# IS INFLATION DEAD?

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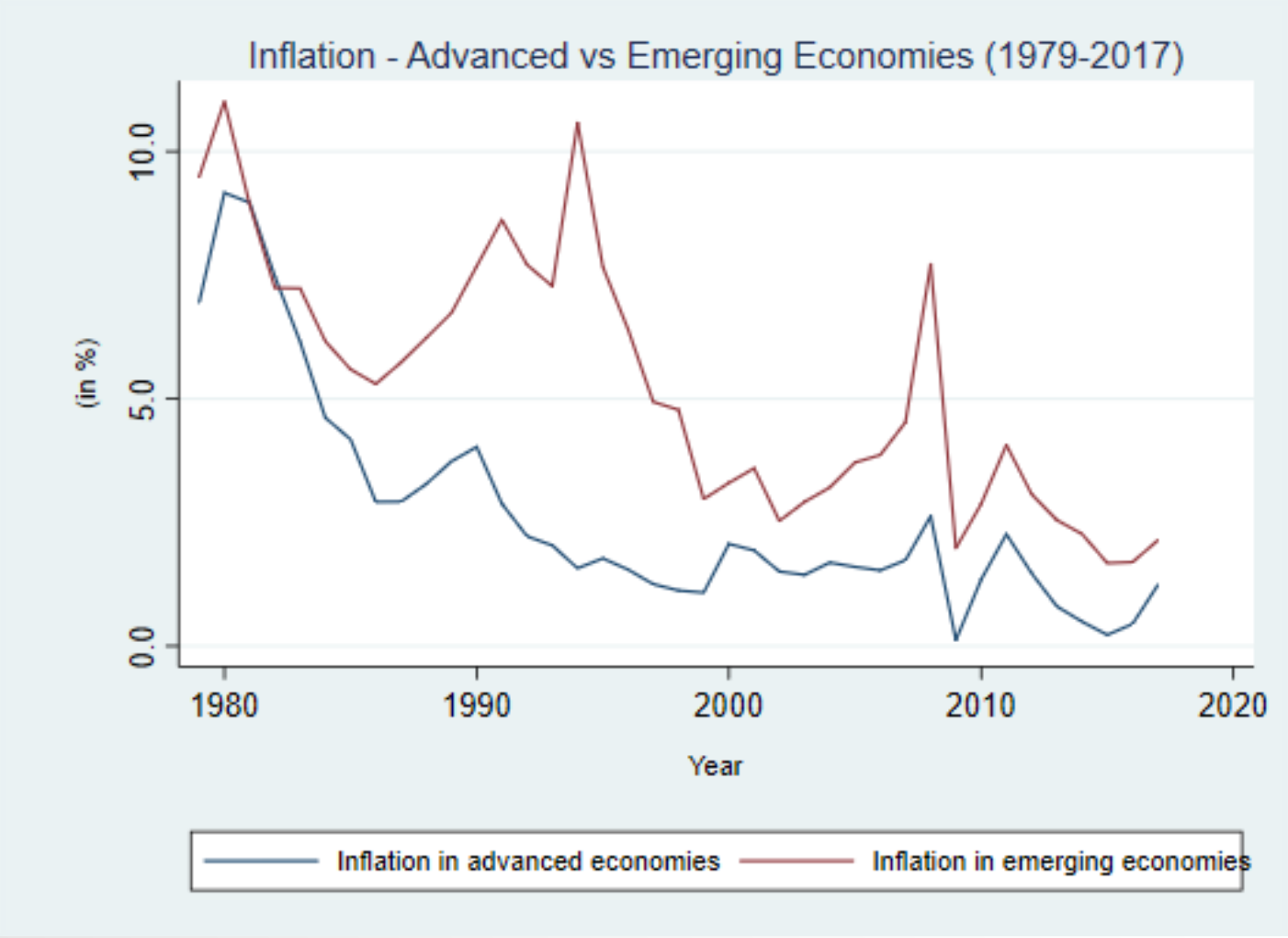
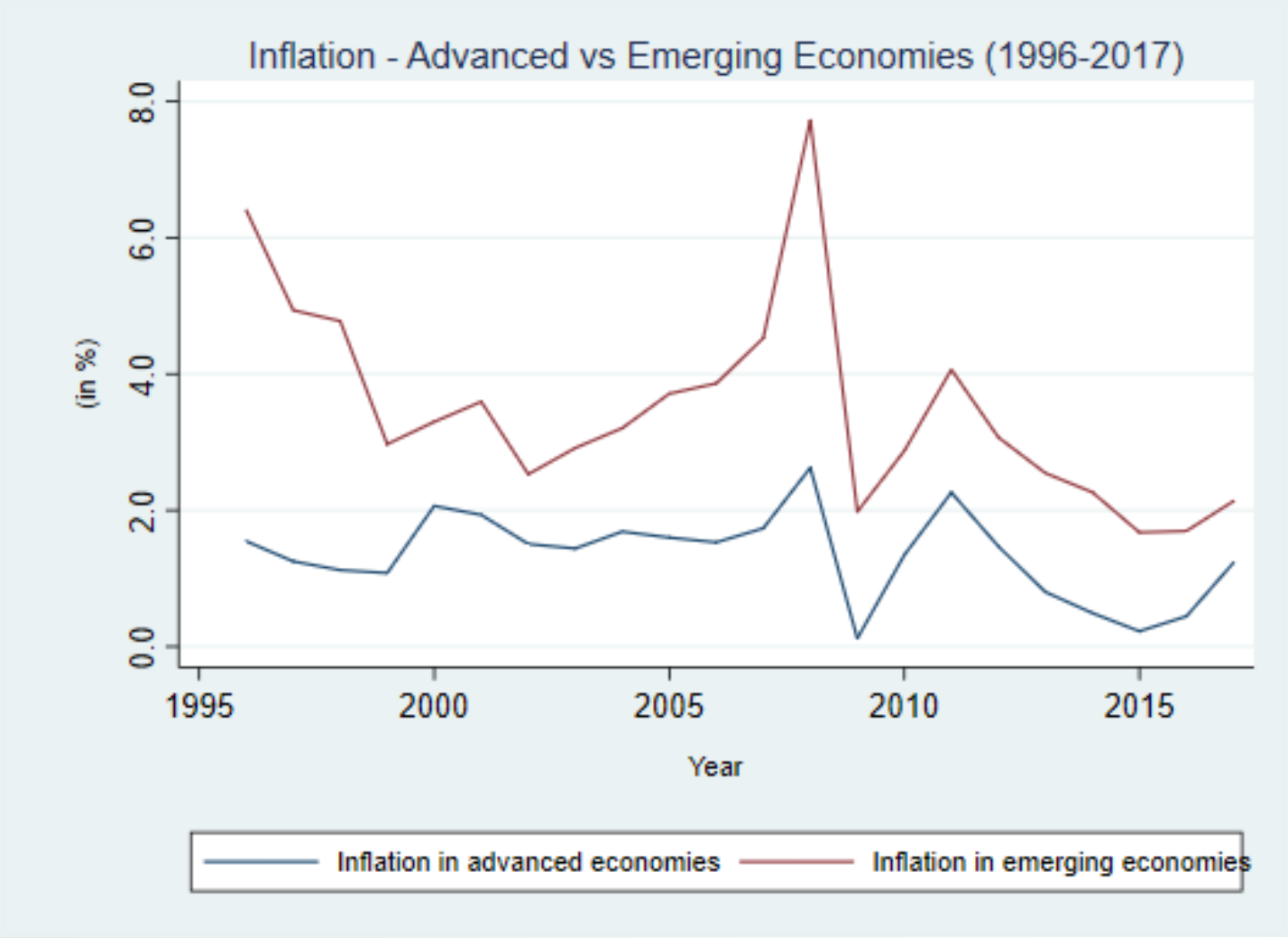
**Some facts to consider about CPI inflation:**

- Inflation in the US averaged 1.9 % between 1996 and 2009; and 70 basis points lower over the next eight years.
- A little appreciated inflation fact is that the mean inflation rate in 21 Advanced Economies (AE) excluding the US, averaged some 25 bp less than the US.
- Charts 1 and 2 document median inflation in the Advanced, and the Rest, economies from 1979 to 2017, and 1996 to 2017.
- Note that inflation decline set in prior to 2007 , and in reality started somewhere in the mid-1990s.

## CHART 1: *MEDIAN* INFLATION – ADVANCED VS EMERGING ECONOMIES (1979 – 2017)



# CHART 2: *(MEDIAN)* INFLATION – ADVANCED VS EMERGING ECONOMIES (1996 – 2017)



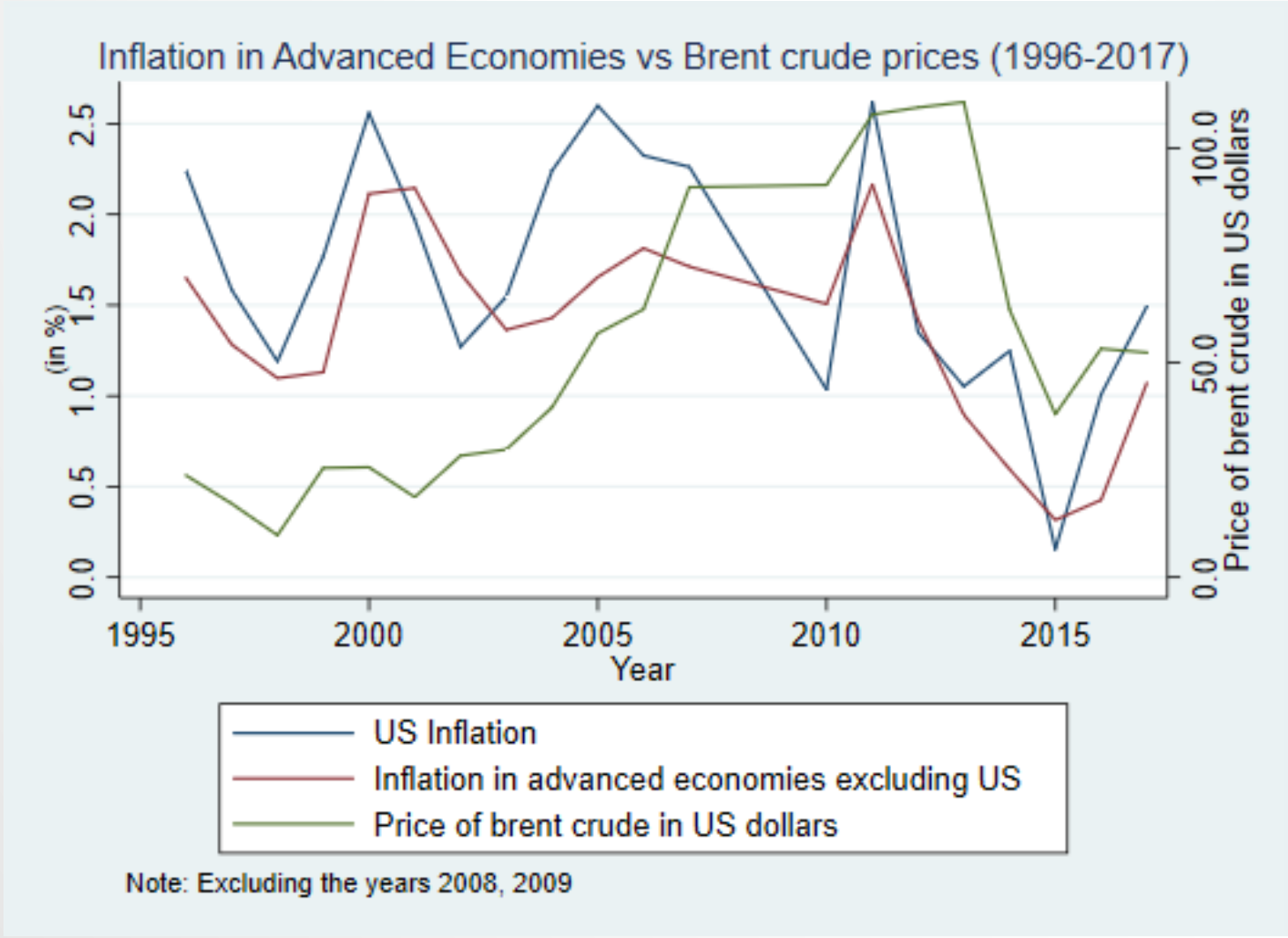
# DOES OIL PRICE IMPACT INFLATION? SURPRISINGLY, NO

- Another noteworthy fact is that the inflation decline set in, and was co-incident with, the largest increase in oil prices (point to point) the world has seen.
- In the seven years, 1973-1980, oil prices went up by a factor of 10 – from 3.6 $/barrel to $38/barrel.
- In the ten years, 1998-2008, oil prices went up by a factor of 7 – from $14.4 a barrel in 1998 to and average $100/barrel in 2008; and a peak of $140 in 2008.
- A recent 2018 paper by Choi, et. al., supports the conclusion about diminishing impact of oil prices.
- The inflation experiences could not be more different – worldwide inflation set in the 1970s in the wake of OPEC; worldwide declining inflation set in with, what we shall soon see, the advent of unlimited supplies of skilled labor.

# TABLE 1: TRENDS IN CRUDE PRICES AND INFLATION

| Time Period | Average Brent crude price (in dollars) | Average increase in Brent crude price (in dollars) | Median Inflation in Developing Economies | Median Inflation in Advanced Economies |
|---|---|---|---|---|
| **1979-1989** | 17.4 | 6.5 | 7.2 | 5.5 |
| **1990-1995** | 18.7 | -7.3 | 8.3 | 2.4 |
| **1996-2009** | 38.8 | -3.0 | 4.0 | 1.5 |
| **2010-2017** | 78.2 | -1.2 | 2.5 | 1.0 |

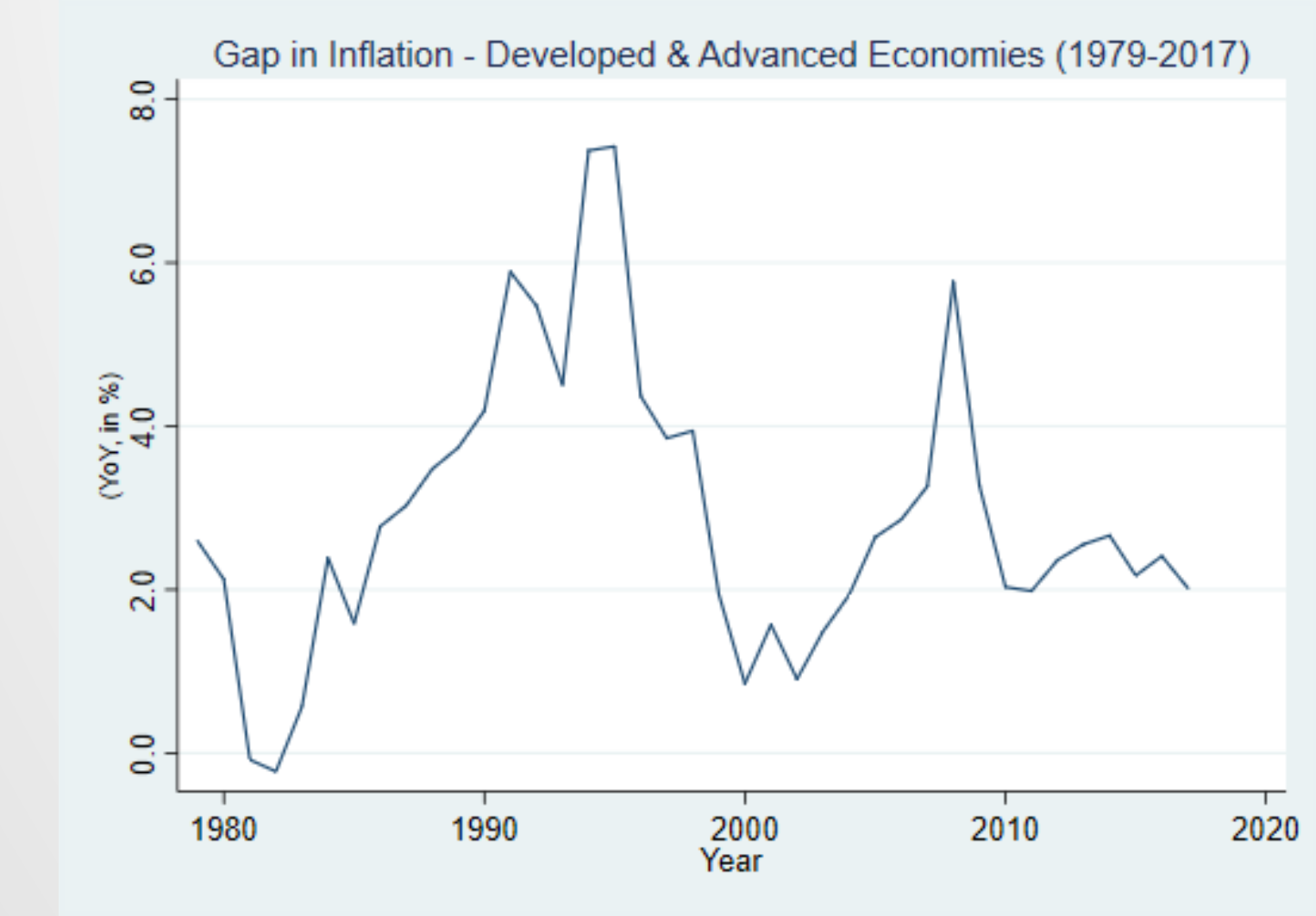
# CHART 3: INFLATION – ADVANCED ECONOMIES VS CRUDE PRICES



# INFLATION – GLOBALIZATION PRESSURES

- Inflation in the  Rest of the world (world excluding the Advanced economies) was not immune to these globalization pressures.
- Chart 4 shows that the gap in median inflation between advanced and the Rest is now down to 200 basis points
- Note how this gap has been  hovering around 200 bp for almost the last decade.

# CHART 4: (MEDIAN) INFLATION GAP – EMERGING & ADVANCED ECONOMIES



# EXPLANATIONS FOR THE INFLATION SLOWDOWN

- Fiscal deficit trends provide zero clues about this slowdown in inflation.
- World GDP growth [IMF weights] was the highest 1996-2007
- World growth has moved inversely to world inflation.
- Output gap, or considerations thereof, do not explain, inflation slowdown.
- Demography (changes in dependency ratio) does explain some of the decline in inflation.
- However, the most consistent explanation for the decline in inflation is the large increase in college graduates in the Rest of the world compared to such supply in the West (Advanced Economies)

# DEMOGRAPHY TO THE RESCUE ?

- There is one consistent explanation for the decline in inflation.
- Decline in the share of working age population is consistent with the structural decline in inflation.
- If dependency ratio is used (a la *Juselius & Takats*) , there is a significant effect – each 1 point decline in the dependency ratio leads to a 12 to 25 bp decline in inflation.
- But if a variable representing excess global supply of college graduates (USSL) and dependency are both in the equation, the latter is insignificant – while the magnitude, and statistical significance, of USSL remains unchanged.

# TABLE 2A: MEDIAN INFLATION EXPLAINED BY

| | (1) | (2) | (3) |
|---|---|---|---|
| **Dependent Variable** | **Inflation in advanced economies** | | |
| **Time Period** | **(1971 – 2017)** | | |
| | | | |
| log of (college graduates in west/college graduates in rest)) | 18.42*** | | 16.07*** |
| | (3.174) | | (3.976) |
| Year | 0.392*** | -0.155*** | 0.328** |
| | (0.0956) | (0.0155) | (0.122) |
| Dependency ratio in the west | | 0.248** | 0.121 |
| | | (0.0961) | (0.0998) |
| Constant | -777.6*** | 299.2*** | -655.4*** |
| | (190.3) | (28.61) | (239.9) |
| | | | |
| Observations | 47 | 47 | 47 |
| R-squared | 0.808 | 0.746 | 0.818 |

*Robust standard errors in parentheses*
**** p<0.01, ** p<0.05, * p<0.1*

# IS GLOBALIZATION THE EXPLANATION?

- Defining globalization – the spread of education
- Barro-Lee provide data, on returns to schooling, for over 100 countries , 1870 to 2016, and some projections, till 2030.
- These data were used in my book, *The New Wealth of Nations*, to construct estimates of wealth embodied in education, as well as to explain the decline in inflation.
- To capture the influence of global labor supply, we construct the simplest of all supply variables – the supply of college educated labor in the Advanced Economies relative to the supply in the rest of the world (hereafter *USSL – Unlimited supply of skilled labor*).
- One fact of note – the two supplies became equal in 1996; by 2016, college graduates in the Rest outnumbered in the AE's by 2:1

# UNLIMITED SUPPLY OF SKILLED (COLLEGE EDUCATED) LABOR

- Arthur Lewis classic 1954 paper talked about unlimited supply of unskilled labor constraining the unskilled wage in developing economies from rising much above the subsistence wage – if the wage were to rise, hordes of new entrants would prevent the real wage from rising.
- Something analogous seems to be happening in the world for the last twenty years or so – there is an excess supply of skilled labor, and that is preventing the real wage from rising in the developed world.
- The college premium, defined as the ratio of the real wage of college educated workers relative to the wage of high school graduates [Data from Economic Policy Institute], has been much investigated in the US. [See Autor, Katz and Kearney (2005)]
- Table 3 reproduces their results for the 1979-2005 period, along with our estimates of the same, using USSL as the explanatory variable.

# TABLE 2B: DETERMINANTS OF MEDIAN INFLATION IN ADVANCED ECONOMIES

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent Variable** | **Median Inflation in Advanced Economies** | | | | |
| **Time Period** | **(1984 - 2017)** | **(1971 - 2017)** | **(1971 - 2017)** | **(1971 - 2017)** | **(1971 - 2017)** |
| log of (# of college graduates in west/(# of college graduates in rest)) | 3.207*** | | | 5.748*** | 4.866*** |
| | (0.404) | | | (0.587) | (0.395) |
| d1998 | -0.852*** | | | | |
| | (0.107) | | | | |
| d1999 | -0.774*** | | | | |
| | (0.104) | | | | |
| d2008 | 1.159*** | | | | |
| | (0.109) | | | | |
| d2009 | -1.302*** | | | | |
| | (0.111) | | | | |
| Median share of 15-64 year population as %age of total population in advanced (DC) economies | | -1.409*** | | | -0.480** |
| | | (0.264) | | | (0.218) |
| Median fiscal deficit in advanced (DC) economies | | | 0.0637 | | |
| | | | (0.211) | | |
| Constant | 2.834*** | 96.20*** | 2.699*** | 3.762*** | 35.32** |
| | (0.170) | (17.61) | (0.673) | (0.225) | (14.49) |
| Observations | 34 | 47 | 38 | 47 | 47 |
| R-squared | 0.787 | 0.436 | 0.001 | 0.754 | 0.787 |

# TABLE 3: WAGE PREMIUM VS SUPPLY OF GRADUATES

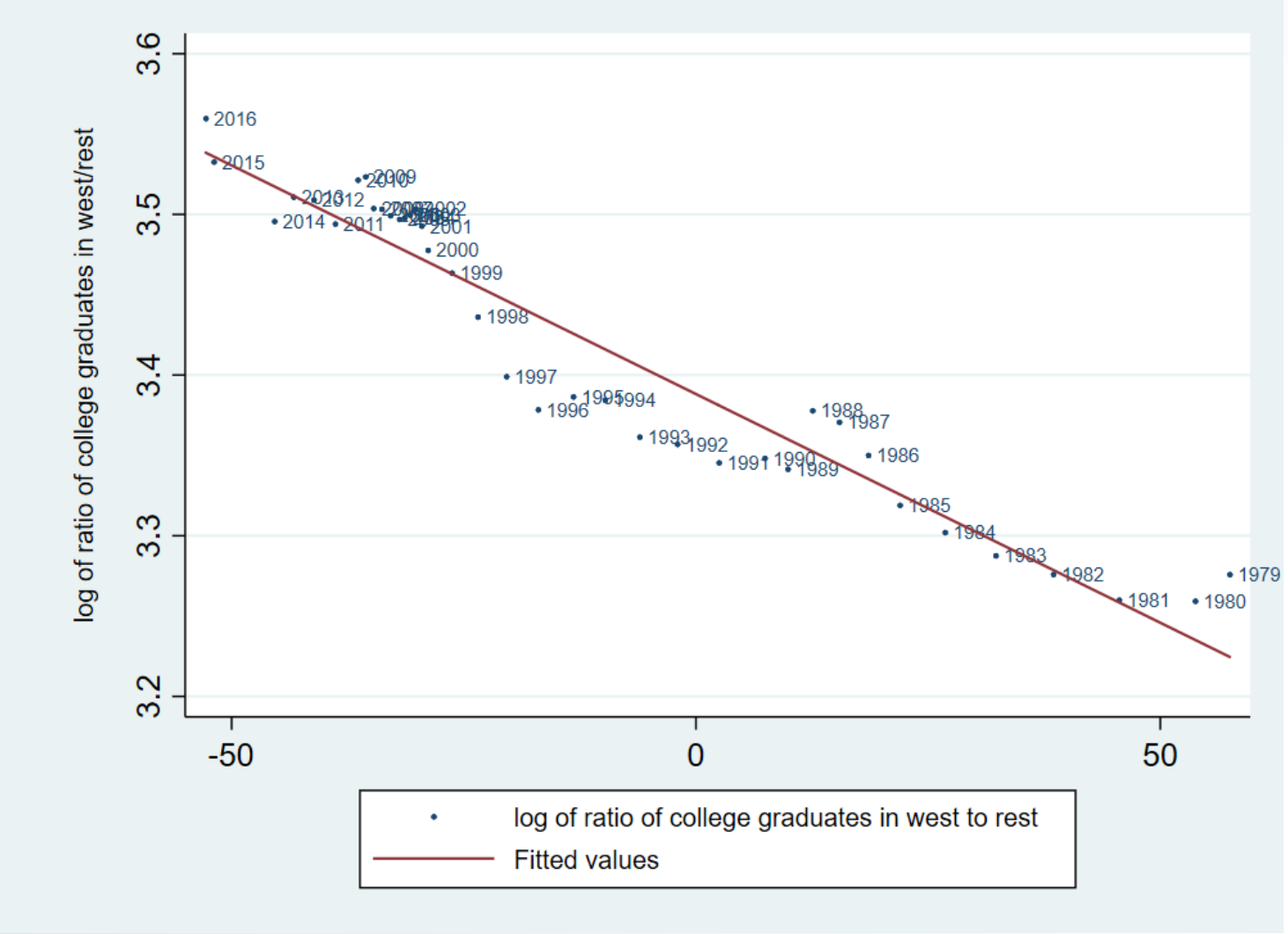
| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **VARIABLES** | **log of college wage premium (1979-2005)** | | | **log of college wage premium (1979 - 2016)** | **log of college wage in the US (1979 - 2016)** |
| | | | | | |
| log of (college (ba)/hs) supply | -0.636 | | | | |
| | (0.573) | | | | |
| Year | 0.0396** | 0.0558*** | -0.0152** | -0.00960*** | 0.00191 |
| | (0.0165) | (0.0152) | (0.00734) | (0.00339) | (0.00223) |
| log of (college (ba+ma)/hs) supply | | -1.245** | | | |
| | | (0.568) | | | |
| log of (college graduates in west/college graduates in rest)) | | | -1.082*** | -0.885*** | -0.202*** |
| | | | (0.229) | (0.132) | (0.0731) |
| Constant | -79.81** | -112.2*** | 29.81* | 18.60*** | -0.422 |
| | (33.24) | (30.45) | (14.61) | (6.747) | (4.433) |
| | | | | | |
| Observations | 27 | 27 | 27 | 38 | 38 |
| R-squared | 0.913 | 0.918 | 0.943 | 0.949 | 0.936 |

***Note:*** *All variables are in real terms;*

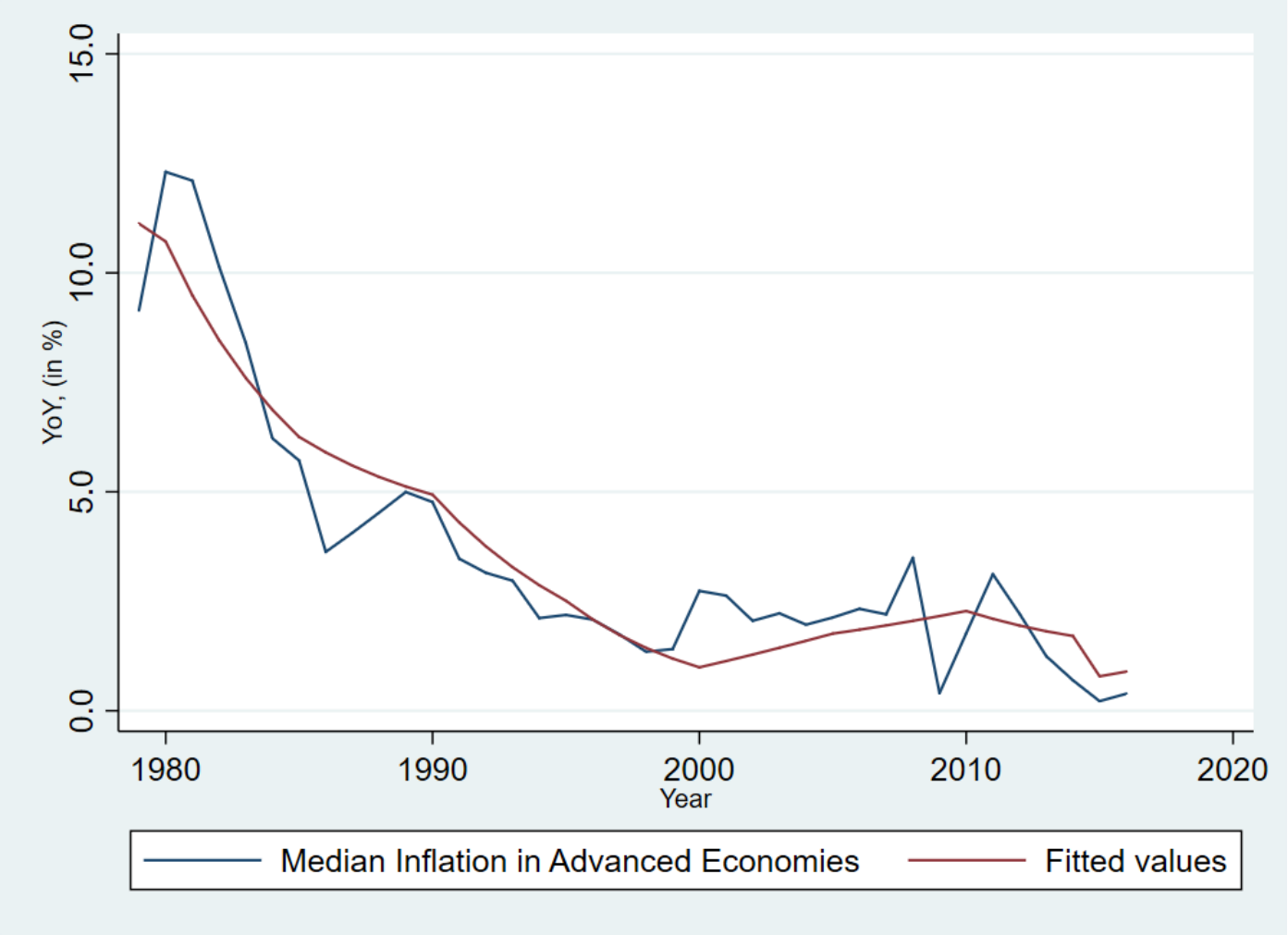
*Robust standard errors in parentheses*

**** p<0.01, ** p<0.05, * p<0.1*

# CHART 5: COLLEGE PREMIUM & UNLIMITED SUPPLIES OF SKILLED LABOR



# CHART 6: USSL AND THE GREAT INFLATION DECLINE



# WHAT EXPLAINS INDIAN INFLATION?

## I. Conventional Models

- Conventional wisdom states that the following variables matter in explaining inflation in India:
    1) **Output Gap**
    2) **Oil Price Inflation**
    3) **Consolidated Fiscal Deficits**

- Latest Monetary Policy Report of the RBI has a quarterly model of inflation with the following independent variables:

  **Output gap, oil price inflation, repo rate, rural wage growth, and lagged CPI inflation**

- Unfortunately, in the above model, none of the variables are significant at the 10 % level, except lagged inflation.

# WHAT EXPLAINS INDIAN INFLATION?

## II. Our Model

- We present a model of Indian inflation which has minimum support prices (MSP) as the major driver of inflation.
- This model was first presented in a July 2011 paper entitled *"Indian Inflation: Populism, Politics and Procurement Prices"*, Developing Trends, Oxus Research Report; (available at my website www.ssbhalla.org)
- The 2011 model, updated to 2017, is presented in Table 6.

# TABLE 4: INFLATION IN INDIA, 1970-2017

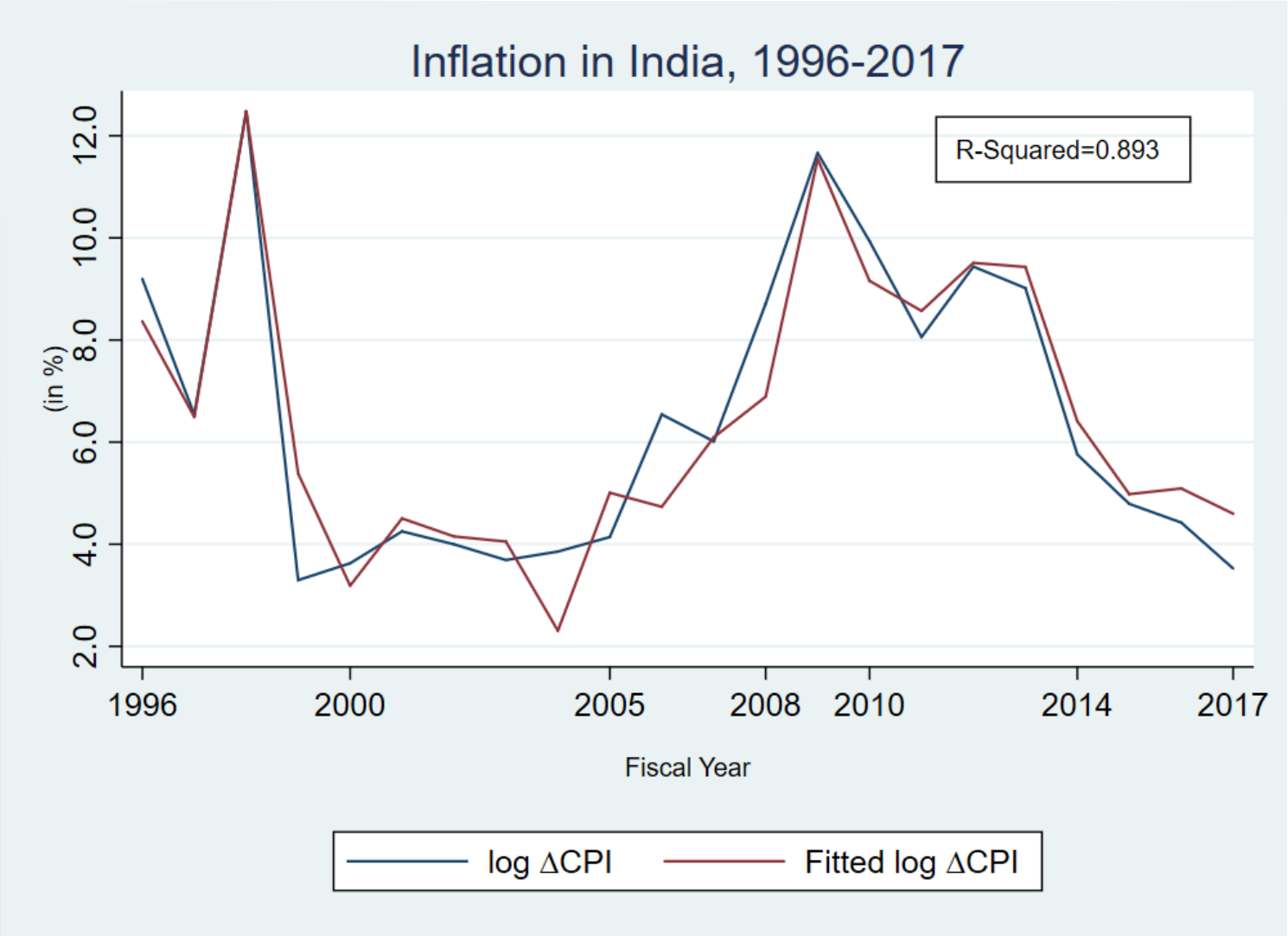
| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **INDEPENDENT VARIABLES** | **Log ΔCPI** | **Log ΔCPI** | **Log ΔCPI** | **Log ΔCPI (1996-2017)** |
| Lagged growth, procurement prices | | 0.199*** | 0.196*** | 0.116*** |
| | | (0.0680) | (0.0709) | (0.0220) |
| Output gap (in %) | -0.255 | 0.120 | 0.0473 | 0.136 |
| | (0.487) | (0.314) | (0.328) | (0.161) |
| Growth, Ploughmen Wages | | 0.137 | 0.150 | 0.281*** |
| | | (0.0887) | (0.0911) | (0.0465) |
| Growth, Crude Price (in Rs.) | | -0.0104 | -0.000762 | -0.0126 |
| | | (0.0201) | (0.0166) | (0.0128) |
| Consolidated Fiscal Deficit (in %) | -0.244 | -0.138 | -0.296 | 0.231 |
| | (0.750) | (0.361) | (0.350) | (0.199) |
| d1998 | 6.658*** | | 5.885*** | 5.792*** |
| | (1.349) | | (0.826) | (0.238) |
| d1991 | 5.763*** | | | |
| | (1.426) | | | |
| Constant | 8.141 | 5.773** | 6.729** | 1.252 |
| | (5.977) | (2.746) | (2.659) | (1.565) |
| | | | | |
| Observations | 48 | 35 | 35 | 22 |

## WHAT EXPLAINS INDIAN INFLATION? - PROCUREMENT PRICES AND RURAL WAGE GROWTH

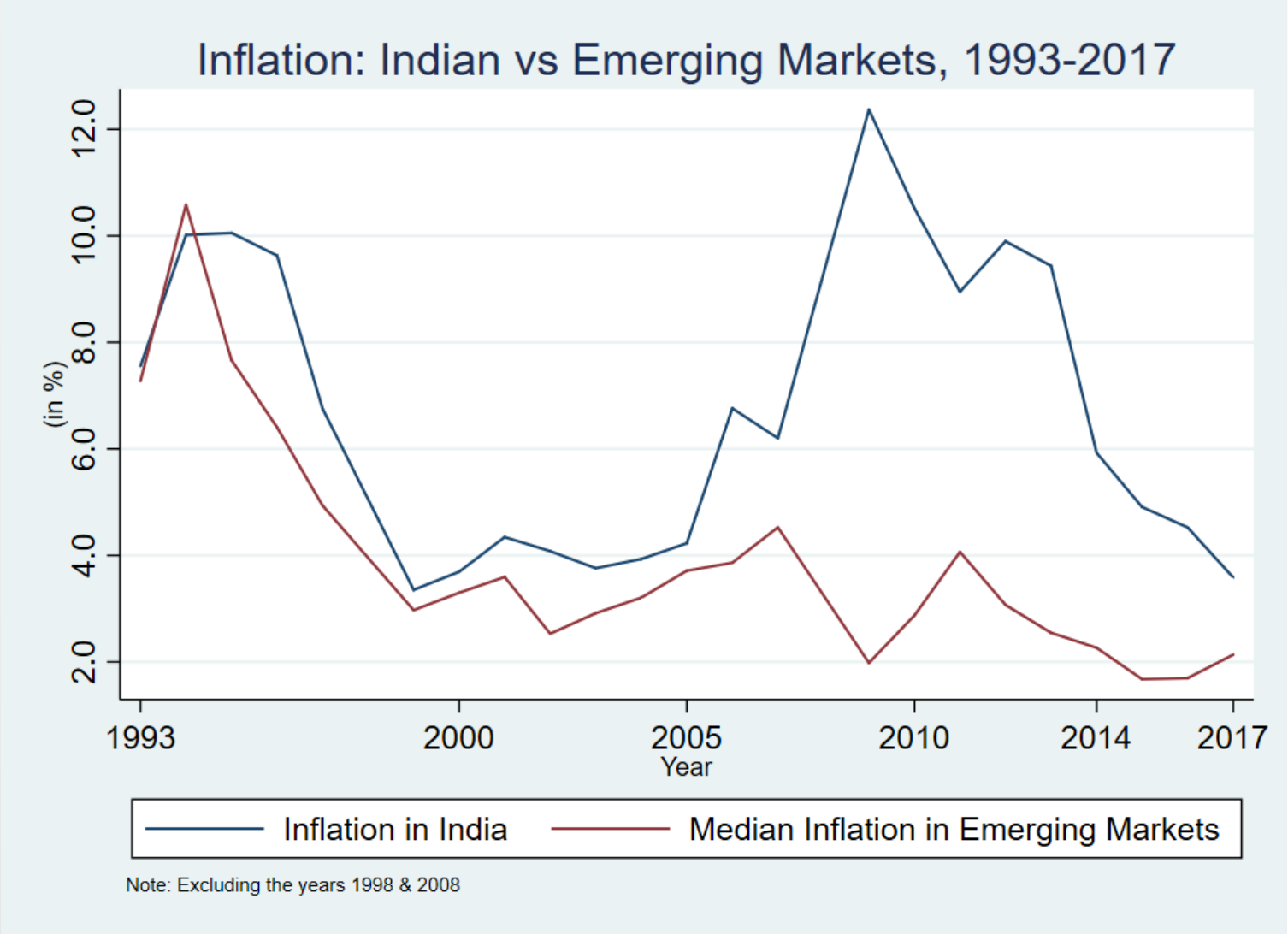
### Results

- Procurement prices and rural wage growth matters for Indian inflation, not much else.
- Further, the impact of procurement prices is diminishing over time, especially over the last three years.
- **Each 1% increase in (lagged) procurement prices leads to a 12 bp increase in inflation.**
- **Each 1 % increase in rural wages leads to a 28 bp increase in inflation.**
- **The model is able to explain 89 % of the variation in log inflation, 1996-2017.**

# INFLATION IN INDIA, 1996 – 2017; TABLE 4, MODEL 4



# CHART 7: INFLATION IN INDIAN VS EMERGING MARKETS, 1993 - 2017



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