The Art and Science of Debt Sustainability Analysis

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Trade and Development Board
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DSA: The economist's view

$$\Delta d = (i - g)d - ps$$

$$D_t \leq \sum_{k=0}^{\infty} \frac{E_t(PS_{t+k})}{\prod_{j=1}^{k}\left(1 + E_t(i_{t+j})\right)}$$

IMF/WB DSA

PS=Primary Surplus =>
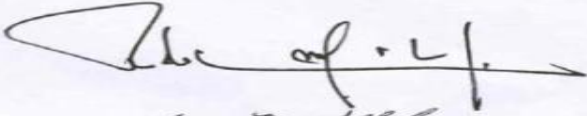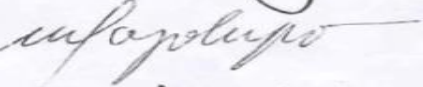Gov't revenues-
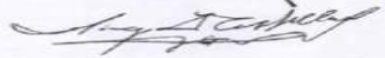Gov't expenditures excluding interests

COMPLICATED MATH
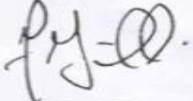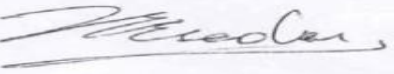
DSA: The policymaker's view

Carta de Lima

Lima, 29 de marzo del 2004

Los Gobernadores del BID que firman este documento, presentes en la XLV Reunión Anual de las Asambleas de Gobernadores, en Lima, Perú, acordaron manifestar de manera

8. Preocupados por la efectividad de las inversiones públicas y considerando que los proyectos de inversión financiados por los Organismos Financieros Multilaterales son sometidos a un riguroso análisis técnico por parte de esas instituciones, tanto en la obtención de los préstamos como en el seguimiento de los proyectos, los Gobernadores defienden de igual manera que estas inversiones tengan un tratamiento diferenciado en el cálculo de los parámetros a los que están sometidos los gastos corrientes.

DSA 2.0

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- Incorporate public investment
- But, how do you measure quality?

Measuring Policies

Figure 12. Correlations Among Public Investment Institutions
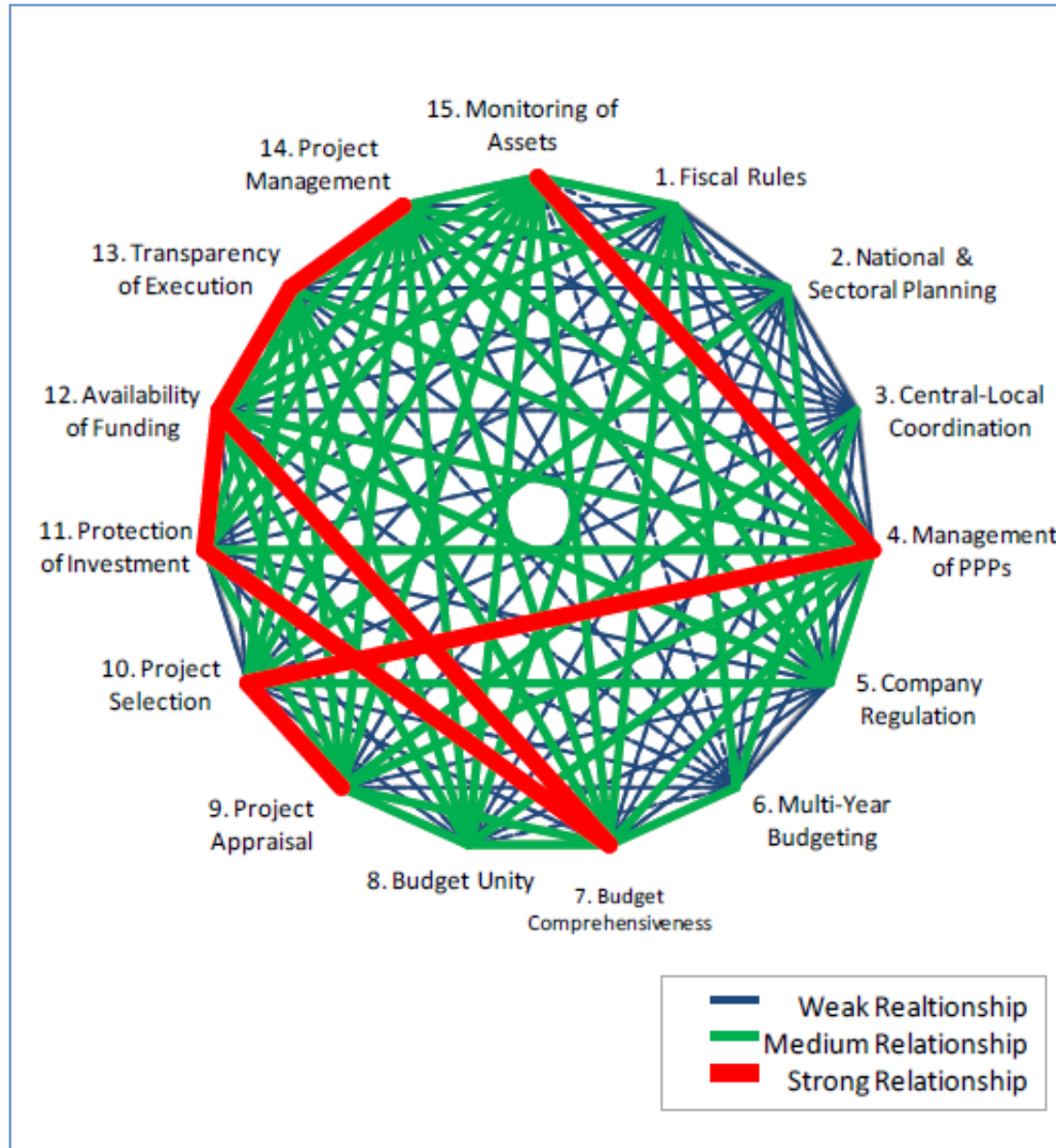
Policies & Effectiveness

b. PIE-X (Physical Indicator) to PIMA Score
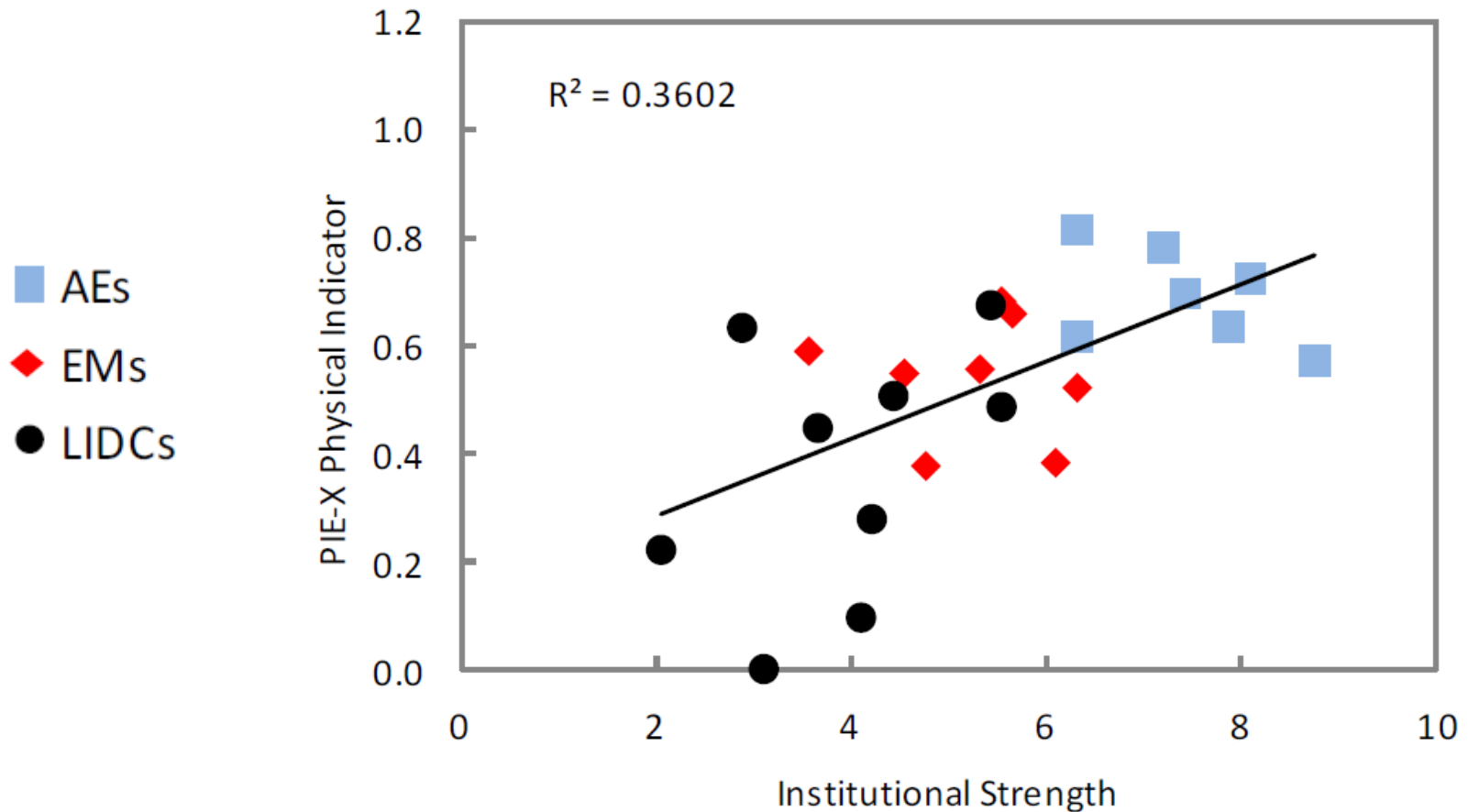
Policies & Effectiveness
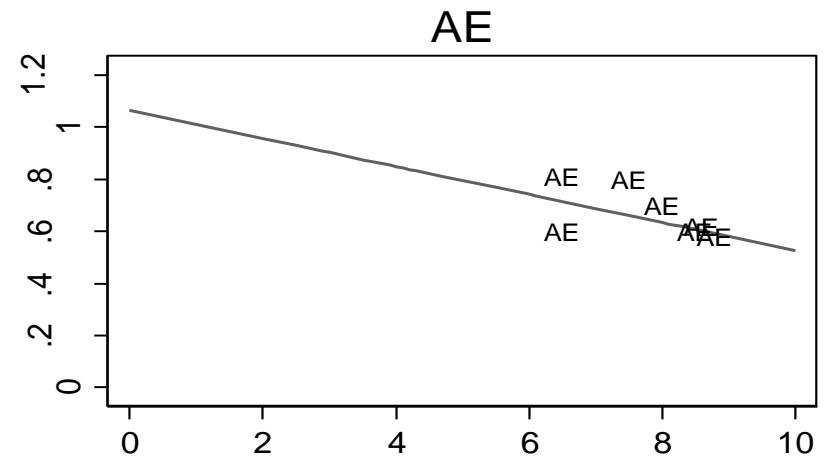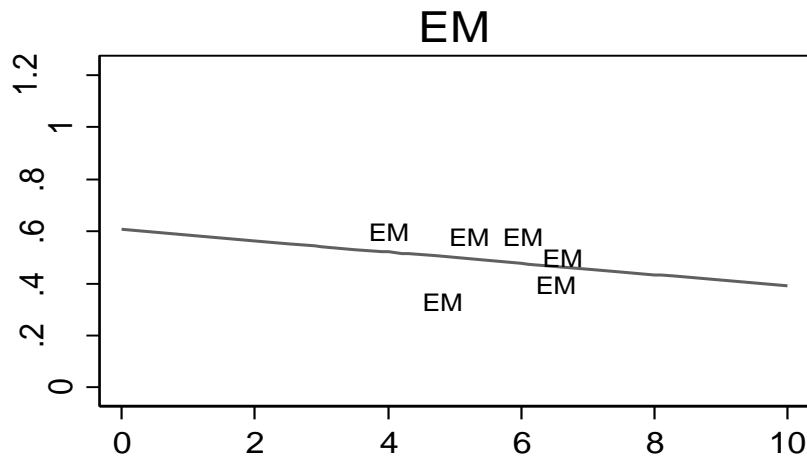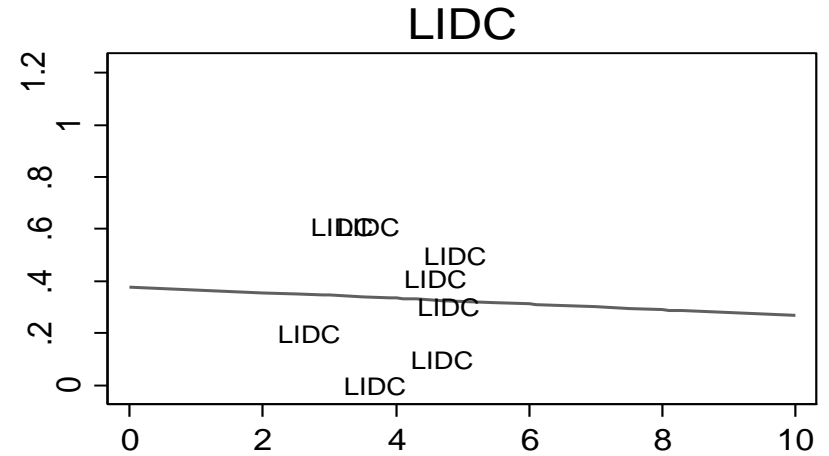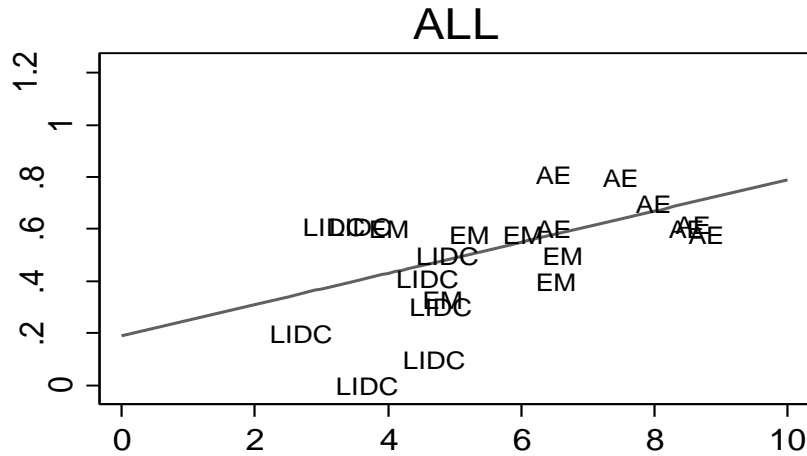
PIMA

Challenges

- PIMA
  - 45 indicators
  - Mixes policies with outcomes
  - Link with effectiveness
  - Link with Growth

Challenges

- DSA 2.0
  - Complex
  - Assumptions may conceal biases
  - Looks like science

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Art & Science

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A POLICY PROPOSAL

Why do we need the tool?

- DSA/DSF have essentially two uses
  - They are used to give policy advice
  - They are used to allocate concessional resources
- For policy advice, we are stuck and we need a mix of art and science
- For allocating concessional resources, we could think about contingent mechanisms which explicitly incorporate uncertainty

Quick summary of the DSF for allocation of concessional resources

- ..we forecast growth over the next twenty years
- ..we look at the quality of policies and institutions
- ..and we decide whether a country will be able to repay
- If so, more money at concessional rate (green light countries)
- If not, less money in form of grant (red light countries)
- There are also yellow light countries
- The problem is that the noise to signal ratio is huge
  - In the late 1960s many economists thought that Ghana would achieve rapid growth and nobody thought much of South Korea

It ain't what you don't know that gets you into trouble. It's what you know for sure that just ain't so (Mark Twain)
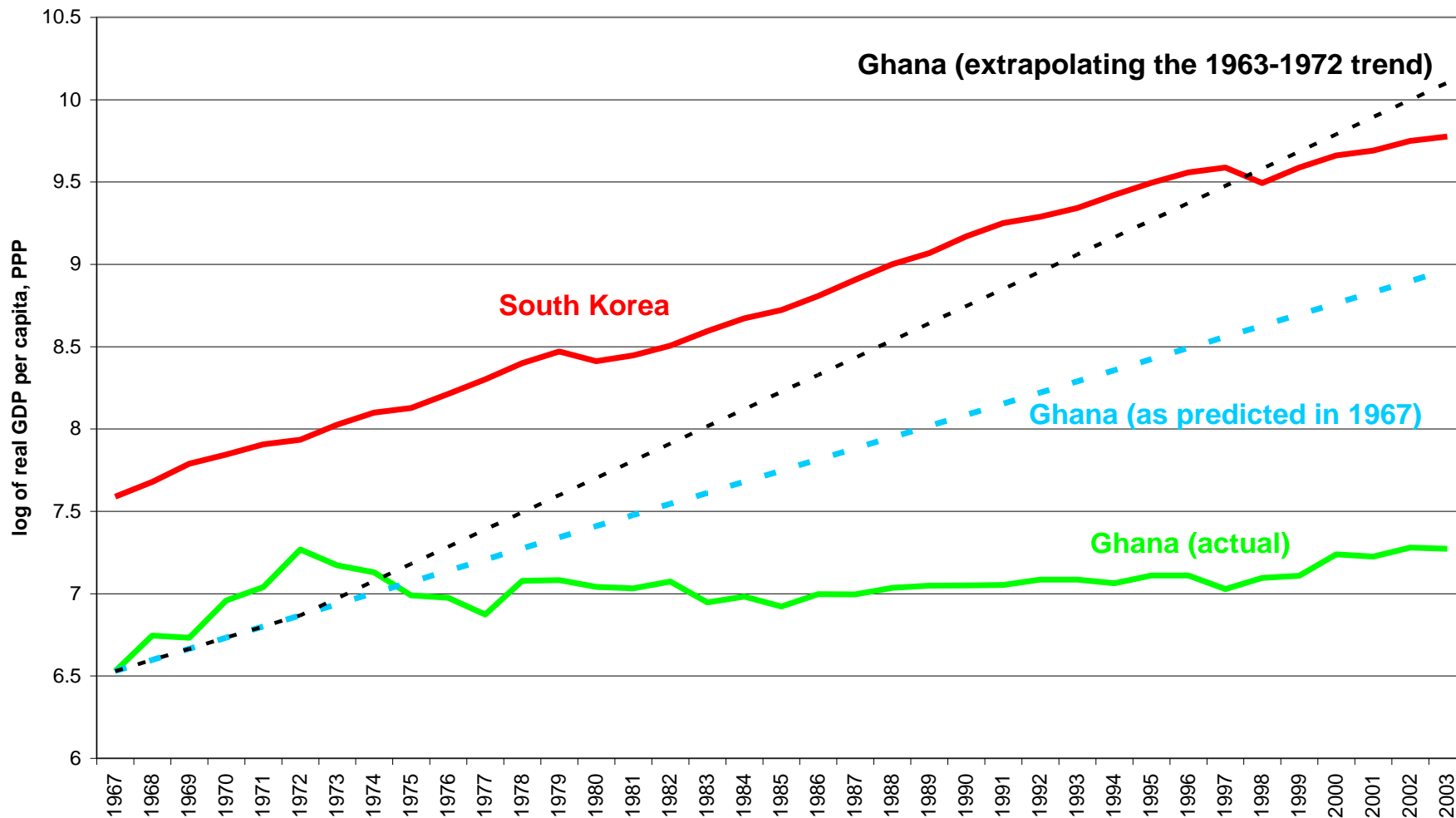
The problem with crystal balls

- *(This)… may be the best theoretical indicator of sustainability, <u>it cannot however be constructed … one must make projections of **g** far in the future, far beyond what is known with any accuracy</u>.*
  - Blanchard (1990)

Predicted growth versus actual growth AEs vs LICs

- I took a sample of **21 AEs**, computed real average GDP growth for the period 1988-1997, and used this historical average to predict output for 1998-2008

- Then, I compared this forecast with actual output in 2008
  - The median difference was **2%**
  - The difference ranged between **-23% and +22%**

- I repeated the previous exercise using a sample of **38 LICs**
  - The median difference between actual and predicted growth was **39%**
  - This difference ranged between **-96% and 106%**

Mission impossible?

- Writing about OECD countries, Blanchard (1990) argued that it is hard to predict growth and this makes forward looking DSAs (or FSAs) very difficult

- Talking about LIC and EMs, Wyplosz (2005) says:

  – *DSA is <u>mission impossible</u>, ...as sustainability is entirely forward looking... any indicator will be both <u>arbitrary and too imprecise to serve as tool for policy prescription</u>.*

Navigating the loans *versus* grant debate without a crystal ball

- If we don't know whether countries will be able to repay, why don't we just move from *ex ante* to *ex post* grants?
  - A proposal in the spirit of Niels Bohr
    - *We all agree that your theory is crazy. The question that divides us is whether it is crazy enough to have a chance of being correct.*
      - (Niels Bohr to Wolfgang Pauli after Pauli's presentation of Heisenberg's and Pauli's nonlinear field theory of elementary particles, Columbia University, 1958)

The Bohr proposal

- Allocate official credit on the basis of need under the assumption that countries will be able to repay (possibly after a grace period)

- Set the repayments of official loans as a fixed percentage (up to a maximum) of the borrower's GDP

- Grants come *ex-post* (like in HIPC) but the rules are decided *ex-ante*

The Bohr proposal: Advantages

- No need for crystal balls
  - Grants will only go to countries that really need them
    - There are many sources of uncertainty besides commodity prices and natural disasters
- It gives the right incentives to lenders
  - No loan pushing
  - Less irresponsible and tied lending

The Bohr proposal: Problems

- Moral hazard
  - 1 Less incentives to grow
    - See Paul Krugman
  - 2 Fake statistics
    - This is a serious issue, we do need better statistics
  - 3 New lenders may jump in after (or before) the country gets debt relief
    - Prohibit (or limit) new borrowing (as it is done now)
    - Allow new borrowing only if it has the same GDP clauses as existing debt
      - Silver lining: this would jump start the market for GDP indexed bonds
- How do you determine needs?
- The actual aid envelope is only known ex-post
  - This is OK, rich countries should be more able to bear risk
  - With temporary shocks, payments could be postponed but not cancelled
    - The maturity of the loan is not fixed in advance
      - Like highway concessions in Chile (Engel, Fischer, and Galetovic, 2001)
- Nasty regimes
  - Adopt an odious debt doctrine (nobody will lend to them)

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APPENDIX

Predicted minus actual GDP at a 10-year horizon (%)

OECD Countries

```
                                diff
_____
           Percentiles      Smallest
  1%       -.2334607       -.2334607
  5%       -.1661483       -.1661483
 10%       -.1506397       -.1506397       Obs                      21
 25%       -.1239834        -.146919       Sum of Wgt.              21

 50%       -.0223748                        Mean              -.0248405
                           Largest          Std. Dev.          .1101229
 75%         .035207        .0852545
 90%        .1097457        .1097457        Variance            .012127
 95%        .1159416        .1159416        Skewness           .1472977
 99%         .219516         .219516        Kurtosis           2.673178
```

Predicted growth versus actual growth OECD countries

- 2 countries out of 21 have a forecast error bigger than 20%

- 7 countries have a forecast error that ranges between 10% and 20% (in absolute value)

- 2 countries have a forecast error that ranges between 5% and 10% (in absolute value)

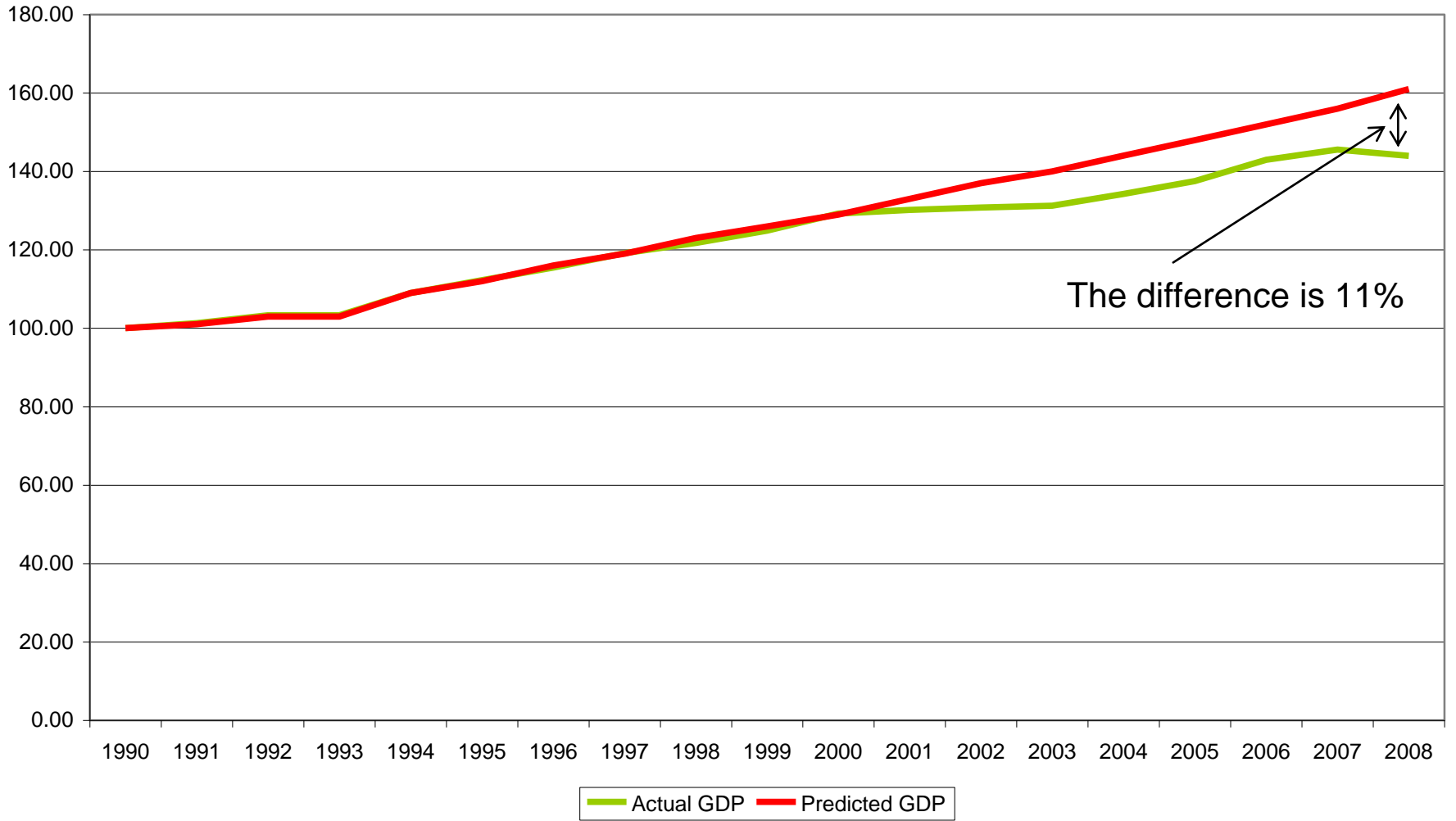- 10 countries have a forecast error smaller than 5% (in absolute value)

Australia
(country with the median forecast error)

The difference is -2%

Legend: ■ Actual GDP ■ Predicted GDP
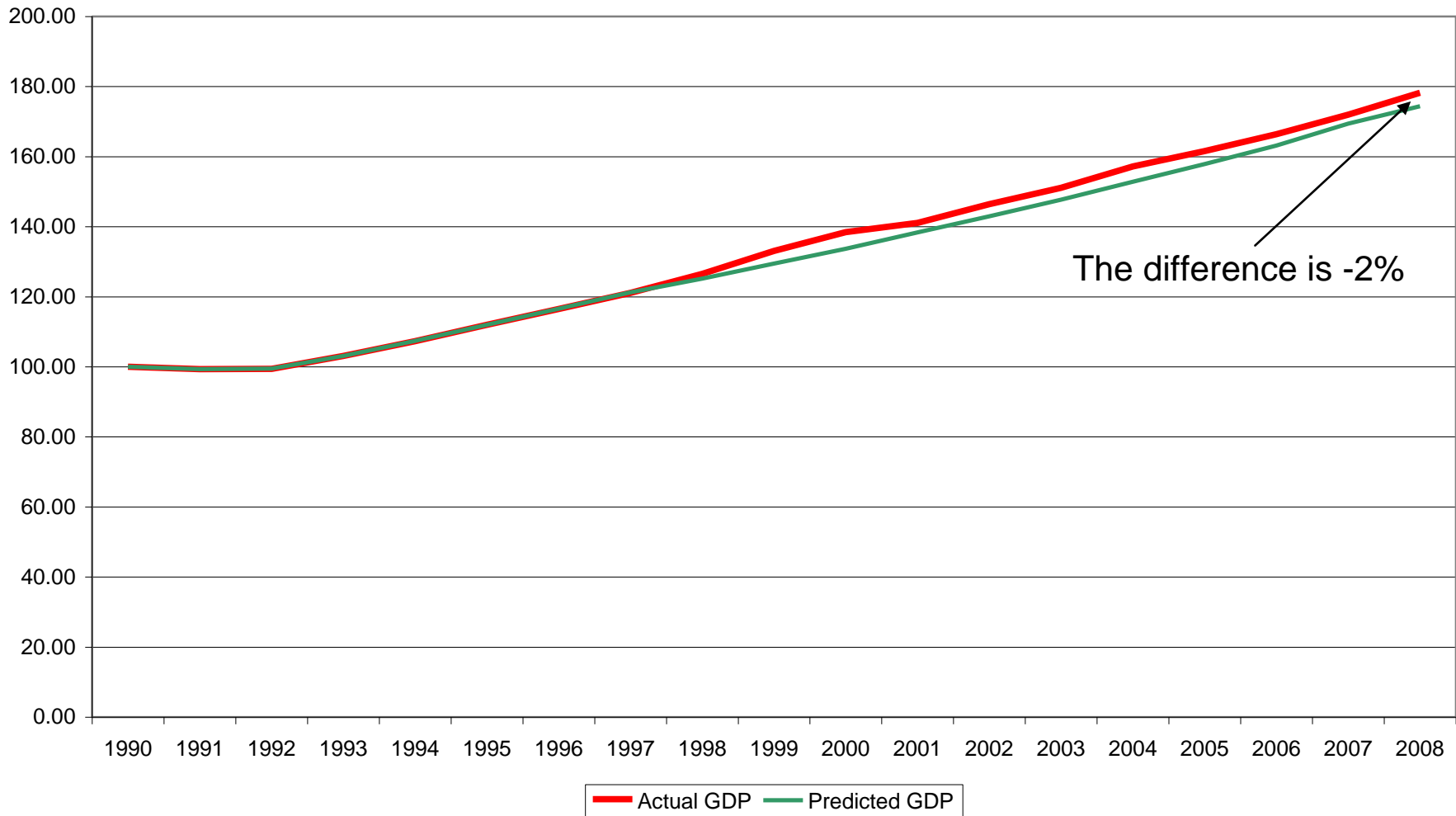
Denmark
(country at the 95th percentile of the forecast error)

The difference is 11%

Actual GDP Predicted GDP

**Spain
(country at the 5th percentile of the forecast error)**

The difference is -16%

Actual GDP   Predicted GDP
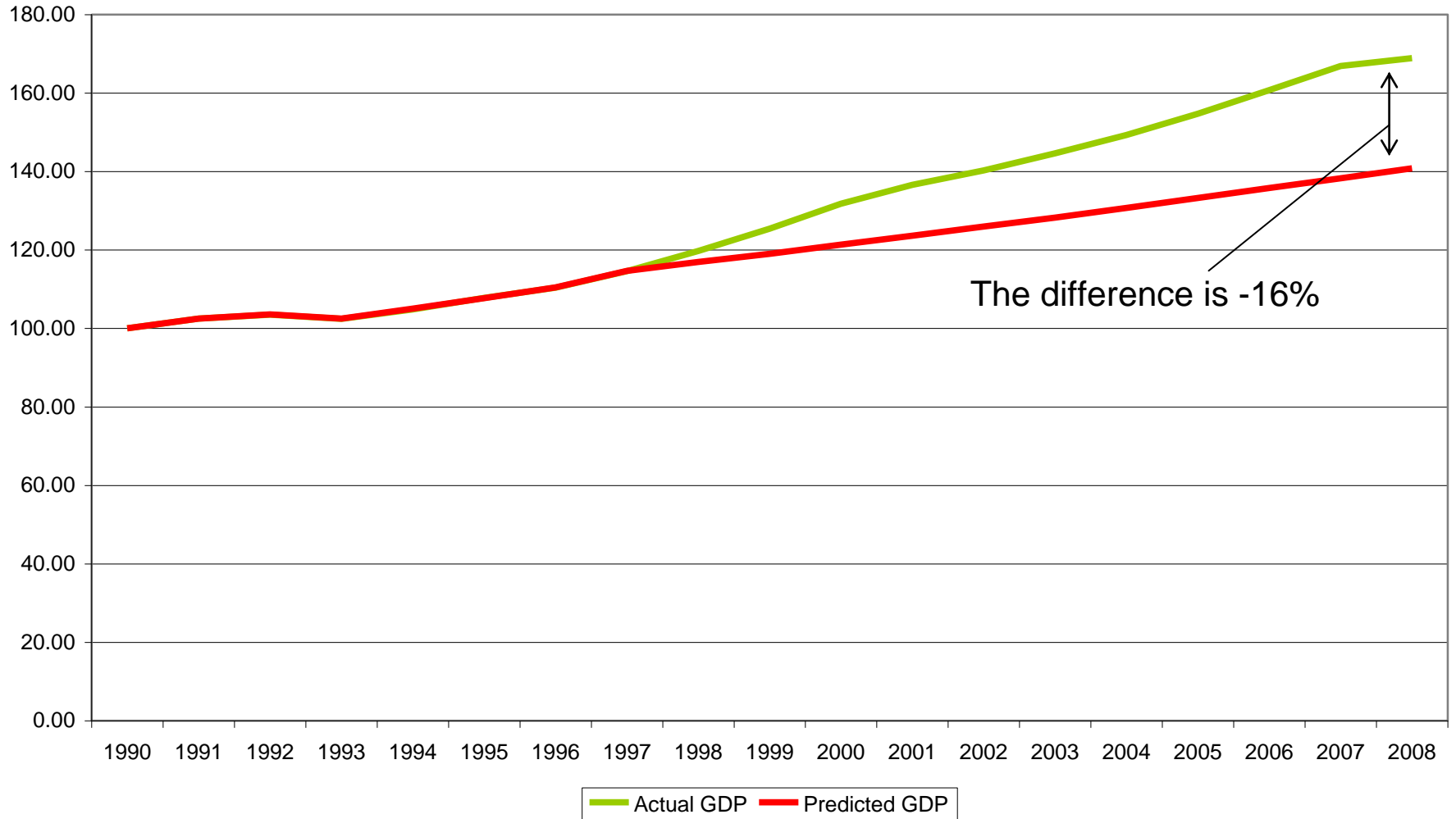
Predicted versus actual GDP

## Predict minus actual GDP at a ten-year horizon (%)

Low Income Countries

```
                            diff1
_____
          Percentiles      Smallest
   1%      -.9643503       -.9643503
   5%      -.8197029       -.8197029
  10%      -.7237194        -.781894      Obs                  38
  25%       -.537829       -.7237194      Sum of Wgt.          38

  50%      -.3906901                      Mean          -.3452198
                            Largest       Std. Dev.      .3767634
  75%      -.2590486        .0060992
  90%       .0060992        .0170211      Variance       .1419507
  95%       .6968015        .6968015      Skewness       1.763998
  99%       1.062628        1.062628      Kurtosis       7.541633
```
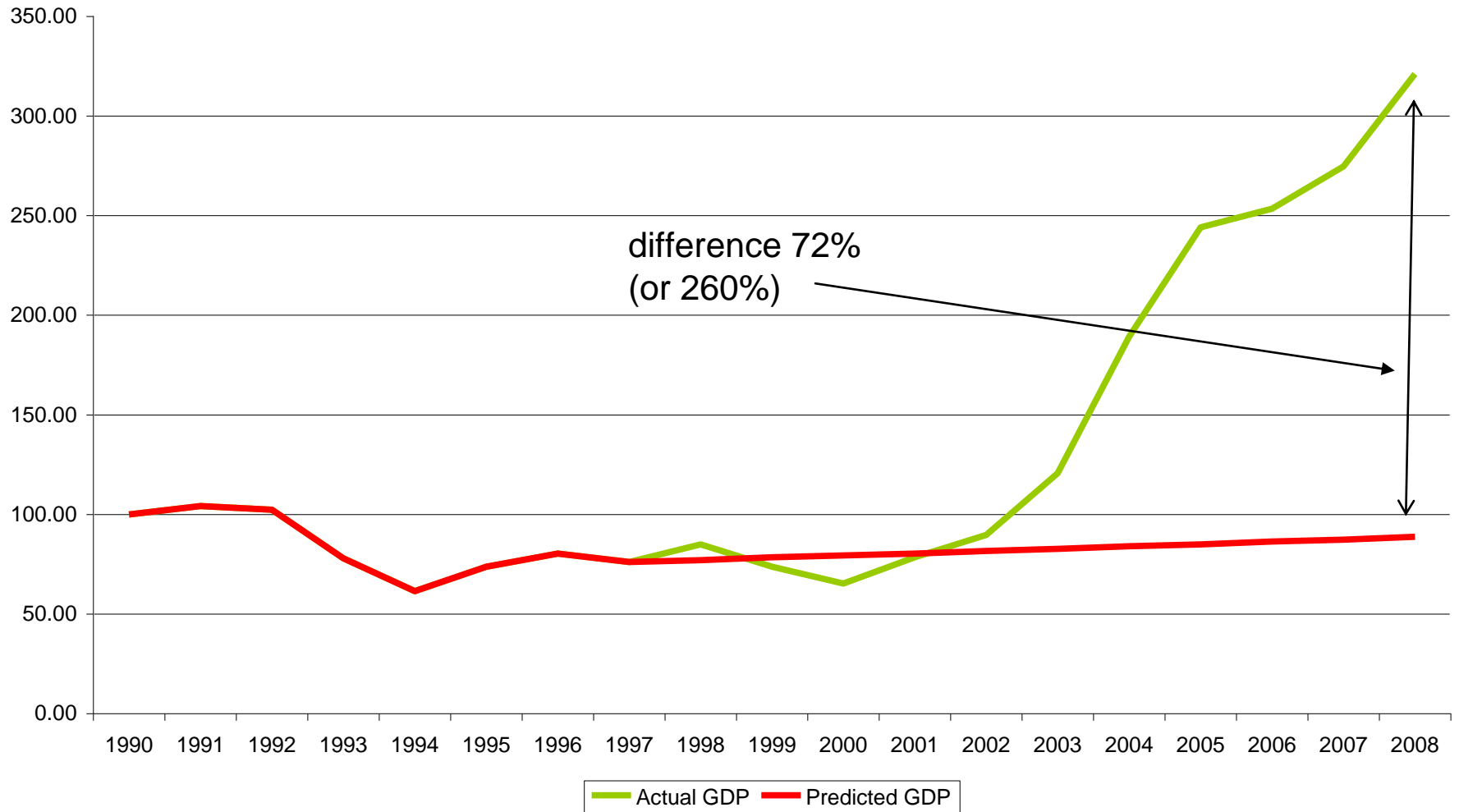
Madagascar: predicted versus actual GDP
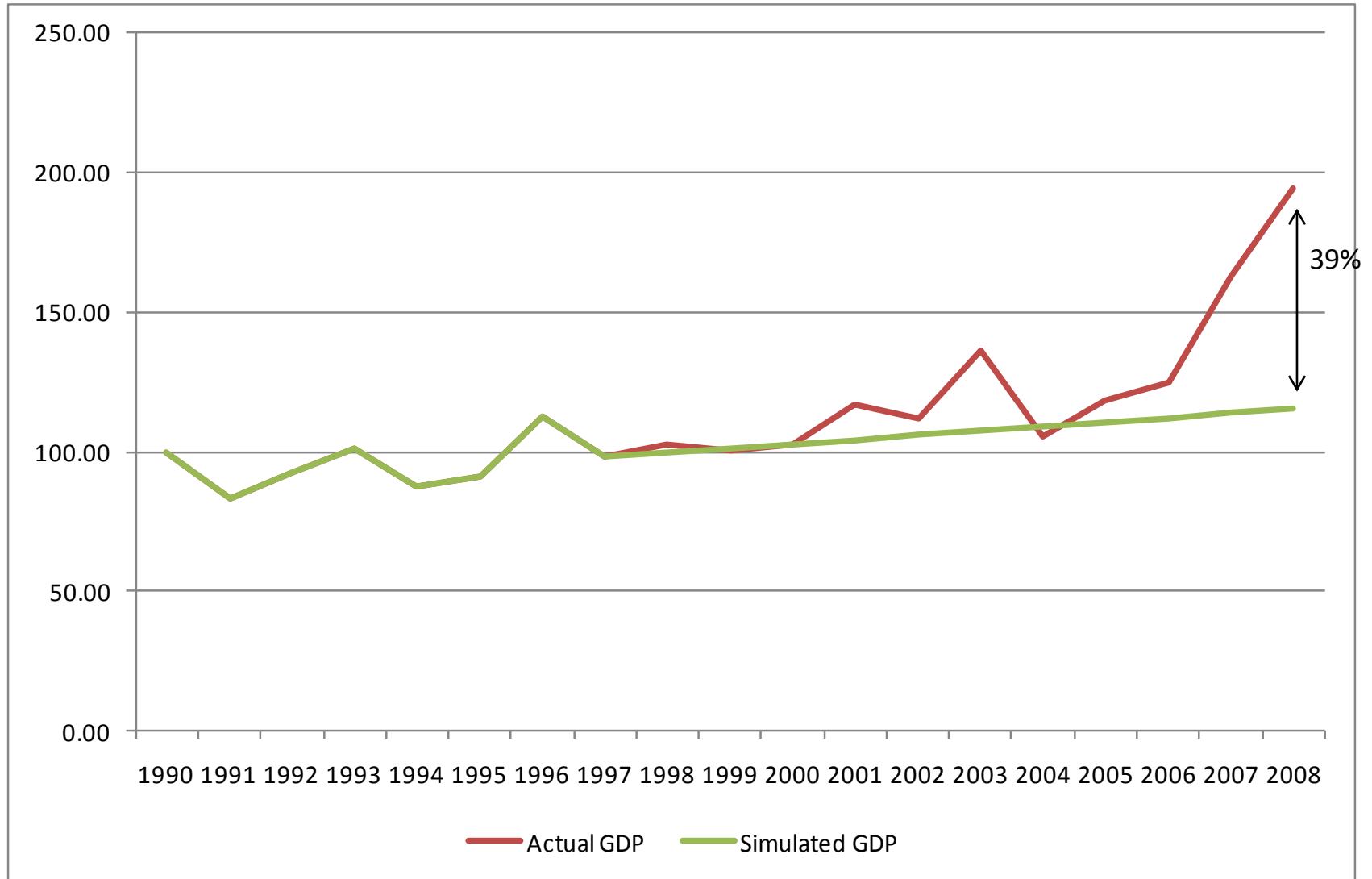
CHAD
(country at the 90th percentile of the forecast error)

difference 72%
(or 260%)

Actual GDP Predicted GDP

Predicted versus actual GDP

- 21 out of 38 countries (nearly 60% of the sample) have forecast error which is bigger than 40% (in absolute value)

- 11 out of 38 countries have a forecast error which ranges between 20% and 40% (in absolute value)

- 2 countries have a a forecast error which ranges between 10% and 20% (in absolute value)

- 4 countries have a forecast error which is smaller than 10% (in absolute value)

Actual versus predicted GDP in Australia and Madagascar (1990 =log(100))
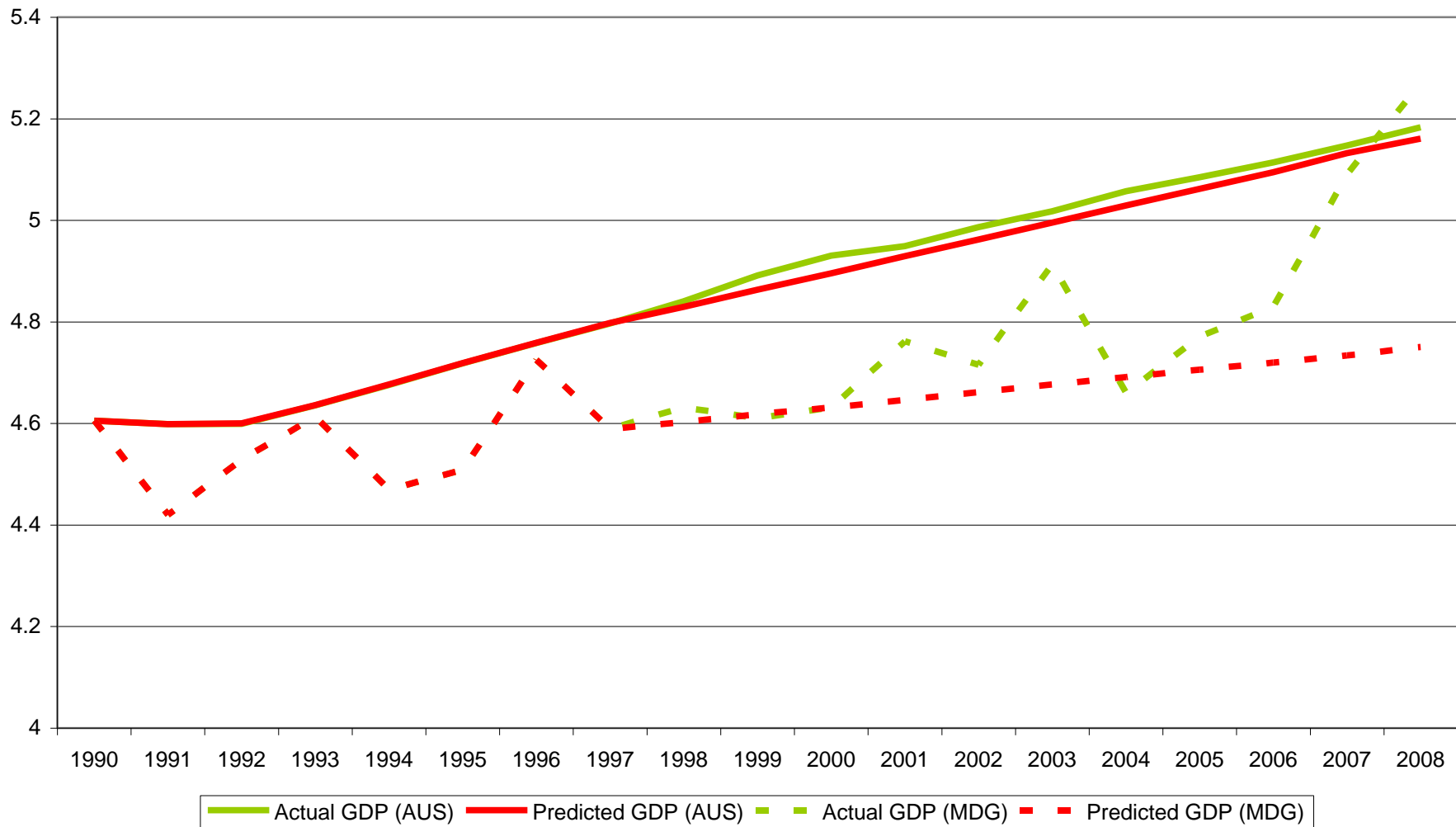
Actual versus predicted GDP in Spain and Chad (1990 =log(100))