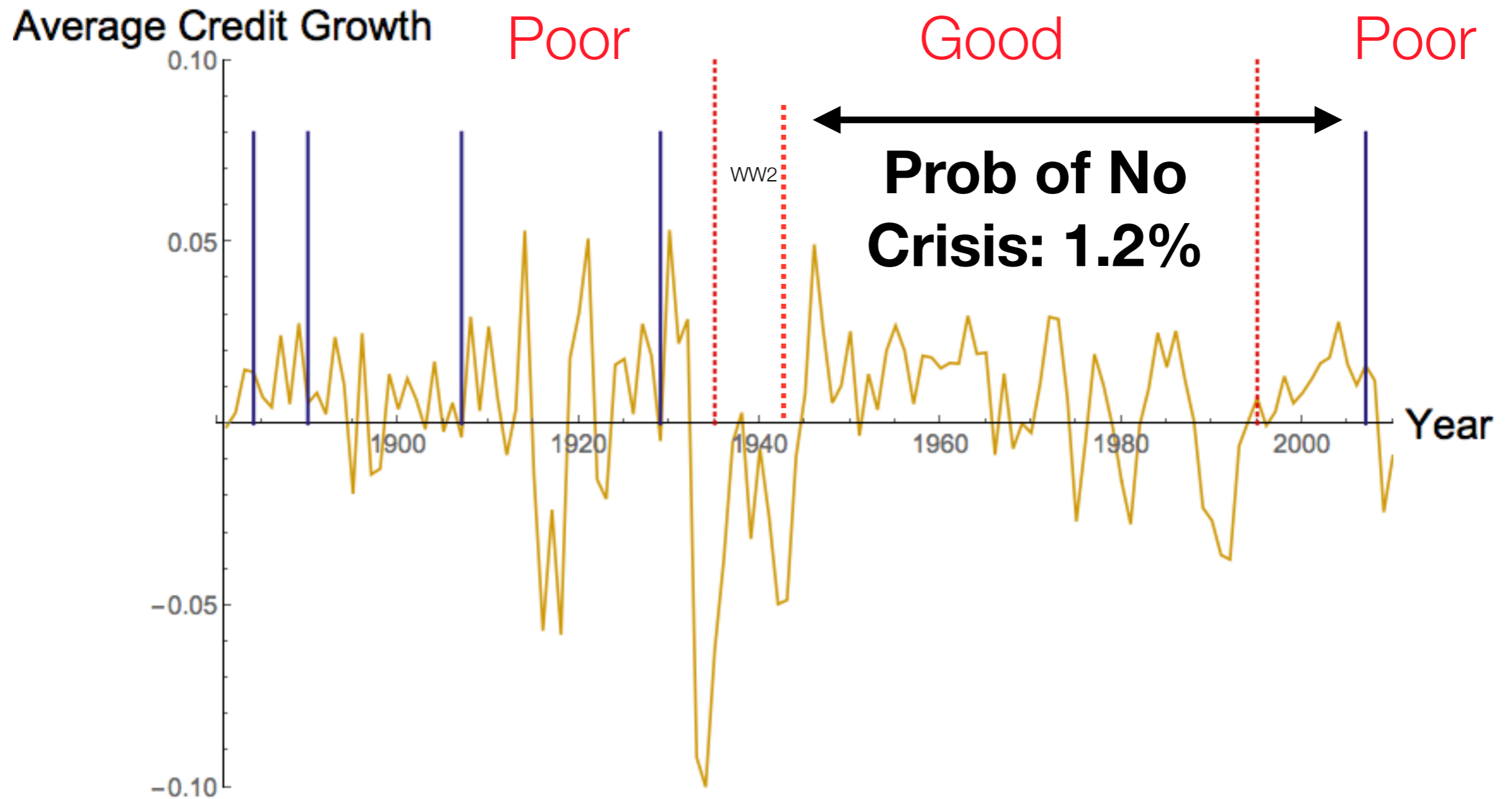
Credit Data: Jorda, Schularick and Taylor Macrohistory Database

Crisis Probability and Market Quality: Non-Parametric Test

- In times of poor market quality (1840 to 1935, 1996 to 2016), the probability of a crisis is: 7% per year;

  - 115 Years, 8 Major Crises

- If the Probability of a Crisis remained at 7% during the 1945 to 1995 period of high market quality, then the probability of **not** observing a major crisis between 1945 and 2006 equals 1.2%;

  - If we have returned to a high crisis probability era, then the probability of observing at least on crisis between 1996 and 2016 is: 76%

- Conclusion:

  - The probability of a crisis does decreases as market quality increases;

  - We are back in a high crisis probability regime.

Crisis Probability and Market Quality: Parametric Analysis

- Estimate the probability of a crisis using a logit as a function of credit booms and opacity:

    - Prob[Crisis] = -9.19 + (62.8 x Credit Growth) + (76.4 x Opacity)

    - Credit Growth has the right sign, but it is not statistically significant (t = 1.27);

    - Opacity has the right sign, but is also (barely) not significant (t = 1.54)'

    - Of course, we have a very small sample!

- Estimate the probability of a crisis as a function credit booms/high market quality interaction

    - Create Low Market Quality Dummy = 0 for 1935 to 1995, 1 Otherwise;

    - Credit Boom/Market Quality = Credit Growth x Low Market Quality

    - Prob[Crisis] = -4.0 + (100 x Credit Boom/Market Quality)

    - Interaction highly significant (t = 5.27)

    - R2 = 13%

- Conclusion: Credit booms on there own don't increase crisis risk, credit booms in poor quality market increase crisis risk.
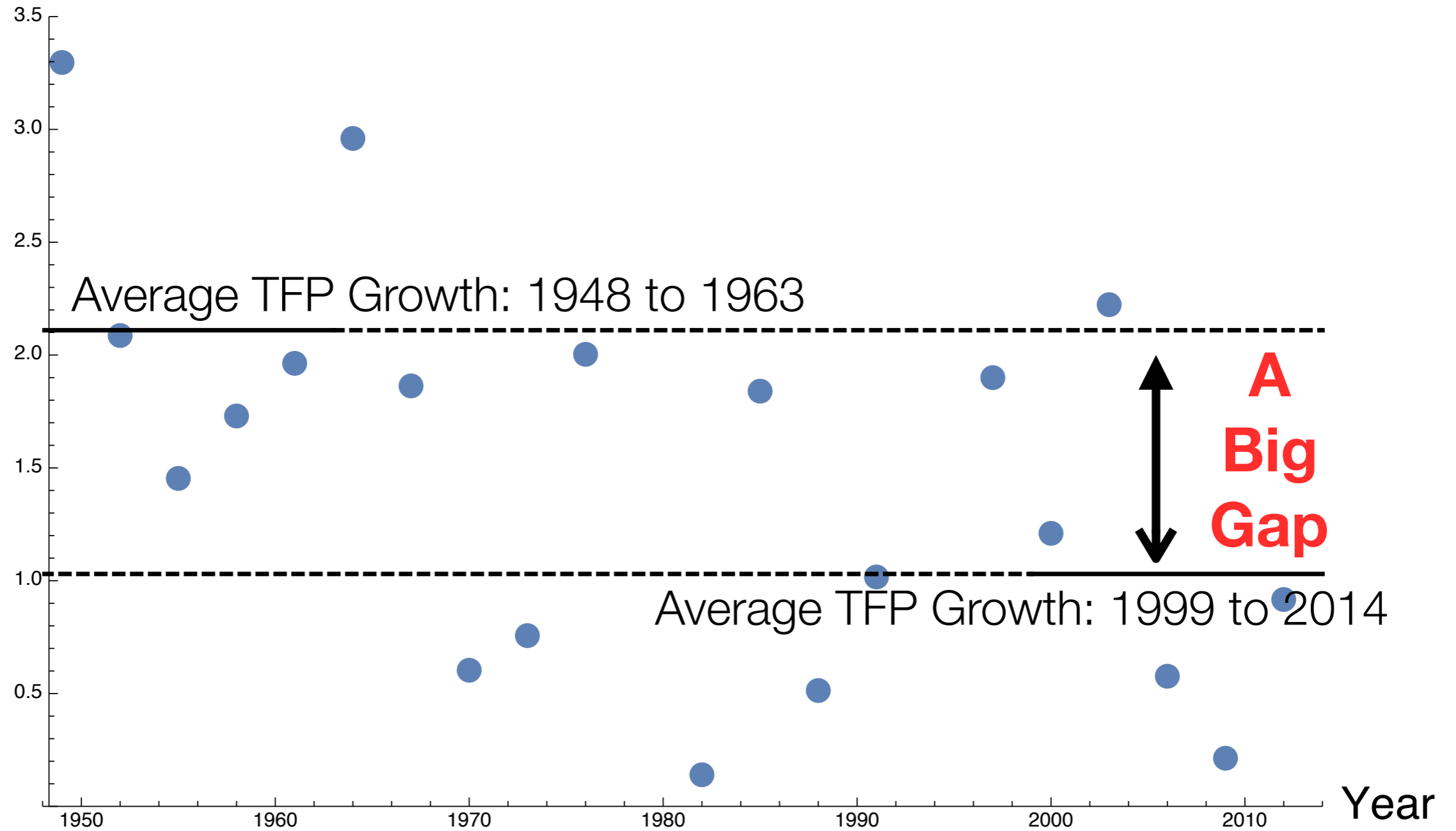
Implications: MacroPru or MacroConduct?

- Credit booms are fantastic;

- Instead of trying to reduce crisis risk by stomping on credit booms, it would be better to reduce crisis risk by improving market quality.

The Decline in US TFP Growth: No Wave or No Surfing?

US TFP Growth

TFP Growth

Average TFP Growth: 1948 to 1963

A Big Gap

Average TFP Growth: 1999 to 2014

Year

Source: Fernald (2012, updated), San Francisco Fed

TFP Growth

Corporations ride a wave of technological change to create
improved products and processes

Robert Gordon's Explanation for the Decline in TFP Growth

Gordon's Explanation: No Wave

- In a series of influential papers, Robert Gordon argues that US economic growth is basically over;

    - TFP growth has been due to three never to be repeated industrial revolutions;

    - As the reverberations of those revolutions fade away, TFP growth will basically stop;

    - Evidence: TFP growth has been falling, and no-one has a better story

        - Gordon (2012 and 2014): Free from the NBER

        - Gordon (2016), *The Rise and Fall of American Growth*: on sale now

Our Explanation for the Decline in TFP Growth

Our Explanation: Flash Over Substance

- In a high Θ world, managers will devote more effort to Flash strategies that produce immediate results (looking good now) and less effort towards Substance strategies that produce fundamental innovations;

- So, as market quality declines, TFP growth declines too;

- Unlike Gordon's conjecture, we can test this idea.
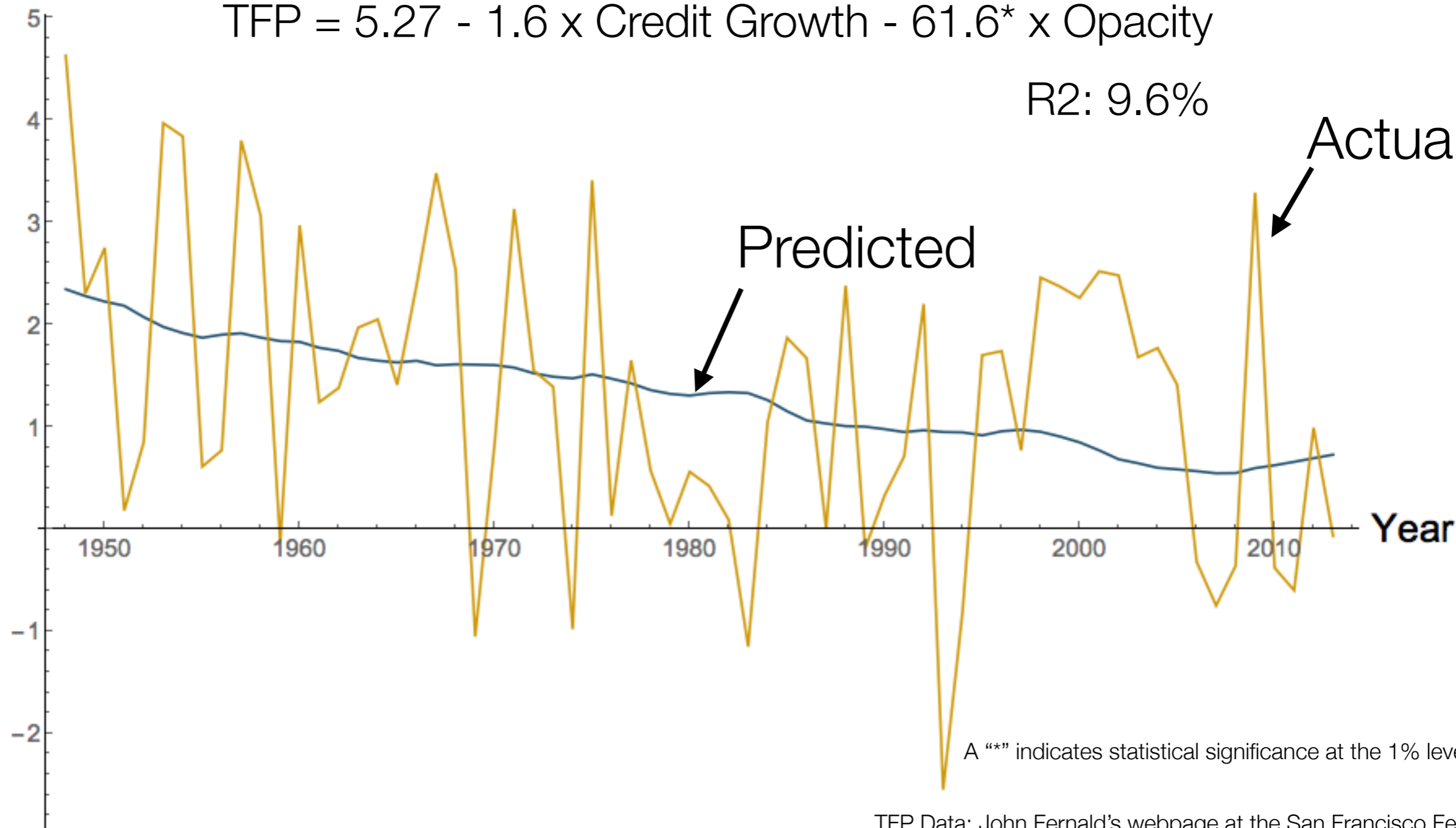
Market Quality and TFP Growth

TFP = 5.27 - 1.6 x Credit Growth - 61.6* x Opacity

R2: 9.6%

Actual

Predicted

A "*" indicates statistical significance at the 1% level

TFP Data: John Fernald's webpage at the San Francisco Fed

Market Quality and TFP Growth

- Opacity has a strongly negative and highly statistically significant effect upon TFP growth;

    - Credit growth does not (in the US case) have a statistically significant effect;

- The decline in market quality over the post-war period does an excellent job of explaining the path of US TFP growth;

- Our analysis suggests that the decline in US TFP growth is due to optimal firm reactions to the decline in market quality.

Caveats

Caveats

- We have a rigorous theory that leads to surprising empirical predictions, and our empirical predictions are supported by the US experience of major financial crises and TFP growth;

- That said:

  - We don't have that much data (8 crises), so we cannot control for possible alternative hypotheses;

  - We look at one country, so we can't rule out the hypothesis that what we find is some weird post-depression/post-war effect that just happened to coincide with our period of High Market Quality;

- Our analysis is not wrong (at least not yet), but we need to test the robustness of our results by expanding the analysis;

MacroConduct Policy

Macro-Conduct Policy

- The financial market quality plays a central role in determining the overall level of economic performance (stability and growth);

- Financial regulation can play a key role in bringing about financial markets that work well;

- **MacroConduct Policy**: Strategically regulating financial markets so as to get them to work well;

    - There is no (or, at least, *there does not need not to be*) a growth/stability trade-off;

    - MacroConduct policy can reduce the immediate risk to financial stability (crisis risk) and also the long-run risk to financial stability produced by low growth;

Next steps

- Find a cure

  - Expand the analysis to be sure that we are on the right track;

  - Assuming that our diagnosis of the problem holds up…

  - We need to find methods/policies that can replicate the beneficial impact of the SEC for markets as they are now;

We don't need a new Glass-Steagall, we need a new SEC

No pressure, but 1 or 2 more crises and…