The Great Disconnect: The Decoupling of Wage and Price Inflation in Japan

Takeo Hoshi

and

Anil K Kashyap

Outline

1. Motivation
2. Breaks (over time) in the inflation process
3. Breaks (over time and across different jobs) in the linkage between labor market and wage
4. Changes in the links between wage inflation and price inflation

1. Motivation

Main Question

- Why is inflation rate in Japan still low?

Despite

- Super-expansionary monetary policy
- Output gap near zero (or positive)
- Tight labor market

especially since 2013 under Abenomics

Our story

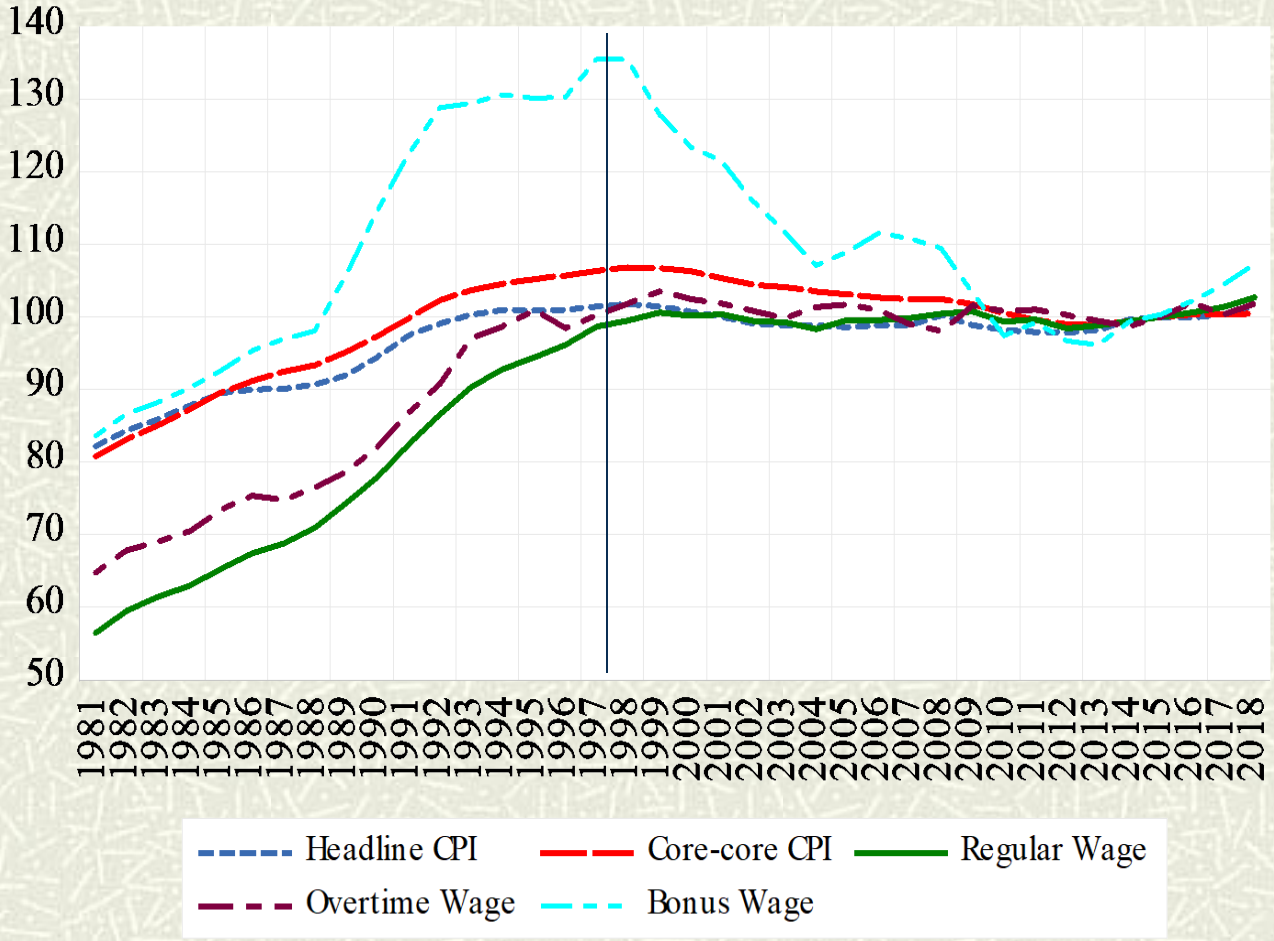
- Wage and Price inflation was pretty “normal” prior to 1998: wage inflation Granger causes price inflation
- Massive labor market shock following the 1997 banking crisis
  - Excess full time workers, for most of the time since
- Wage inflation mostly disconnects from the unemployment rate post 1998
  - Helpful to separate regular, overtime and bonus pay
- Wage and Price inflation also disconnect after 1998

Related literature

- Phillips Curve approaches
  - E.g. Bernanke (2017), BoJ (2017), Gagnon (2017)
- Wage Phillips curves
  - Emphasis on the dual labor market
  - Genda ed (2017) essays
- We argue that the labor market developments matter and have altered price inflation dynamics – importantly this started in the late 1990s.

2. Breaks in the Inflation Process

Japanese Price and Wage Levels: 1981-2018 (2012=100)



ARMA Models for Core Core Inflation

	Sample: 1981 - 1997			Sample: 1998 - 2018		
Variable	Coefficient	Standard Error	T-stat	Coefficient	Standard Error	T-stat
Constant	0.0291	0.0135	2.1482	-0.0014	0.0023	-0.6033
AR(1)	0.9802	0.0333	29.4294	0.8968	0.0483	18.5498
MA(2)	0.3842	0.1019	3.7694	0.2015	0.1070	1.8827
R^2	0.93			0.84		
Approximate P-value Q statistic	0.9483 (at lag 17)			0.5818 (at lag 19)		

ARMA Models for Regular Wages

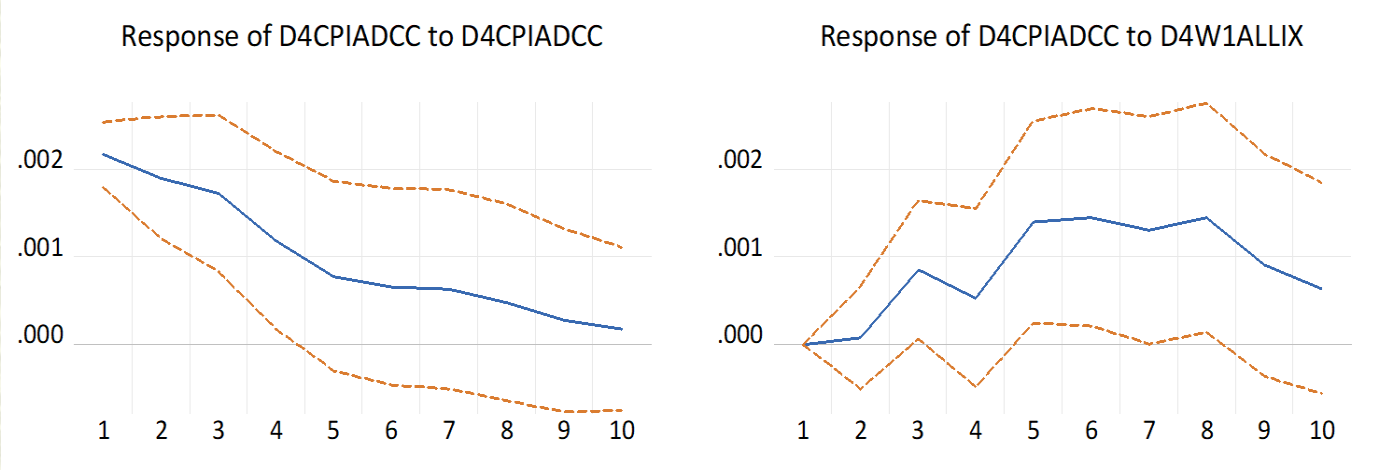
	Sample: 1981 - 1997			Sample: 1998 - 2018		
Variable	Coefficient	Standard Error	T-stat	Coefficient	Standard Error	T-stat
Constant	0.0371	0.0062	5.9556	0.0023	0.0022	1.0329
AR(1)	0.5457	0.1257	4.3396	0.2065	0.1146	1.8025
AR(2)	0.3165	0.1278	2.4768	0.3116	0.1154	2.6995
R^2	0.6584			0.1748		
Approximate P-value Q statistic	0.09 (at lag 17)			0.00 (at lag 19)		

Wages Granger Cause Prices Prior to 1998

Dependent variable: Core-core inflation Sample Period: **1981q1-1997q4**			
Excluded	Chi-sq	df	Prob.
Regular wage inflation	10.139	4	0.038
Overtime wage inflation	2.292	4	0.682
Bonus wage inflation	17.529	4	0.002
All	32.725	12	0.001

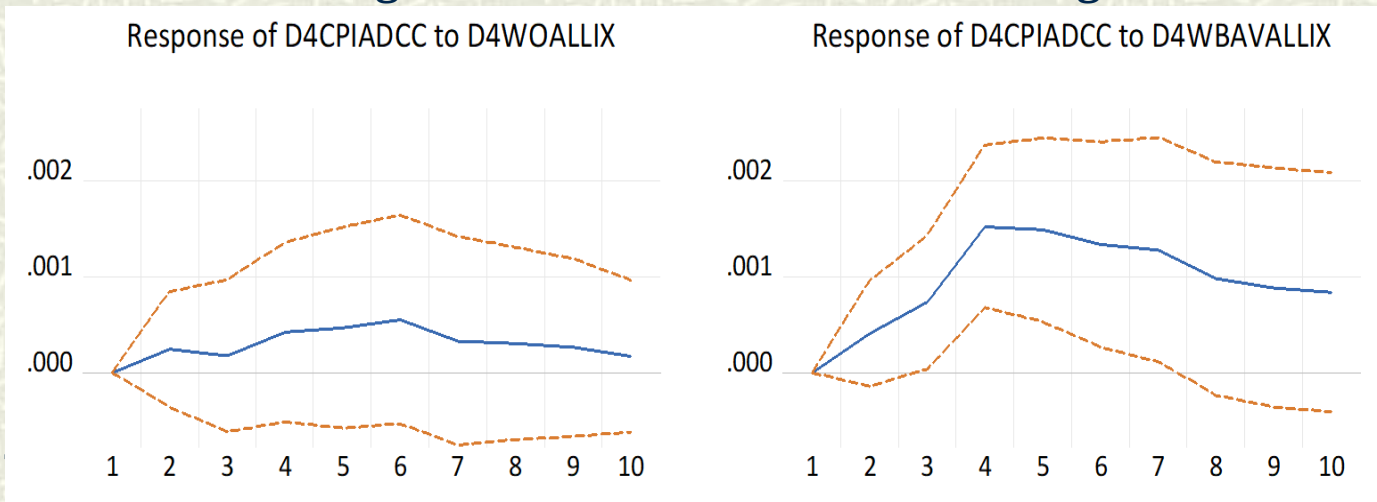
Impulse responses are sensible too
(95 percent confidence intervals shown)

To Core-Core Inflation



To Regular Wage Inflation

To Overtime Wage Inflation



To Bonus Wage Inflation

Wages Account for a lot of Price Variation Prior to 1998 (Choleski decomposition)

Variance Decomposition of Core-Core Inflation Rate (%): 1981q1-1997q4

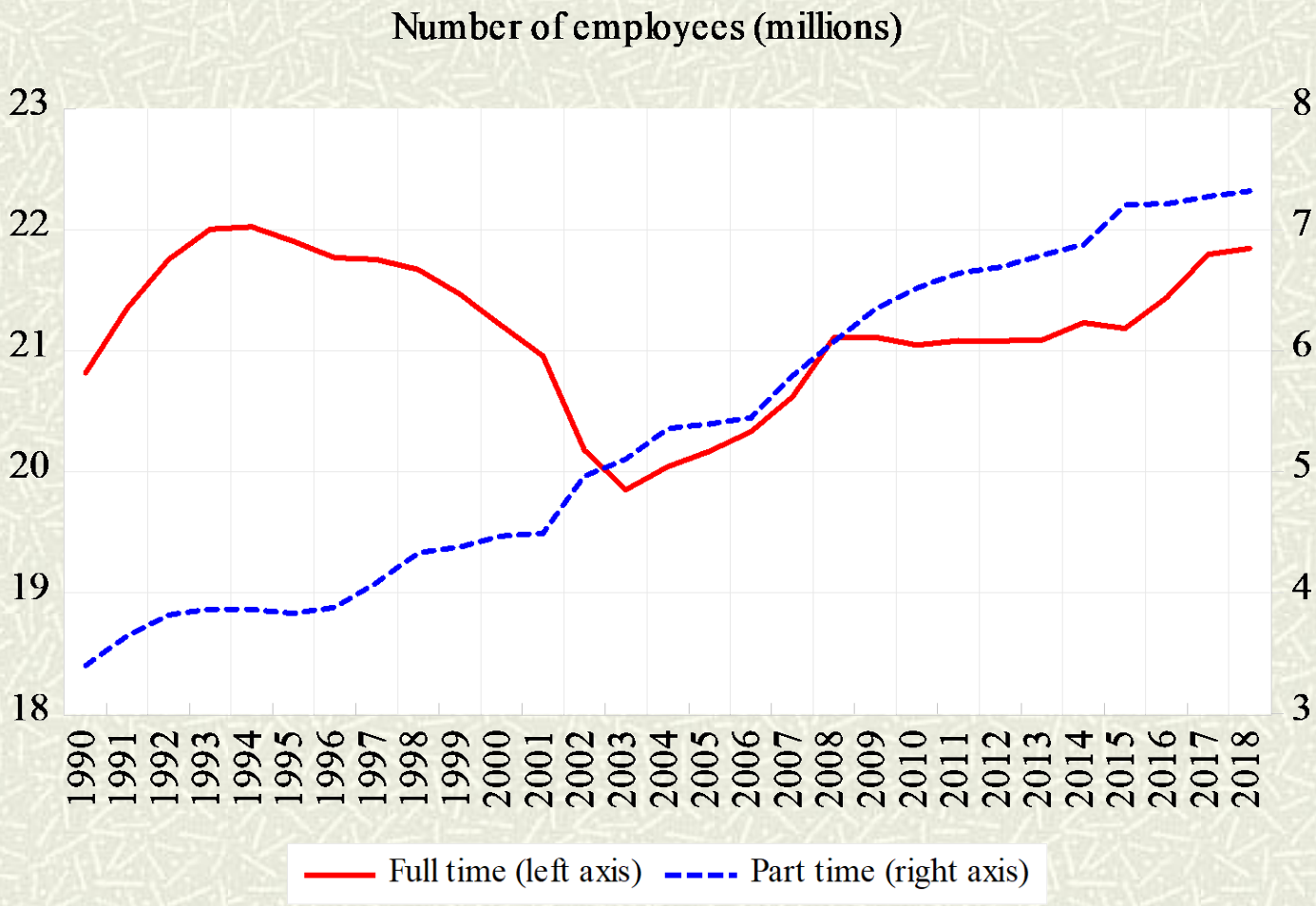
Quarter	Core-core inflation	Regular wage inflation	Overtime wage inflation	Bonus wage inflation
1	100.000	0.000	0.000	0.000
2	97.293	0.072	0.685	1.950
3	88.002	5.745	0.699	5.554
4	74.613	5.977	1.564	17.846
5	60.427	13.516	2.199	23.858
6	51.556	19.056	2.977	26.412
7	46.362	22.224	2.955	28.459
8	42.410	26.210	2.933	28.447
9	40.540	27.234	2.981	29.245
10	39.328	27.486	2.965	30.220

Summary

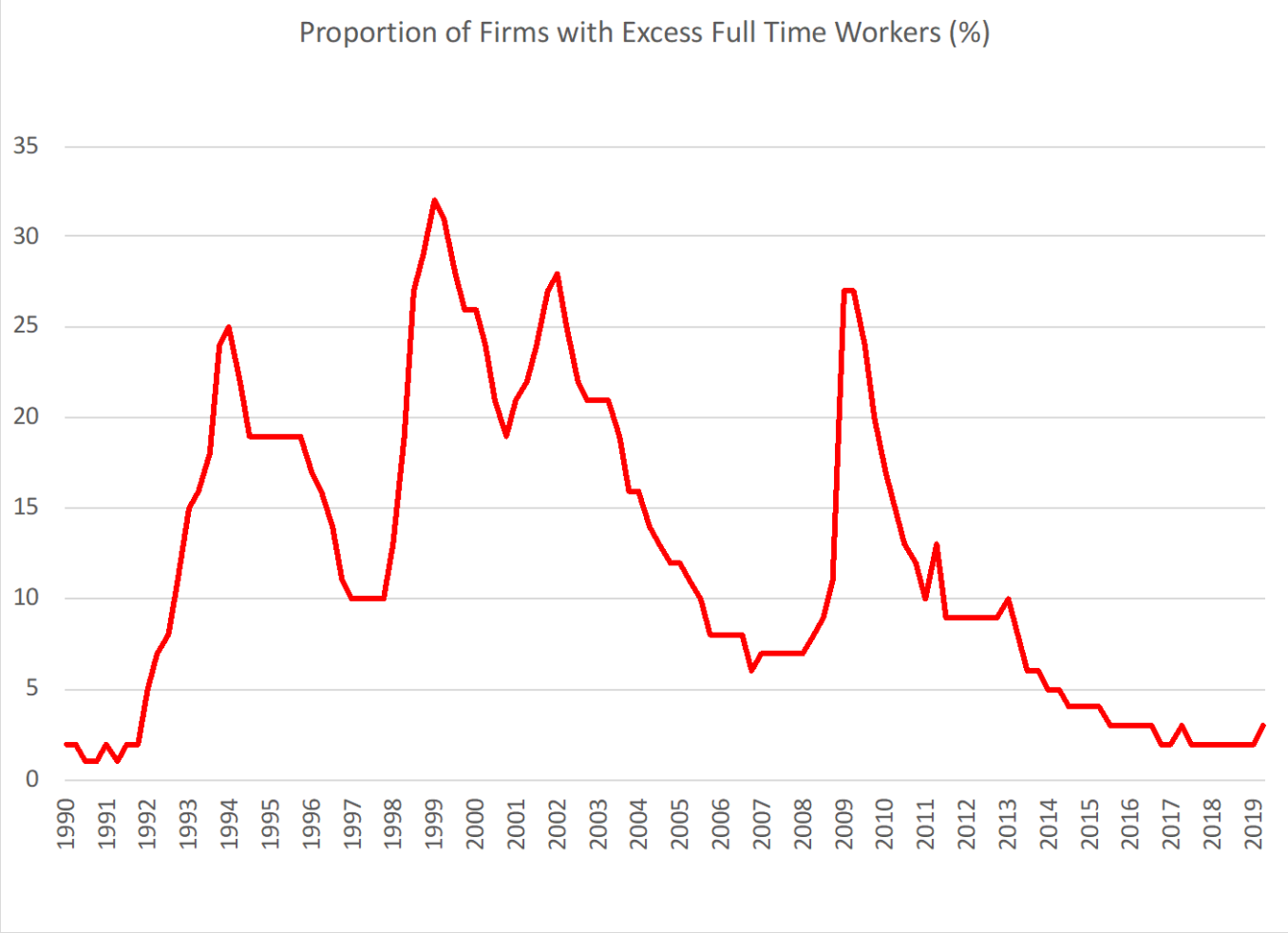
- Prior to 1998
  - Prices and Wages were growing
  - Wage inflation Granger caused Price inflation
  - Wages shocks accounted for a lot of Price variation
- After 1998
  - Prices and Wages stop growing
  - Statistical representations for prices and wages shift and become less persistent

3. Breaks in the linkage between labor market conditions and wages

Changing composition of employment (Full-time vs. Part-time) (Unit: Million)



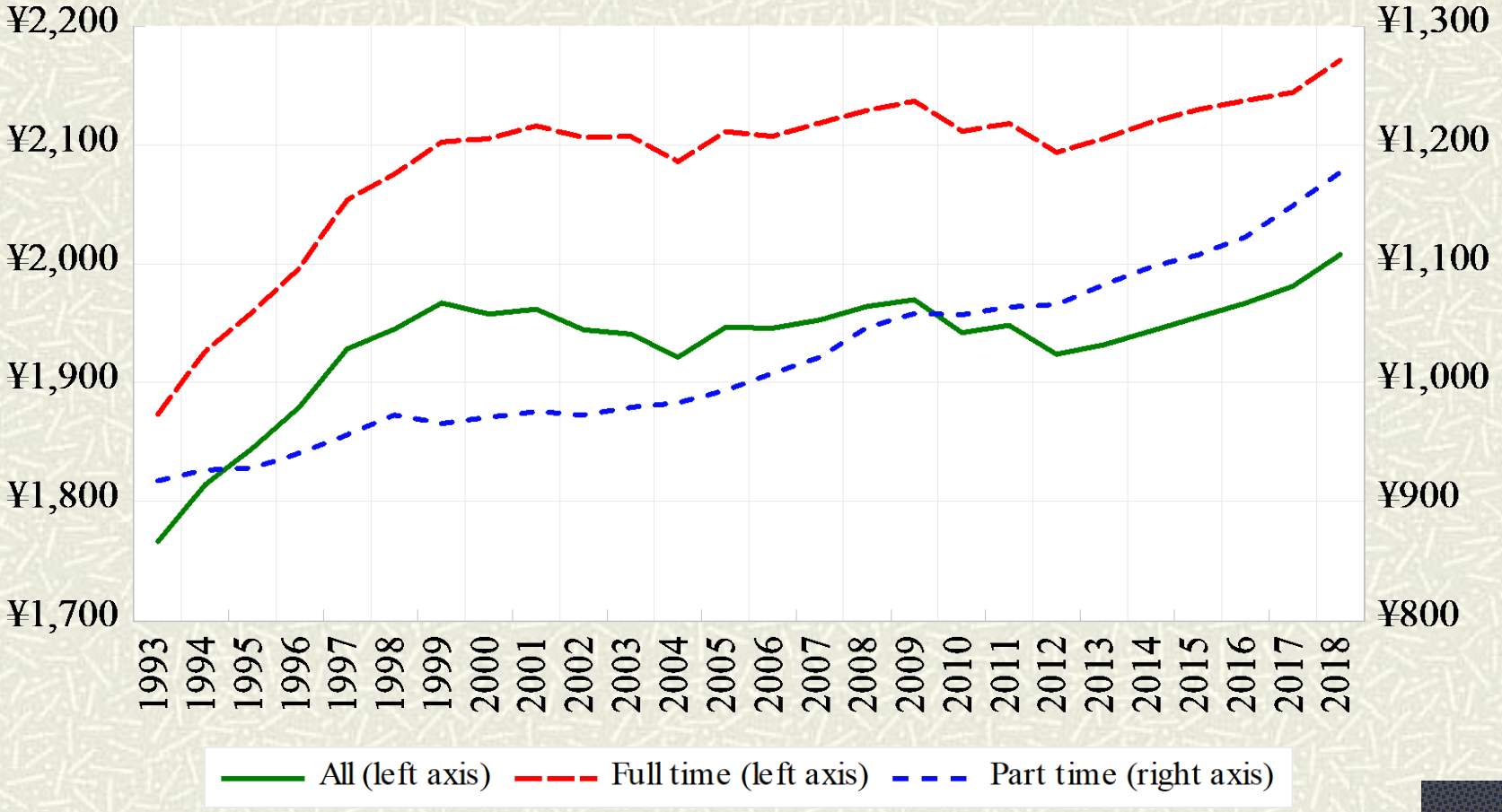
Excess supply of Full-Time workers



Wages for all workers shift post 1998

Regular Wages	Sample: 1981 - 1997			Sample 1998- 2018		
Variable	Coefficient	Standard Error	T statistic	Coefficient	Standard Error	T statistic
Constant	0.1060	0.0131	8.12	0.0290	0.0084	3.44
AR(1)	0.2880	0.1071	2.69	0.0428	0.1041	0.41
AR(2)	0.1916	0.1434	1.34	0.1844	0.1078	1.71
Lagged UNEMP	-0.0267	0.0049	-5.48	-0.0064	0.0019	-3.40
R^2	0.71			0.28		
Overtime Wages	Sample: 1981 - 1997			Sample 1998- 2018		
Variable	Coefficient	Standard Error	T statistic	Coefficient	Standard Error	T statistic
Constant	0.1338	0.0260	5.14	0.0189	0.0206	0.92
AR(1)	0.7125	0.1173	6.07	0.4308	0.1673	2.58
AR(2)	-0.2469	0.1701	-1.45	0.0734	0.1322	0.55
Lagged UNEMP	-0.0398	0.0099	-4.03	-0.0042	0.0048	-0.87
R^2	0.62			0.23		

Remarkable stagnation in wage levels



Regular Wages and Slack 1998Q1 -2018:Q4

	Full time workers			Part time workers		
Variable	Coefficient	Standard Error	T-stat	Coefficient	Standard Error	T-stat
Constant	0.0221	0.0083	2.66	0.0471	0.0093	5.08
AR(1)	-0.0151	0.1076	-0.14	0.3802	0.1071	3.55
AR(2)	0.2189	0.1084	2.02	0.1253	0.1664	0.75
Lagged UNEMP	-0.0046	0.0019	-2.45	-0.0087	0.0022	-3.93
R^2	0.17			0.54		

Overtime Wages and Slack 1998Q1 -2018:Q4

	Full time workers			Part time workers		
Variable	Coefficient	Standard Error	T-stat	Coefficient	Standard Error	T-stat
Constant	0.0131	0.0203	0.65	0.0778	0.0725	1.07
AR(1)	0.6005	0.1229	4.89	0.6860	0.1136	6.04
AR(2)	0.0378	0.1182	0.32	-0.1282	0.1181	-1.09
Lagged UNEMP	-0.0027	0.0047	-0.56	-0.0142	0.0158	-0.90
R^2	0.40			0.42		

Bonus Wages and Slack 1998:1-2018:4

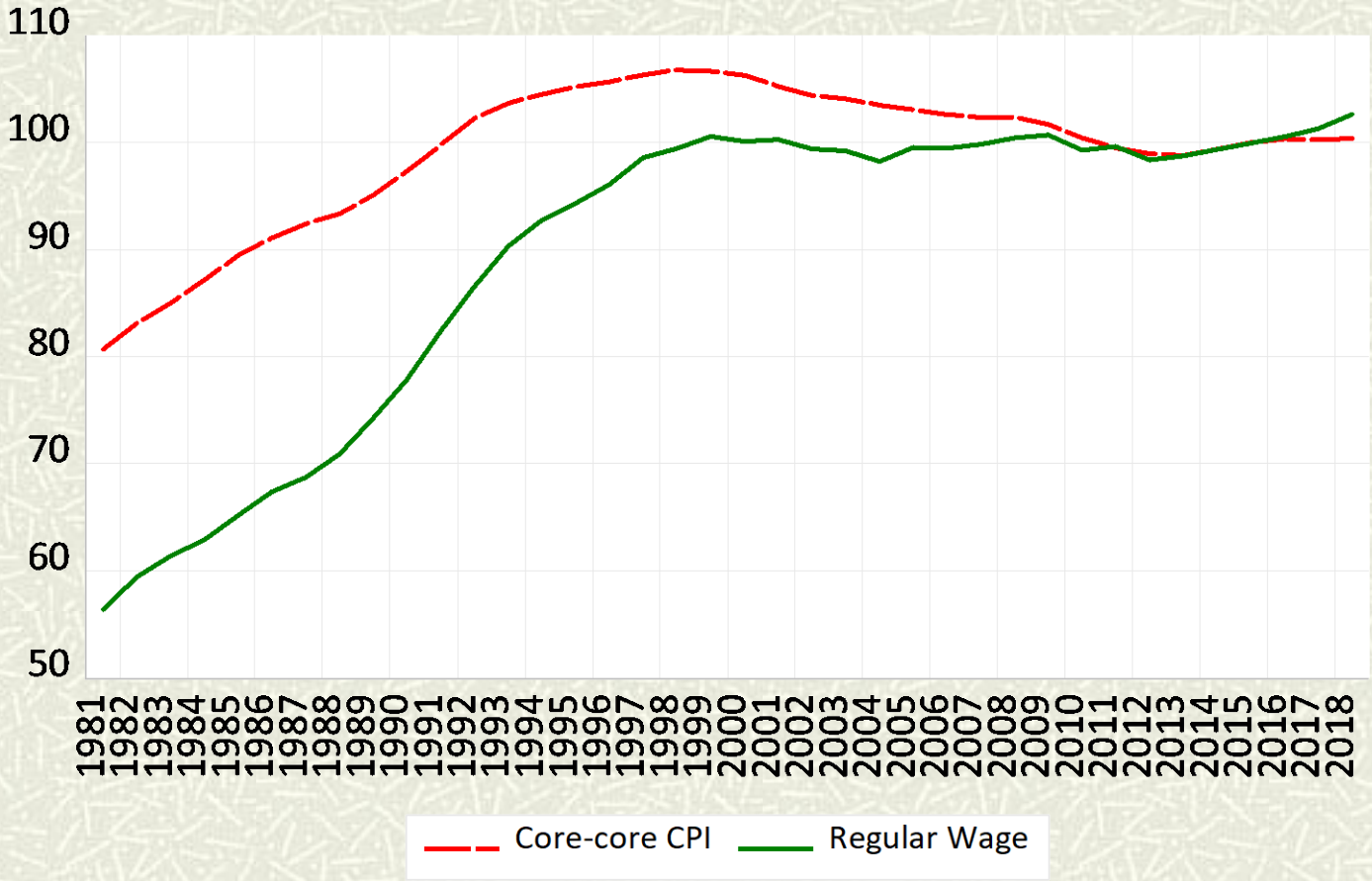
	Full time workers			Part time workers		
Variable	Coefficient	Standard Error	T-stat	Coefficient	Standard Error	T-stat
Constant	0.1252	0.0376	3.32	0.1170	0.0633	1.85
AR(1)	0.7734	0.0714	10.84	0.7005	0.0913	7.68
Lagged UNEMP	-0.0313	0.0080	-3.90	-0.0354	0.0139	-2.55
R^2	0.75			0.62		

Summary on wage and labor market linkage

- After 1998 unemployment hardly affects wages
  - Main channel is through bonuses
- The links for full-time workers (who account for the bulk of the wage bill) are very weak
  - For most of this period, suggestive evidence that there are excess full-time workers

4. Wage inflation (or lack of) and price inflation

Wage and Price Co-Movements



Post 1998: Wages don’t Granger cause Prices

Dependent variable: Core-core inflation			
Excluded	Chi-sq	df	Prob.
Regular wage inflation	2.771	4	0.597
Overtime wage inflation	1.377	4	0.848
Bonus wage inflation	2.200	4	0.699
All	6.272	12	0.902

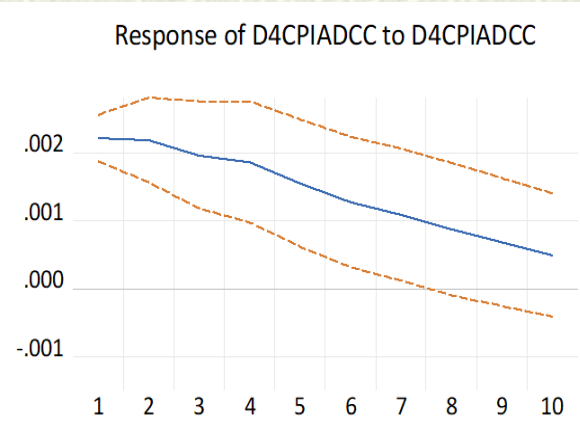
Post 1998: Wage shocks don't matter for Prices

Variance Decomposition of Core-Core Inflation Rate (%): 1998q1-2018q4

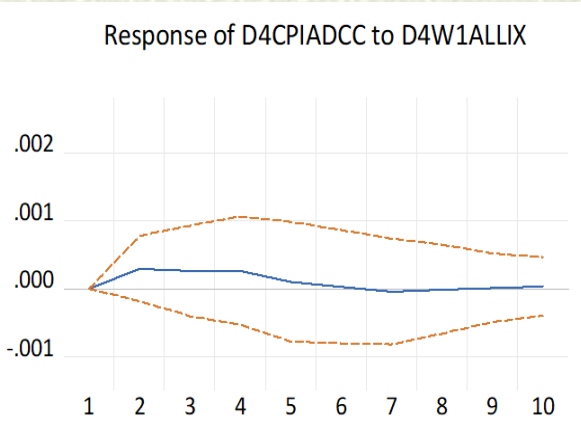
Quarter	Core-core inflation	Regular wage inflation	Overtime wage inflation	Bonus wage inflation
1	100.000	0.000	0.000	0.000
2	98.957	0.899	0.016	0.128
3	98.494	1.145	0.111	0.249
4	97.651	1.311	0.840	0.198
5	97.212	1.194	1.304	0.290
6	95.712	1.090	2.518	0.680
7	94.517	1.025	3.222	1.236
8	93.279	0.978	3.762	1.981
9	92.176	0.948	4.157	2.720
10	91.529	0.936	4.274	3.261

Impulse responses also weak

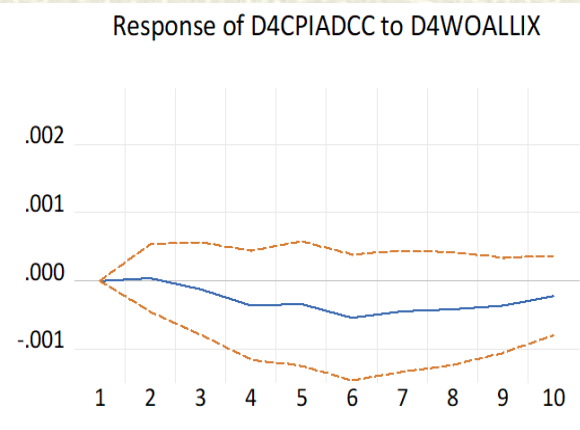
To Core-Core Inflation



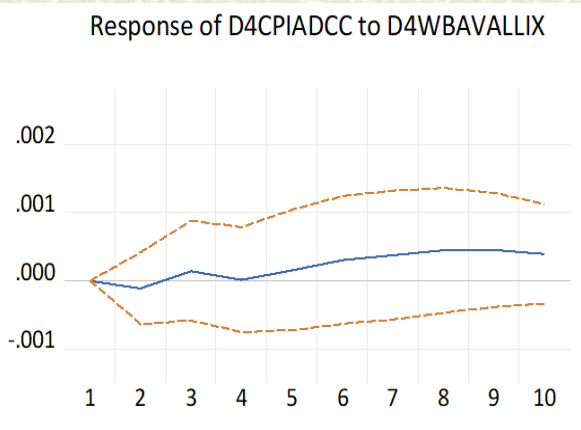
To Regular Wage Inflation



To Overtime Wage Inflation

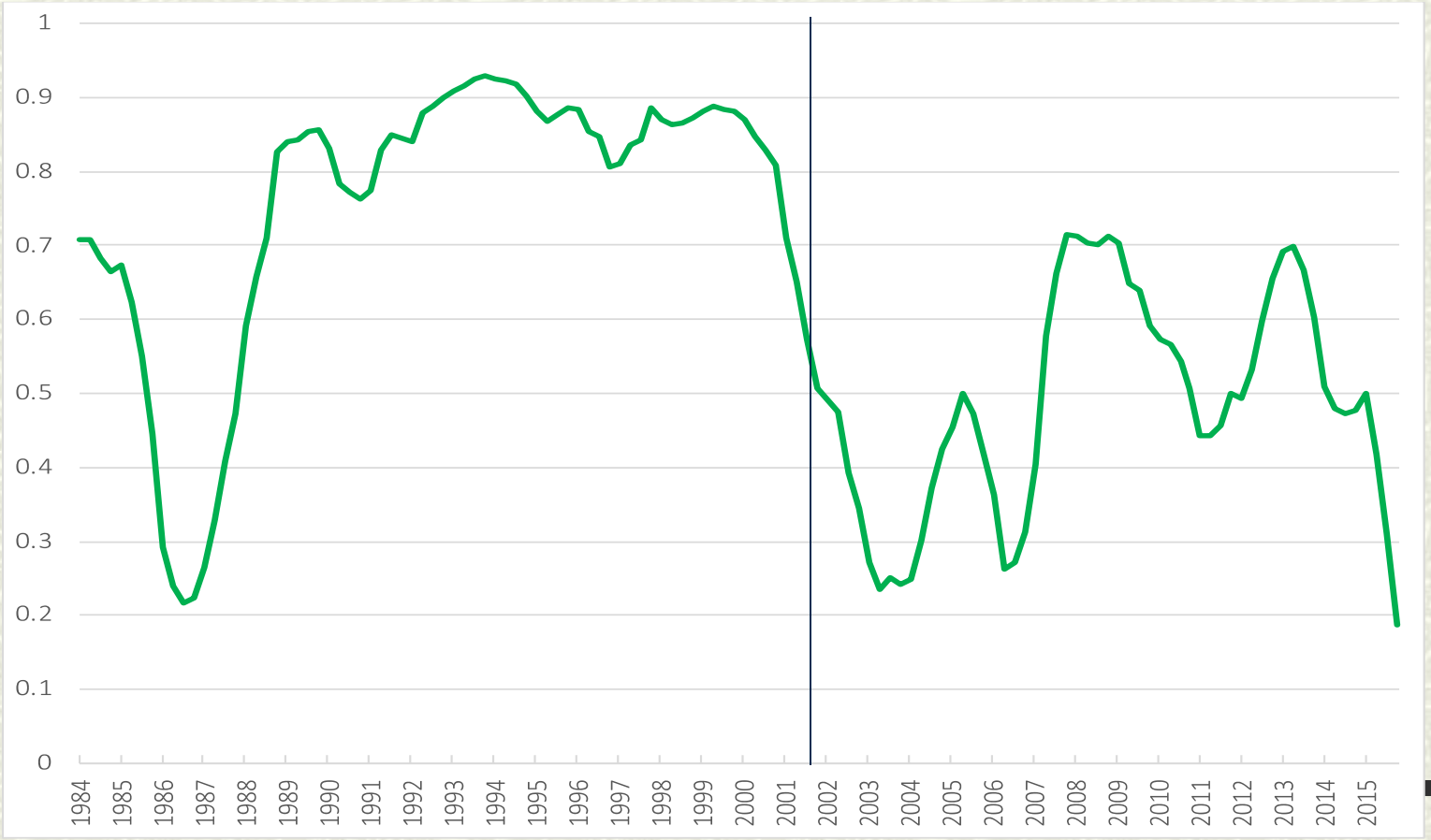


To Bonus Wage Inflation



25 quarter centered rolling correlations between the unobserved trends for Core-Core inflation and Regular wage inflation

$$y_t = \mu_t + \sigma^y \varepsilon_t$$
$$\mu_t = \mu_{t-1} + \sigma^\mu \nu_t$$

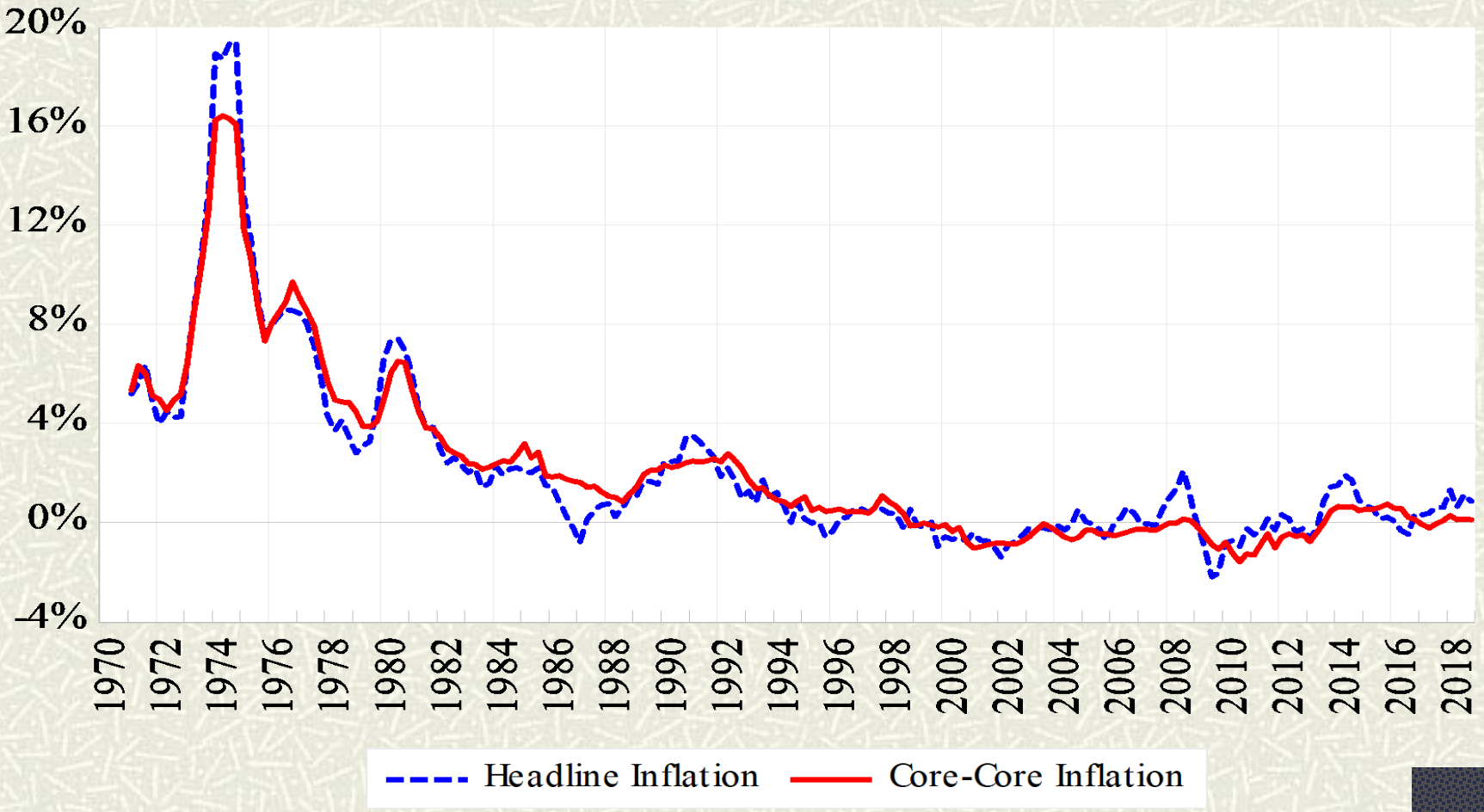


Bottom line

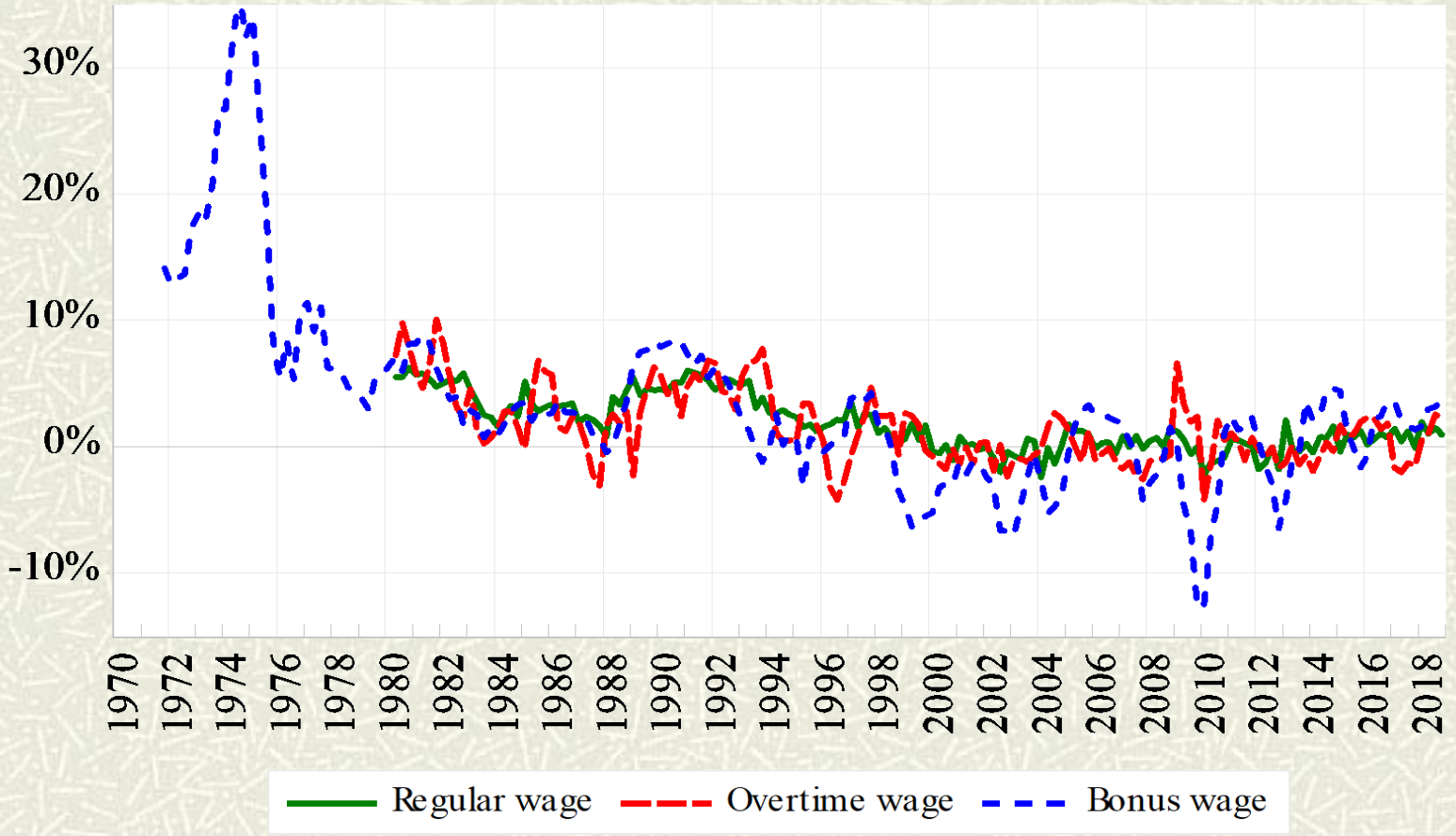
- Lots of macroeconomic relationships in Japan shifted around 1998
- Labor market conditions become less connected to slack
- The labor market shifts seems to be tied up with differences in the markets for full-time and part-time workers
- Wage developments no longer seem critical price developments

Extra Slides

Price Inflation



Wage Inflation



Reasons to suspect an inflation break around 1998

- Banking crisis breaks out in late 1997
- BoJ independence comes in 1998
- Various other macro relations are disrupted around then:
  - Labor market relationships
  - Connections between monetary policy and the economy
  - Consumption dynamics
  - Corporate restructuring
  - Net foreign asset dynamics