



The post-crisis Phillips curve and its policy implications

(Supporting slides)

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3 major changes

- Use observable variables only
- Change the paradigm from flow to stock
- Allow the curve to be non-stationary

Main idea

- During and after a crisis, the permanent income hypothesis is flawed.
- People relate to their peak gains in the past rather than to uncertain future gains. They judge their consumption decisions based on the relation between their current wages and their past wages, adjusted for inflation.
- Inflation rate stays below its target until the cumulative real wage gap closes.

New concept

- Cumulative real wage gap = the cumulative gap between the current wage and a maximum peak wage value in the past, adjusted for inflation.
- Inflation gap = the gap between current inflation rate and the inflation target (or, in the absence of a target, an average value of inflation over a longer time-span).

Cumulative real wage gap

- *Wage gap:*

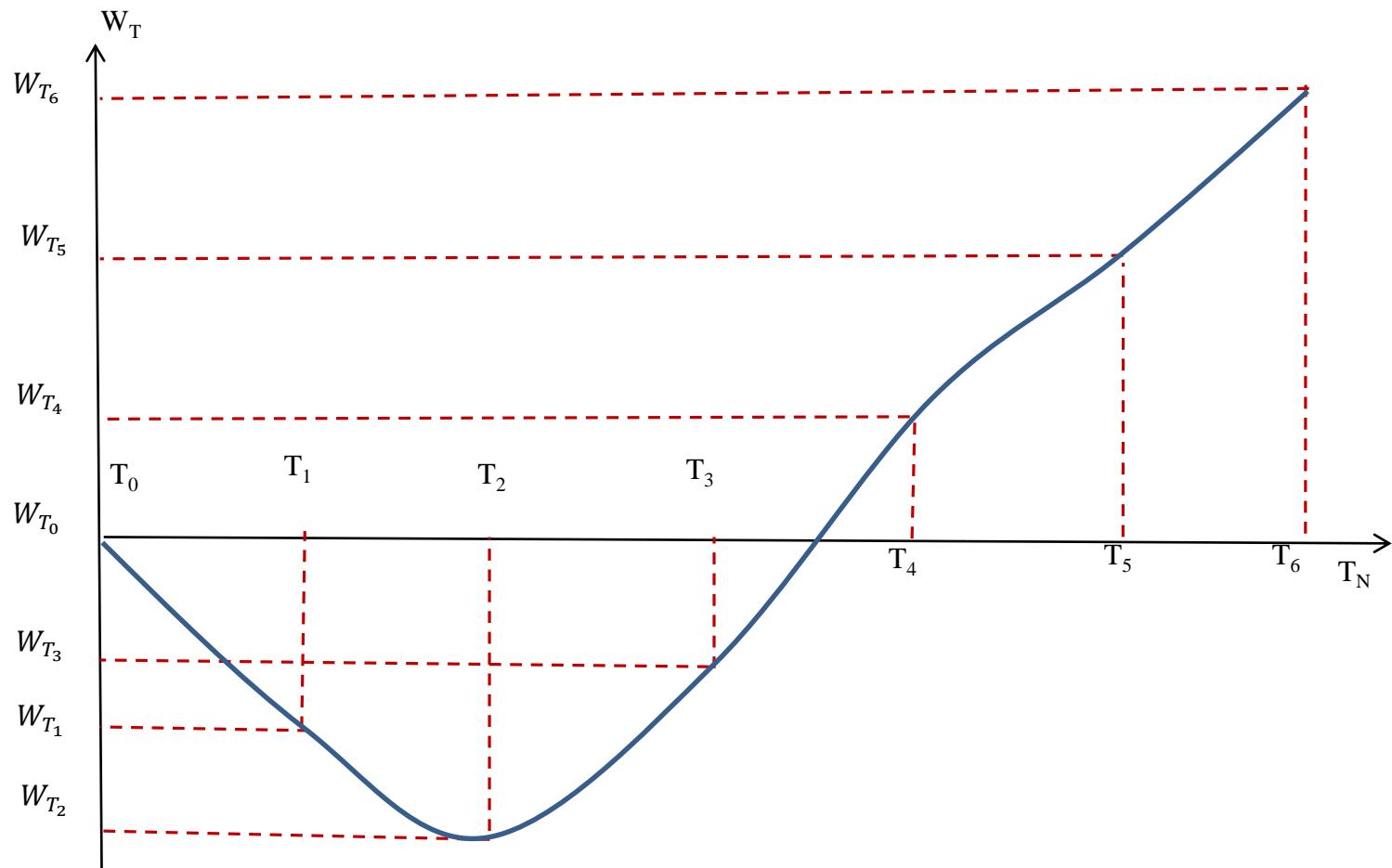
$$W_{gap\ T_n} = W_{T_n} - W_{T_0}$$

where $W_{gap\ T_n}$ is the real wage gap at time T_n , W_{T_n} is the real wage at time T_n , and W_{T_0} is the real wage at time T_0 , the peak value of real wage in the reference period.

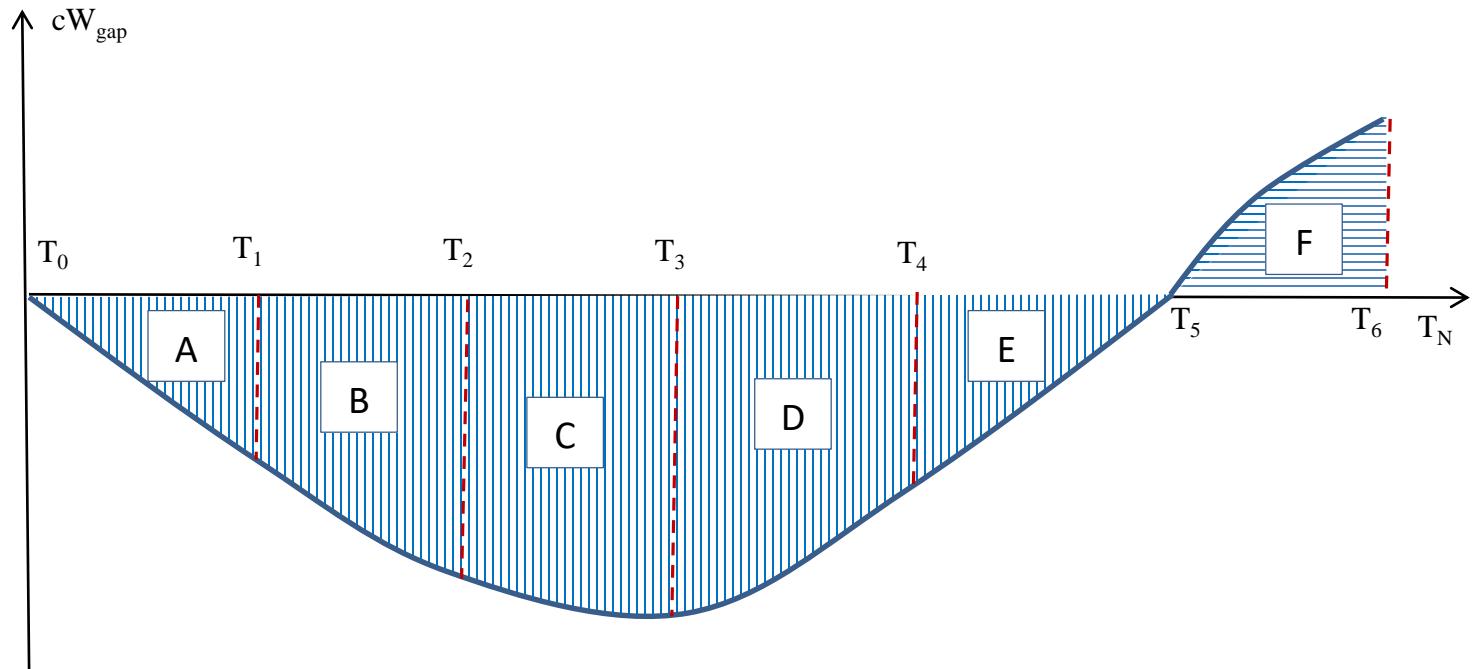
- *Cumulative real wage gap* at time T_n is defined as:

$$cW_{gap\ T_N} = \sum_{n=1}^N W_{gap\ T_n} = \sum_{n=1}^N (W_{T_n} - W_{T_0})$$

Real wage and real wage gap



Cumulative real wage gap

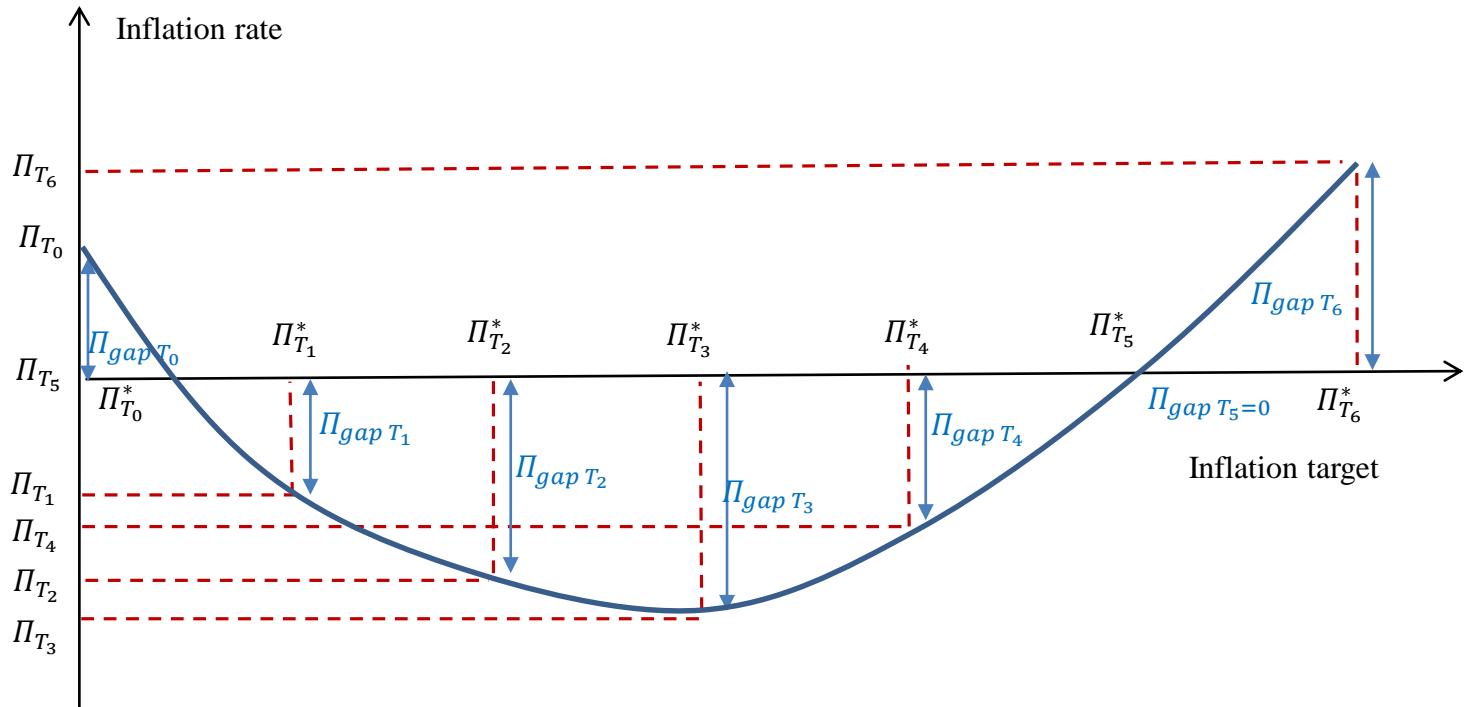


$$cW_{gap \mid T_N} = \sum_{n=1}^N (W_{T_n} - W_{T_0}) = \sum_{n=1}^N A_n$$

where A_n is the real wage gap between T_n and T_{n-1} , expressed as area.

- $cW_{gap T_1} = A = \int_{T_0}^{T_1} cW_{gap}(t)dt < 0$
- $cW_{gap T_2} = A + B = \int_{T_0}^{T_1} cW_{gap}(t)dt + \int_{T_1}^{T_2} cW_{gap}(t)dt = \int_{T_0}^{T_2} cW_{gap}(t)dt < 0$
- $cW_{gap T_3} = A + B + C = \int_{T_0}^{T_1} cW_{gap}(t)dt + \int_{T_1}^{T_2} cW_{gap}(t)dt + \int_{T_2}^{T_3} cW_{gap}(t)dt = \int_{T_0}^{T_3} cW_{gap}(t)dt < 0$
- $cW_{gap T_4} = A + B + C + D = \int_{T_0}^{T_1} cW_{gap}(t)dt + \int_{T_1}^{T_2} cW_{gap}(t)dt + \int_{T_2}^{T_3} cW_{gap}(t)dt + \int_{T_3}^{T_4} cW_{gap}(t)dt = \int_{T_0}^{T_4} cW_{gap}(t)dt < 0$ and
 $cW_{gap T_4} > cW_{gap T_3}$
- $cW_{gap T_5} = A + B + C + D + E = \int_{T_0}^{T_1} cW_{gap}(t)dt + \int_{T_1}^{T_2} cW_{gap}(t)dt + \int_{T_2}^{T_3} cW_{gap}(t)dt + \int_{T_3}^{T_4} cW_{gap}(t)dt + \int_{T_4}^{T_5} cW_{gap}(t)dt = \int_{T_0}^{T_5} cW_{gap}(t)dt = 0$
- $cW_{gap T_6} = A + B + C + D + E + F = \int_{T_0}^{T_1} cW_{gap}(t)dt + \int_{T_1}^{T_2} cW_{gap}(t)dt + \int_{T_2}^{T_3} cW_{gap}(t)dt + \int_{T_3}^{T_4} cW_{gap}(t)dt + \int_{T_4}^{T_5} cW_{gap}(t)dt + \int_{T_5}^{T_6} cW_{gap}(t)dt = \int_{T_0}^{T_6} cW_{gap}(t)dt > 0$

Inflation gap



$$\Pi_{gap T_n} = \Pi_{T_n} - \Pi_{T_n}^*$$

where $\Pi_{gap T_n}$ is the inflation gap at time T_n , Π_{T_n} is the inflation rate at time T_n , and $\Pi_{T_n}^*$ is the central banks' target at time T_n ,

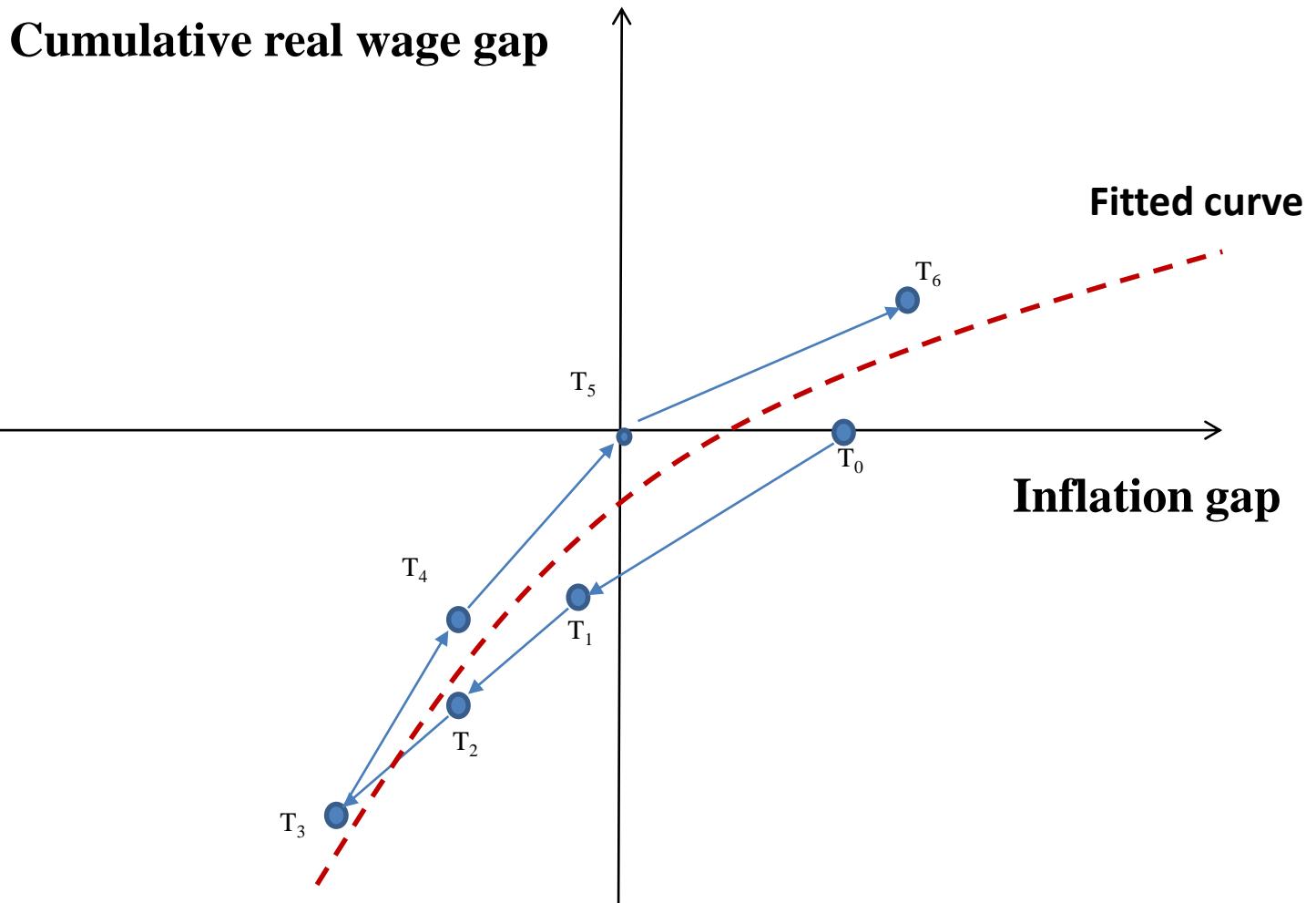
Post-Crisis Phillips Curve: cumulative real wage gap vs. inflation gap

$$[\Pi_{gap T_n}]_N = f([cW_{gap T_n}]_N) + [\varepsilon_{T_n}]_N$$

$$[\Pi_{T_n} - \Pi_{T_n}^*]_N = f\left(\sum_{n=1}^N (W_{T_n} - W_{T_0})\right)_N + [\varepsilon_{T_n}]_N$$

where N is number of years and ε_{T_n} is the residual

Post-crisis Phillips Curve



Source: Voinea, 2019

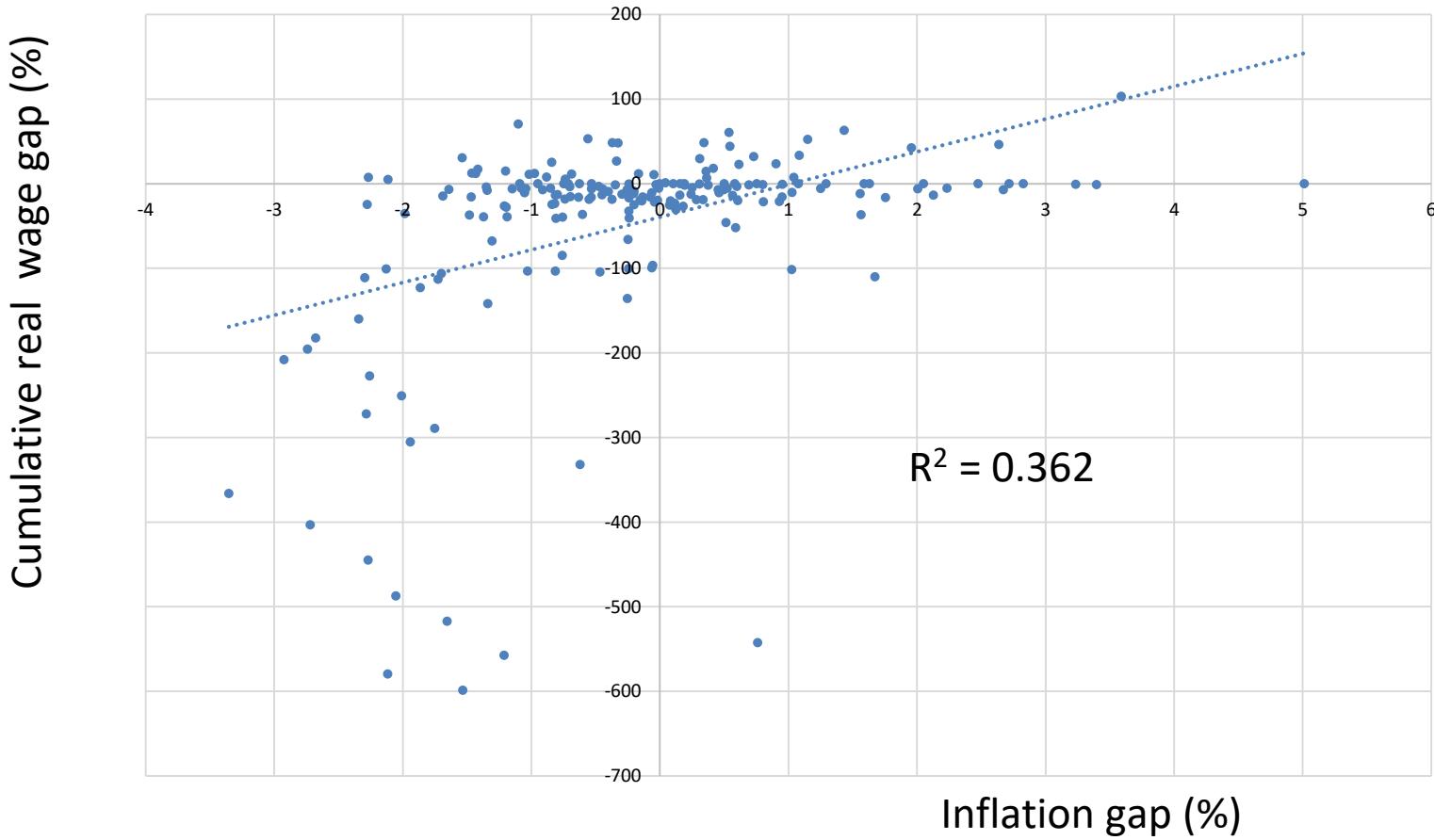
Empirical evidence

- The analysis covers 35 OECD countries over the period 1990-2017 (for US: 1989 – 2017).
- Data sources for wages and inflation are the OECD and the FRED databases (for US), annual data.
- A wage adjustment episode is the adjustment in real wages that follows after the peak year. For each wage adjustment episode in a country, the data sample starts at year T_0 (the peak year) and it ends when a new peak is detected (at year $T_{0\text{ new}} - 1$). Wage adjustment episodes are time-specific. Peak years are country-specific.

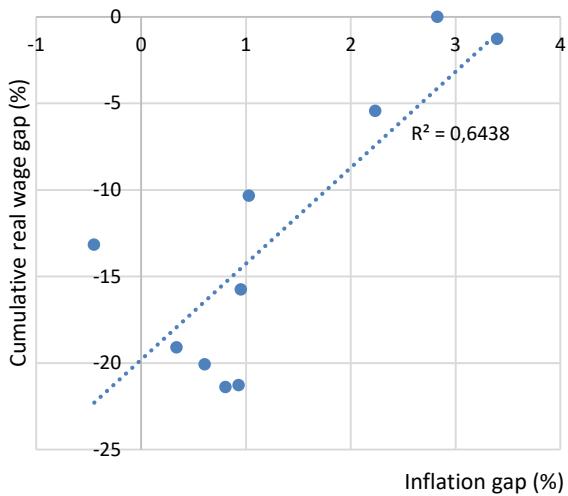
Wage adjustment episodes

- First: Period 1993-2000 for AUS, AUT, BEL, DNK, FIN, FRA, DEU, IRL, LUX, NLD, NZL, CHE, GBR; 1994-2000 for ISL, ITA, NOR, ESP, SWE; 1990-2017 for JPN; 1998-2017 for KOR, 1989-1998 for US.
- Second: Period 2001-2017 for AUS, AUT, BEL, CZE, DNK, FIN, FRA, DEU, HUN, ISL, IRL, ITA, LUX, LTU, NLD, NOR, NZL, PRT, SVK, SVN, ESP, SWE, CHE, GBR; 2002-2017 for CAN, EST, GRC, ISR, POL; 2003-2017 for CHL; 2001-2006 for LTV; 2004-2008 for MEX; 1999-2017 for USA.
- Third: 2008-2017 for LAT, 2010-2017 for MEX.

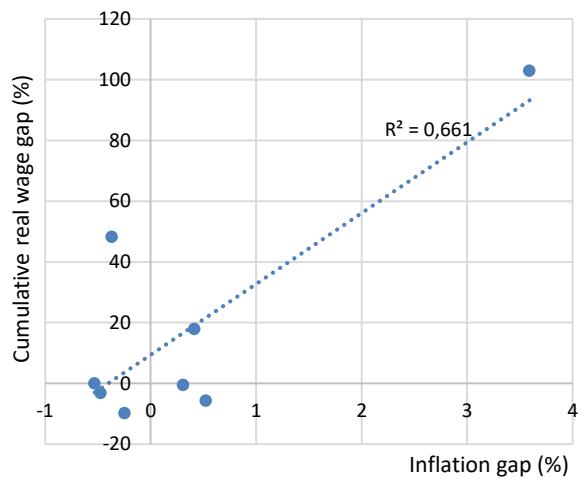
Post-crisis Phillips Curve, 21 OECD countries, 1st wage adjustment



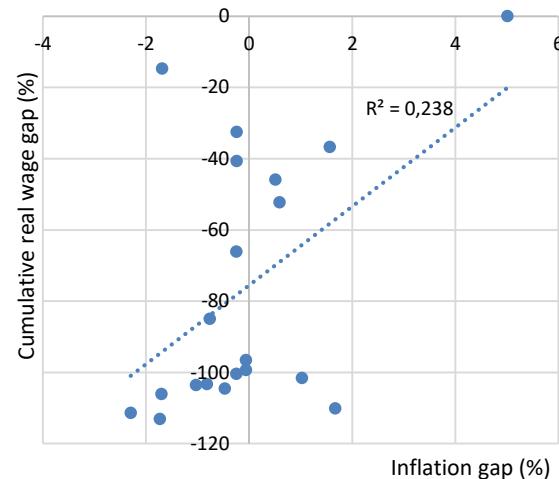
U.S., 1989-1998



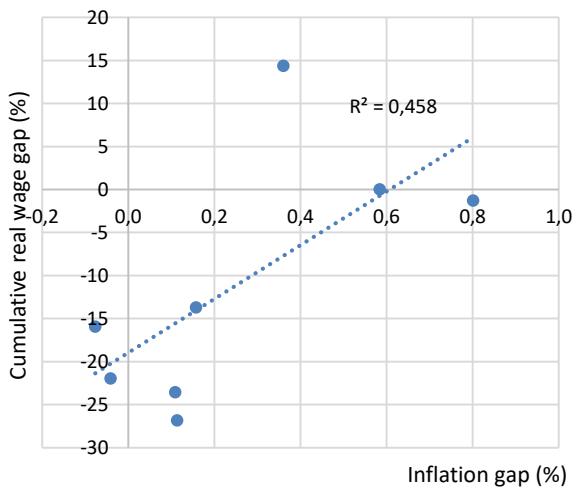
Ireland, 1993-2000



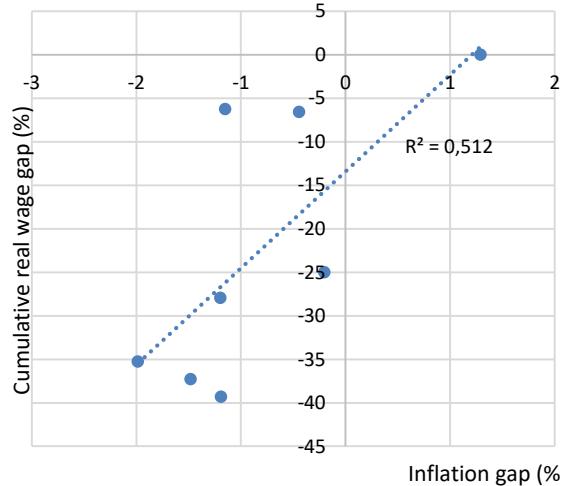
Korea, 1998-2017



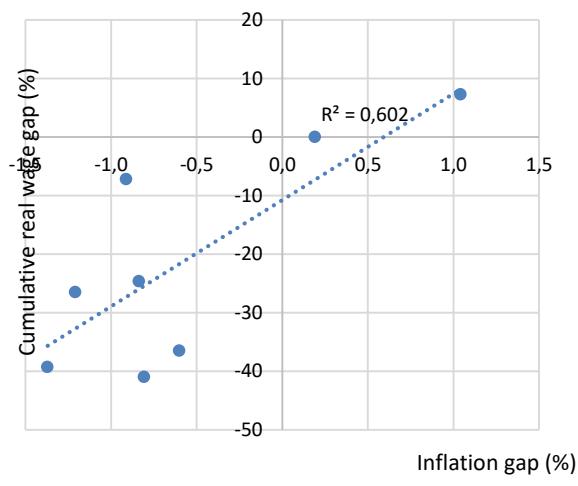
Netherlands, 1993-2000



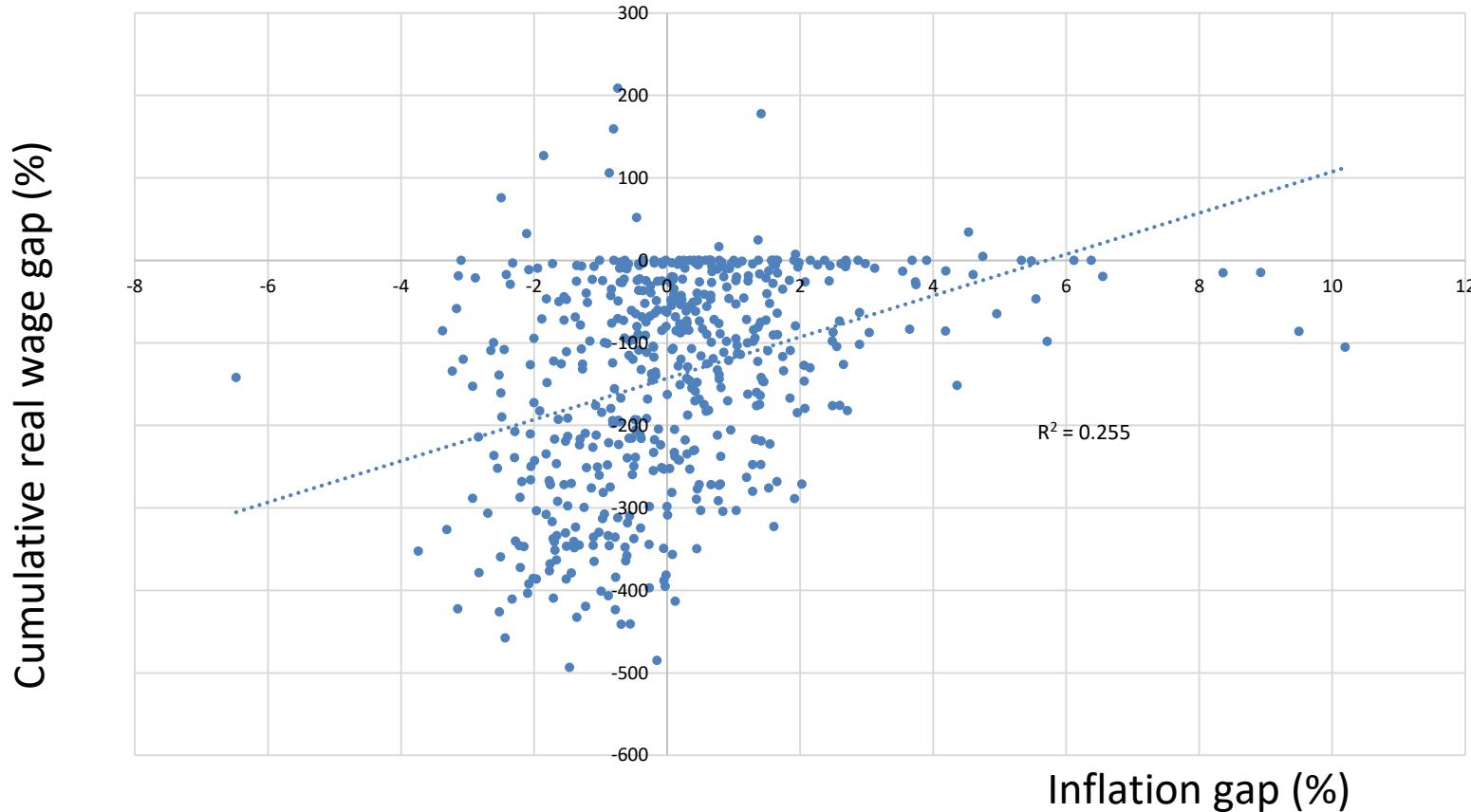
Switzerland, 1993-2000



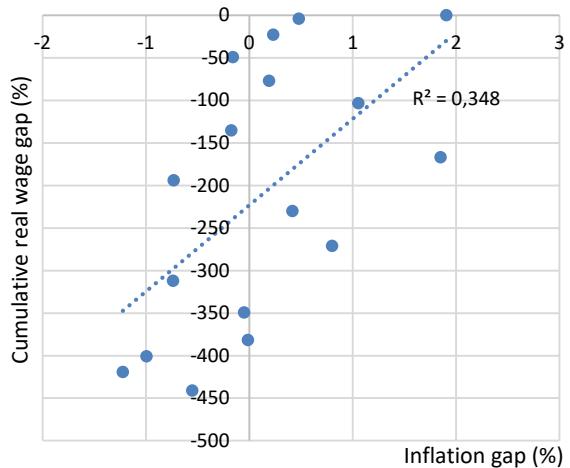
Iceland, 1994-2000



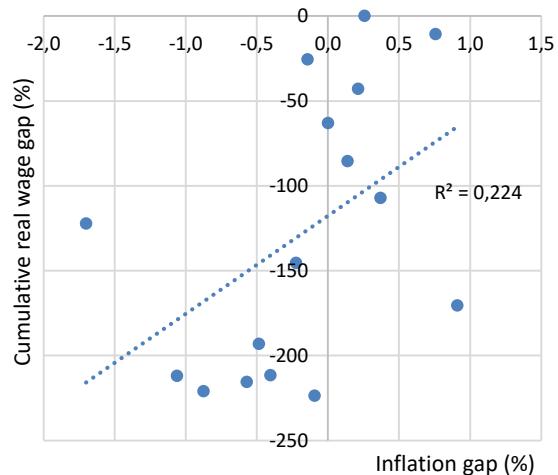
Post-crisis Phillips Curve, 33 OECD countries, 2nd wage adjustment



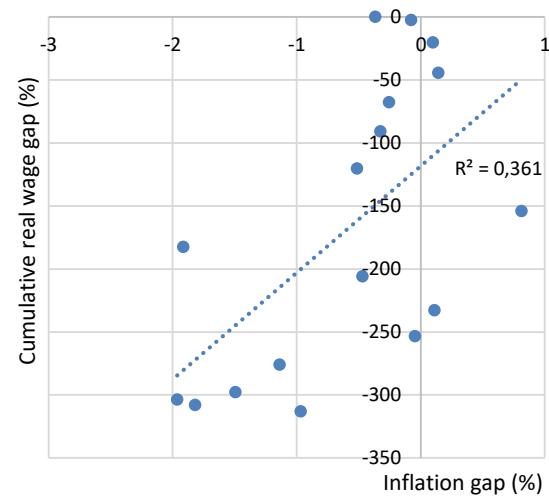
Australia, 2001-2017



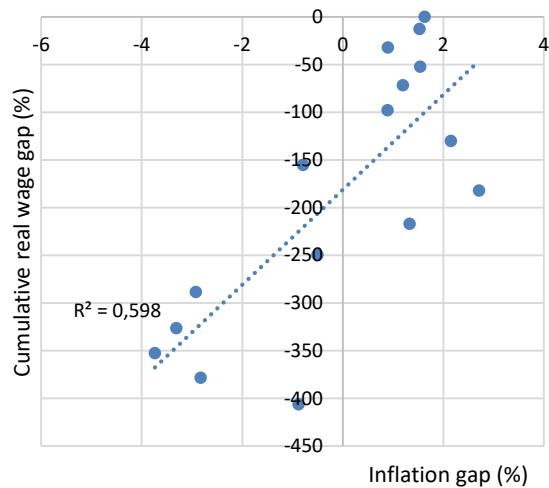
Canada, 2002-2017



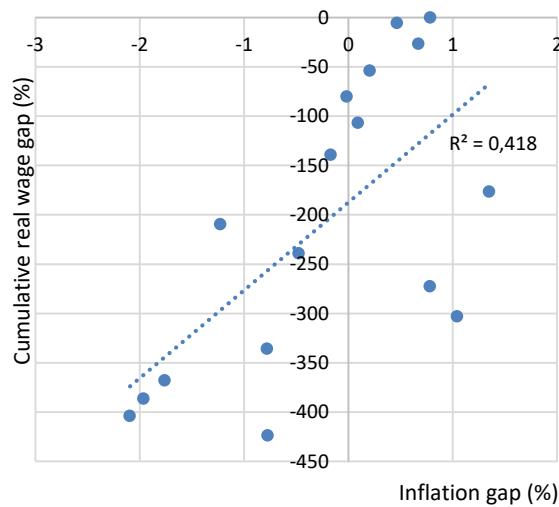
France, 2001-2017



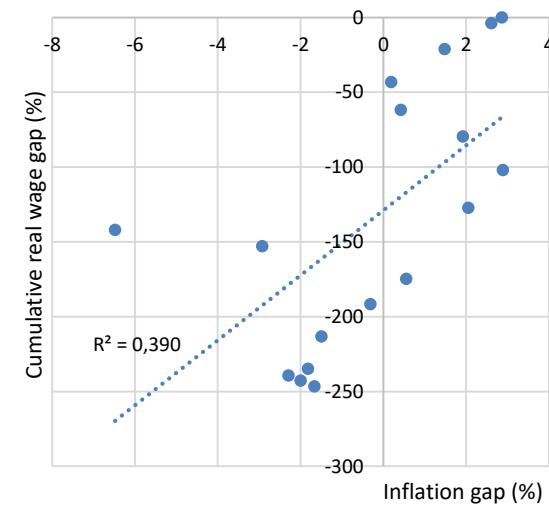
Greece, 2002-2017



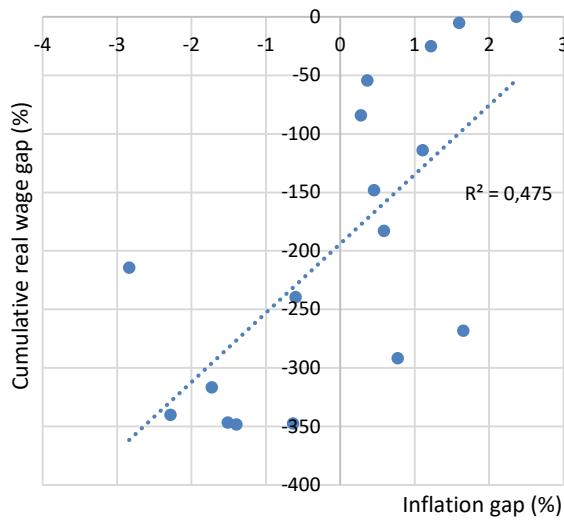
Italy, 2001-2017



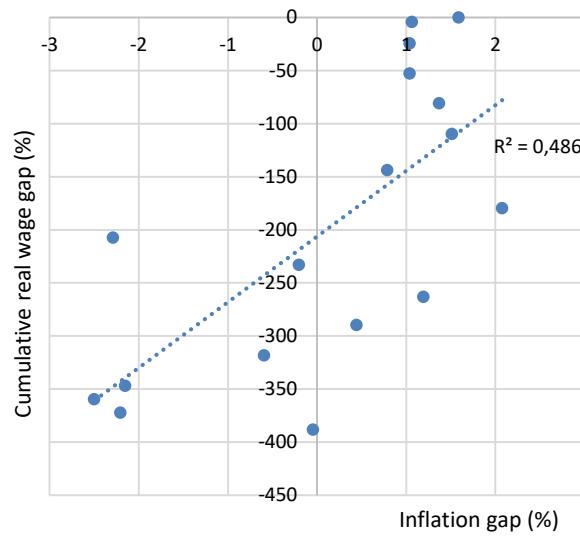
Ireland, 2001-2017



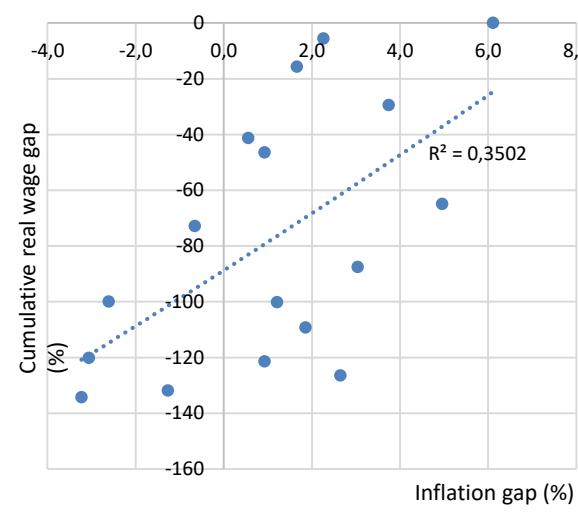
Portugal, 2001-2017



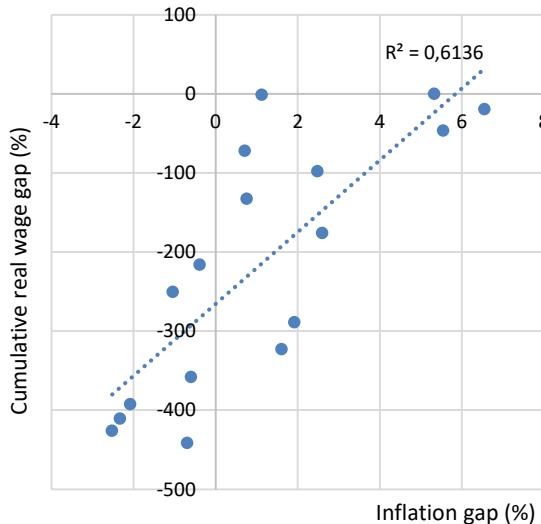
Spain, 2001-2017



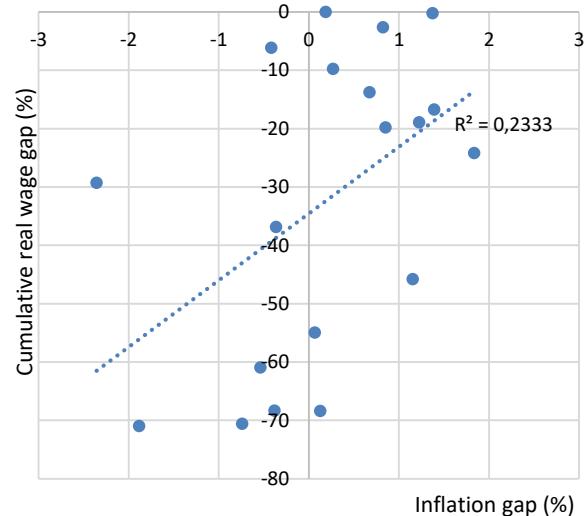
Hungary, 2001-2017



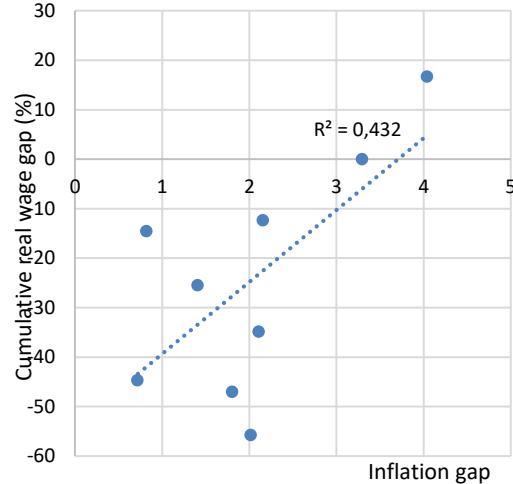
Slovak Rep., 2001-2017



U.S., 1999-2017



Mexico, 2009-2017



Panel estimation with country fixed effects, standard method

Country	Period	No. of observations	Coefficient	R-squared
All OECD countries	1 st wage adjustment	197	0.0028**	0.362
	2 nd wage adjustment	525	0.0045***	0.255
	3 rd wage adjustment	18	0.0099	0.477

Panel estimation with country fixed effects, log-normalized

Country	Period	No. of observations	Coefficient	R-squared
All OECD countries	1 st wage adjustment	197	0.0561**	0.217
	2 nd wage adjustment	525	0.0846***	0.265
	3 rd wage adjustment	18	0.0454	0.126

Main conclusions

- Bottom line: inflation depends on the cumulative wage gap - it does not increase close to or above its target level until the cumulative real wage gap is closed.
- The policy implication from this finding is that countries which closed their cumulative real wage gap should be much more prudent in further wage increases – because they will be seen in inflation much faster and larger than in the recent past. For countries which have not closed their cumulative real wage gap, the implication is that inflation will remain subdued until they close their cumulative wage gap.