# Understanding de-anchoring of inflation expectations Evidence from Chile

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11th International Research Conference
Central Bank of Sri Lanka, 7 December 2018

* The opinions expressed are those of author and do not represent those of the Central Bank of Chile or its board members.

# What is this about?

- Several scholars have raised the question of whether inflation expectations are well anchored, but few ask which factors affect expectations that *are* de-anchored.
- For forward looking monetary policy it is crucial to understand what has caused a possible de-anchoring and how already de-anchored expectations may be affected.
  - Two possible reasons for de-anchoring:
    - The agents do not believe that the CB will do whatever is necessary to reach the inflation target (credibility).
    - The agents believe that the growth forecasts of the CB are wrong and, hence, given their believe to the policy actions, that the long-run inflation will be different from the inflation target (difference of opinion).
- In this context, the quest of this study is (1) to analyze explaining factors of de-anchored expectations and (2) what are the triggering factors to and from de-anchoring.

# Outline of talk

1. This paper
2. The exercises in the study
   a) Theoretical framework
   b) Empirical questions
3. Data and descriptive statistic
4. Estimation results
5. Final remarks

# This paper is different from existing literature

- De-anchoring is defined as survey responses (micro) different from the target of the Central Bank of Chile

  *The practical purpose or operating objective behind monetary policy is to keep projected inflation around 3% annually over a policy horizon of about two years. The policy horizon is the maximum period during which the Central Bank normally attempts to take inflation back to 3%.* (Central Bank of Chile (2007, p. 17))

- Objective is **NOT** to discuss whether inflation expectations are anchored or not

- Rather the objective is to study why expectations of some agents are not anchored, i.e. the determinants of de-anchored expectations.

- An illustrative study of the triggering factors of de-anchoring and factors that can anchor them, when they are de-anchored.

# Theoretical considerations

- It is assumed that the initial inflation expectation of agent $j$ for the monetary policy horizon $T$ is anchored to the inflation target of the central bank, $\pi^*$:

$$E_{j0}\left(\pi_T \middle| I_{j0}\right) = \pi^*.$$

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$$E_{j0}(\pi_T | I_{j0}) = \pi^*.$$

- Deviations from the inflation target may be due common shocks, $e_t$, or idiosyncratic ones, $e_{jt}$, that have an *expected* impact on $\pi_T$ via the functions $f_{jt}(\cdot)$ and $g_{jt}(\cdot)$. Furthermore, the agent has expectations to the impact on $\pi_T$ of expected future monetary policy actions $h_{jt}(m_{jt},\ldots,m_{jT})$. Hence, at time $t$:

$$E_{jt}(\pi_T | I_{jt}) = \pi^* + f_{jt}(e_t) + g_{jt}(e_{jt}) + h_{jt}(m_{jt}, \ldots, m_{jT}).$$

# Theoretical considerations

- If shocks are perceived by the agent to affect the inflation at the horizon of the monetary policy, they should be contradicted by the perceived effects of policy actions in order to maintain the expectations anchored:

$$f_{jt}(e_t) + g_{jt}(e_{jt}) = -h_{jt}(m_{jt}, \dots, m_{jT}).$$

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- If this is not the case, inflation expectations are de-anchored:
  - Lack of credibility to the CB?
  - Difference of opinion with the CB with respect to effects of shocks and/or policy actions?
- This formulation is similar to the one presented by Beechey et al. (AEJ: Macro, 2011)

# Empirical questions:

**Exercise 1: Determinants of:**

- Q1: De-anchored 2-years-ahead expectations ($E(\pi_t^{2Y}) \neq 3$)
- Q2: *Negative* de-anchoring ($E(\pi_t^{2Y}) < 3$)
- Q3: *Positive* de-anchoring ($E(\pi_t^{2Y}) > 3$)

**Exercise 2** (Small sample caveat!!! Illustrative)**:**

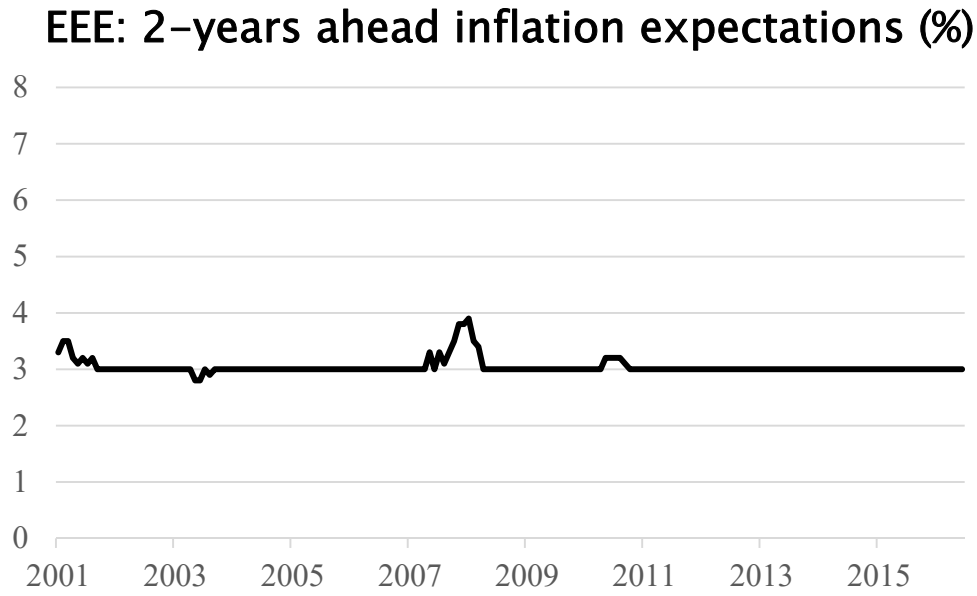
- Q4: Step to *negative* de-anchoring ($E(\pi_t^{2Y}) < 3 | E(\pi_{t-1}^{2Y}) = 3$)
- Q5: Step to *positive* de-anchoring ($E(\pi_t^{2Y}) > 3 | E(\pi_{t-1}^{2Y}) = 3$)
- Q6: Return from *negative* de-anchoring ($E(\pi_t^{2Y}) = 3 | E(\pi_{t-1}^{2Y}) < 3$)
- Q7: Return from *positive* de-anchoring ($E(\pi_t^{2Y}) = 3 | E(\pi_{t-1}^{2Y}) > 3$)

# Data base

- Micro data of the EES from 2001M9-2017M12.
- Unbalanced panel: E.g. not all respondents answer all the time.
- EES Data supplied by the Central Bank of Chile. Other data extracted from the data base available at the web page of the Central Bank of Chile.
- EES observations:
  - Inflation expectations two years ahead (normalized by 3)
  - Short-term expectations (to measure surprises): Inflation, MPR, growth.
  - Medium-term expectations (to measure differences with respect to CB forecasts): Inflation Dec., GDP current year, MPR 12M (+median)
- Observations from Monetary policy reports: Inflation Dec. and GDP current year.
- Macro observations: Commodity prices (oil and food), unit labor costs, exchange rate, MPR, inflation, output growth, business expectations.
- Econometric analysis employs information available to agents when answering the survey.

# Some descriptive statistics 1: Replies to question of inflation two-years-ahead

- Not many observations of de-anchoring if considering the median of the replies.




Notes: Solid thick line: Median.

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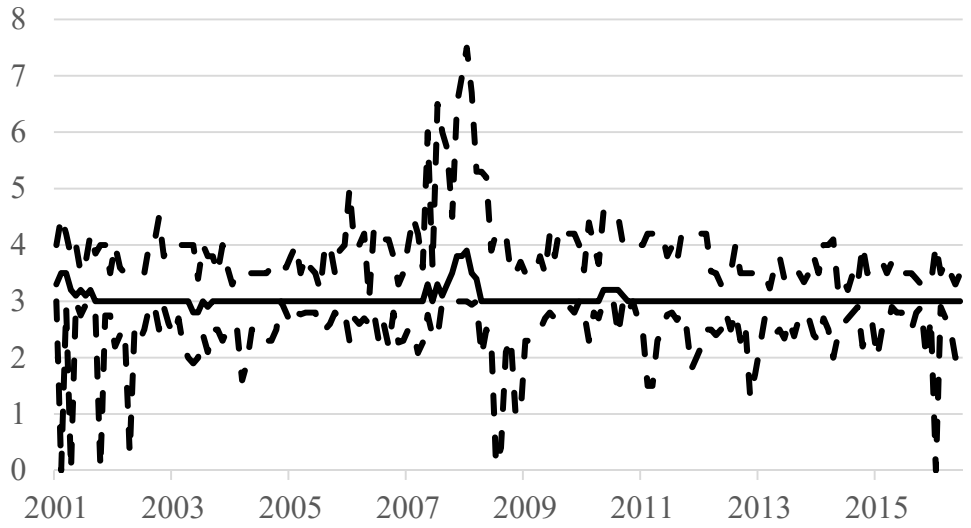
EEE: 2-years ahead inflation expectations (%)

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# Some descriptive statistics 1: Replies to question of inflation two-years-ahead

- Not many observations of de-anchoring if considering the median of the replies.
- But there are variations in individual replies.
- Some of the individual replies may be affected by measurement errors -> Robustness: Trim of replies

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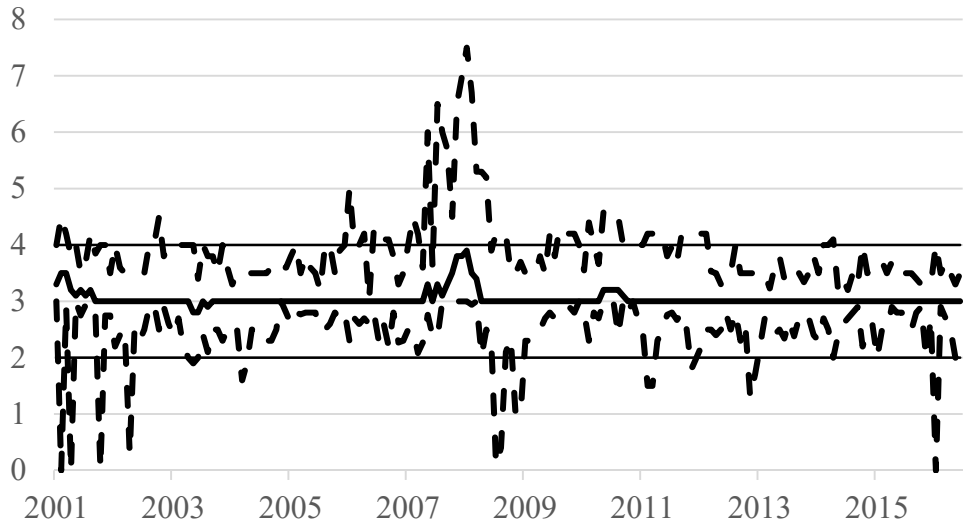


Notes: Solid thick line: Median. Dotted lines: Minimum and maximum of replies. Solid thin lines: 2% and 4%.

# Some descriptive statistics 2: Number of replies

- Most of the replies are from the financial sector

| | | | =3 | | >3 | | <3 | |
|---|---|---|---|---|---|---|---|---|
| | # | % | # | % | # | % | # | % |
| Number of replies | 6,666 | | 4,310 | 65 | 1,473 | 22 | 883 | 13 |
| Financial sector | 3,502 | 53 | 2,358 | 55 | 629 | 43 | 515 | 58 |
| Non-Financial sector | 3,164 | 47 | 1,952 | 45 | 844 | 57 | 368 | 42 |

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- The distribution of the replies does not change much when leaving out extreme observations (2% - 4%).

| | | | =3 | | >3 | | <3 | |
|---|---|---|---|---|---|---|---|---|
| | # | % | # | % | # | % | # | % |
| Number of replies | 6,572 | 99 | 4,310 | 66 | 1,398 | 21 | 864 | 13 |
| Financial sector | 3,473 | 53 | 2,358 | 55 | 608 | 43 | 507 | 59 |
| Non-Financial sector | 3,099 | 47 | 1,952 | 45 | 790 | 57 | 357 | 41 |

# Some descriptive statistics 3: Number of replies

- Relatively few *conditiona*l observations

| | # obs | Trim |
|---|---|---|
| Q4 | 246 | 244 |
| Q5 | 297 | 294 |
| Q6 | 226 | 226 |
| Q7 | 327 | 327 |

# Estimations results 1: De-anchored 2-years-ahead inflation expectations

$$\text{I: } \forall E(\pi_t^{2Y}) \neq 3\text{: } E(\pi_t^{2Y}) - 3 = \alpha + \delta_i + \varphi_t + \beta' x_{it} + \gamma' z_t + \varepsilon_{it}$$

| | | (I) | |
|---|---|---|---|
| | $E_{jt\text{-}1}(\pi_{t\text{-}1}) - \pi_{t\text{-}1}$ | -0.043 | -0.017 |
| | | (0.043) | (0.032) |
| | $E_{jt\text{-}1}(r_{t\text{-}1}) - r_{t\text{-}1}$ | -0.016 | -0.003 |
| | | (0.091) | (0.054) |
| | $E_{jt\text{-}1}(y_{t\text{-}2}) - y_{t\text{-}2}$ | 0.010 | 0.003 |
| | | (0.008) | (0.006) |
| | $E_{jt\text{-}1}(\pi_T) - \tilde{E}_{t\text{-}1}(\pi_T)$ | -0.059 | -0.031 |
| | | (0.048) | (0.033) |
| Dif. wrt. CB growth forecast | $E_{jt\text{-}1}(Y_T) - \tilde{E}_{t\text{-}1}(Y_T)$ | 0.141** | 0.076 |
| | | (0.067) | (0.050) |
| | $\Delta p_{t-1}^{food}$ | -0.009 | -0.003 |
| | | (0.006) | (0.004) |
| Oil price changes | $\Delta p_{t-1}^{oil}$ | **-0.004***** | **-0.003***** |
| | | (0.001) | (0.001) |
| Salary changes | $\Delta w_{t\text{-}1}$ | **0.102***** | **0.052** |
| | | (0.043) | (0.034) |
| | $\Delta fx_{t\text{-}1}$ | 0.006 | 0.001 |
| | | (0.006) | (0.001) |
| Output gap | $gap_{t\text{-}1}$ | **0.092***** | **0.057***** |
| | | (0.015) | (0.01) |
| Diff. wrt. MPR expectation | $E_{jt\text{-}1}(r_{t+10}) - \tilde{E}_{t\text{-}1}(r_{t+10})$ | **0.208***** | **0.130***** |
| | | (0.029) | (0.010) |
| | # obs | 1,933 | 1,860 |
| | # respondents | 105 | 104 |
| | $R^2$ | 0.111 | 0.071 |
| | Trim | No | Yes |

Negative effect of oil price changes: output effect dominates in the long run

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Positive effect of positive output gap

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Higher MPR expectations than the CB → long-run expectations increase: "CB will not do enough"

# Estimations results 2: *Negative* and *positive* de-anchoring

$$\text{II: } \forall E(\pi_t^{2Y}) < 3: E(\pi_t^{2Y}) - 3 = a + \delta_i + \varphi_t + \beta' x_{it} + \gamma' z_t + \varepsilon_{it}$$
$$\text{III: } \forall E(\pi_t^{2Y}) > 3: E(\pi_t^{2Y}) - 3 = \alpha + \delta_i + \varphi_t + \beta' x_{it} + \gamma' z_t + \varepsilon_{it}$$

| | | (II) Smaller than 3% | | (III) Greater than 3% | |
|---|---|---|---|---|---|
| | $E_{jt\text{-}1}(\pi_{t\text{-}1}) - \pi_{t\text{-}1}$ | -0.022 | 0.024 | -0.041 | -0.021 |
| | | (0.048) | (0.030) | (0.047) | (0.028) |
| | $E_{jt\text{-}1}(r_{t\text{-}1}) - r_{t\text{-}1}$ | -0.094 | 0.081 | 0.064 | -0.005 |
| | | (0.198) | (0.061) | (0.076) | (0.045) |
| Surprise output growth | $E_{jt\text{-}1}(y_{t\text{-}2}) - y_{t\text{-}2}$ | 0.003 | **0.010** | **0.017**** | **0.008*** |
| | | (0.008) | (0.007) | (0.008) | (0.004) |
| Dif. wrt. CB inflation forecast | $E_{jt\text{-}1}(\pi_T) - \tilde{E}_{t\text{-}1}(\pi_T)$ | -0.008 | -0.008 | **-0.067*** | **-0.027** |
| | | (0.039) | (0.031) | (0.037) | (0.026) |
| Dif. wrt. CB growth forecast | $E_{jt\text{-}1}(Y_T) - \tilde{E}_{t\text{-}1}(Y_T)$ | -0.075 | -0.038 | **0.110**** | **0.082**** |
| | | (0.071) | (0.050) | (0.055) | (0.033) |
| | $\Delta p_{t-1}^{food}$ | 0.003 | -0.001 | -0.005 | 0.005 |
| | | (0.007) | (0.005) | (0.006) | (0.004) |
| Oil price changes | $\Delta p_{t-1}^{oil}$ | -0.002 | -0.001 | **-0.003**** | **-0.002***** |
| | | (0.002) | (0.001) | (0.001) | (0.001) |
| | $\Delta w_{t\text{-}1}$ | 0.0160 | 0.009 | 0.056 | 0.016 |
| | | (0.044) | (0.037) | (0.042) | (0.026) |
| Changes exchange rate | $\Delta fx_{t\text{-}1}$ | 0.003 | 0.004 | **0.010**** | 0.003 |
| | | (0.006) | (0.004) | (0.006) | (0.003) |
| Output gap | $gap_{t\text{-}1}$ | **0.042***** | **0.033***** | **0.049**** | 0.011 |
| | | (0.013) | (0.009) | (0.017) | (0.009) |
| Dif. wrt. MPR expectation | $E_{jt\text{-}1}(r_{t+10}) - \tilde{E}_{t\text{-}1}(r_{t+10})$ | **0.059*** | **0.060**** | **0.086***** | 0.016 |
| | | (0.033) | (0.025) | (0.027) | (0.019) |
| | # obs | 744 | 730 | 1,189 | 1,130 |
| | # respondents | 74 | 74 | 96 | 95 |
| | $R^2$ | 0.067 | 0.069 | 0.092 | 0.035 |
| | Trim | No | Yes | No | Yes |

Growth lower than expected → long-run expectations increase??? Expectation of a too expansive MP reaction?

# Estimations results 2: *Negative* and *positive* de-anchoring

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CB's inflation forecast may affect expectations (?)

# Estimations results 2: *Negative* and *positive* de-anchoring

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| | $\Delta p_{t-1}^{food}$ | 0.003 | -0.001 | -0.005 | 0.005 |
| | | (0.007) | (0.005) | (0.006) | (0.004) |
| Oil price changes | $\Delta p_{t-1}^{oil}$ | -0.002 | -0.001 | **-0.003**** | **-0.002***** |
| | | (0.002) | (0.001) | (0.001) | (0.001) |
| | $\Delta w_{t\text{-}1}$ | 0.0160 | 0.009 | 0.056 | 0.016 |
| | | (0.044) | (0.037) | (0.042) | (0.026) |
| Changes exchange rate | $\Delta fx_{t\text{-}1}$ | 0.003 | 0.004 | **0.010**** | 0.003 |
| | | (0.006) | (0.004) | (0.006) | (0.003) |
| Output gap | $gap_{t\text{-}1}$ | **0.042***** | **0.033***** | **0.049**** | 0.011 |
| | | (0.013) | (0.009) | (0.017) | (0.009) |
| Dif. wrt. MPR expectation | $E_{jt\text{-}1}(r_{t+10}) - \tilde{E}_{t\text{-}1}(r_{t+10})$ | **0.059*** | **0.060**** | **0.086***** | 0.016 |
| | | (0.033) | (0.025) | (0.027) | (0.019) |
| | # obs | 744 | 730 | 1,189 | 1,130 |
| | # respondents | 74 | 74 | 96 | 95 |
| | $R^2$ | 0.067 | 0.069 | 0.092 | 0.035 |
| | Trim | No | Yes | No | Yes |

CB's growth forecast affects expectations. Sign indicates that agents do not believe CB's forecast

# Estimations results 2: *Negative* and *positive* de-anchoring

II: $\forall E(\pi_t^{2Y}) < 3: E(\pi_t^{2Y}) - 3 = a + \delta_i + \varphi_t + \beta' x_{it} + \gamma' z_t + \varepsilon_{it}$

III: $\forall E(\pi_t^{2Y}) > 3: E(\pi_t^{2Y}) - 3 = \alpha + \delta_i + \varphi_t + \beta' x_{it} + \gamma' z_t + \varepsilon_{it}$

| | | (II) Smaller than 3% | | (III) Greater than 3% | |
|---|---|---|---|---|---|
| | $E_{jt\text{-}1}(\pi_{t\text{-}1}) - \pi_{t\text{-}1}$ | -0.022 | 0.024 | -0.041 | -0.021 |
| | | (0.048) | (0.030) | (0.047) | (0.028) |
| | $E_{jt\text{-}1}(r_{t\text{-}1}) - r_{t\text{-}1}$ | -0.094 | 0.081 | 0.064 | -0.005 |
| | | (0.198) | (0.061) | (0.076) | (0.045) |
| Surprise output growth | $E_{jt\text{-}1}(y_{t\text{-}2}) - y_{t\text{-}2}$ | 0.003 | **0.010** | **0.017**** | **0.008*** |
| | | (0.008) | (0.007) | (0.008) | (0.004) |
| Dif. wrt. CB inflation forecast | $E_{jt\text{-}1}(\pi_T) - \tilde{E}_{t\text{-}1}(\pi_T)$ | -0.008 | -0.008 | **-0.067*** | **-0.027** |
| | | (0.039) | (0.031) | (0.037) | (0.026) |
| Dif. wrt. CB growth forecast | $E_{jt\text{-}1}(Y_T) - \tilde{E}_{t\text{-}1}(Y_T)$ | -0.075 | -0.038 | **0.110**** | **0.082**** |
| | | (0.071) | (0.050) | (0.055) | (0.033) |
| | $\Delta p_{t-1}^{food}$ | 0.003 | -0.001 | -0.005 | 0.005 |
| | | (0.007) | (0.005) | (0.006) | (0.004) |
| Oil price changes | $\Delta p_{t-1}^{oil}$ | -0.002 | -0.001 | **-0.003**** | **-0.002***** |
| | | (0.002) | (0.001) | (0.001) | (0.001) |
| | $\Delta w_{t\text{-}1}$ | 0.0160 | 0.009 | 0.056 | 0.016 |
| | | (0.044) | (0.037) | (0.042) | (0.026) |
| Changes exchange rate | $\Delta fx_{t\text{-}1}$ | 0.003 | 0.004 | **0.010**** | 0.003 |
| | | (0.006) | (0.004) | (0.006) | (0.003) |
| Output gap | $gap_{t\text{-}1}$ | **0.042***** | **0.033***** | **0.049**** | 0.011 |
| | | (0.013) | (0.009) | (0.017) | (0.009) |
| Dif. wrt. MPR expectation | $E_{jt\text{-}1}(r_{t+10}) - \tilde{E}_{t\text{-}1}(r_{t+10})$ | **0.059*** | **0.060**** | **0.086***** | 0.016 |
| | | (0.033) | (0.025) | (0.027) | (0.019) |
| | # obs | 744 | 730 | 1,189 | 1,130 |
| | # respondents | 74 | 74 | 96 | 95 |
| | $R^2$ | 0.067 | 0.069 | 0.092 | 0.035 |
| | Trim | No | Yes | No | Yes |

Positive oil price change affects positively de-anchored expectations. Output effect dominates

# Estimations results 2: *Negative* and *positive* de-anchoring

$$\text{II: } \forall E(\pi_t^{2Y}) < 3: E(\pi_t^{2Y}) - 3 = a + \delta_i + \varphi_t + \beta' x_{it} + \gamma' z_t + \varepsilon_{it}$$
$$\text{III: } \forall E(\pi_t^{2Y}) > 3: E(\pi_t^{2Y}) - 3 = \alpha + \delta_i + \varphi_t + \beta' x_{it} + \gamma' z_t + \varepsilon_{it}$$

| | | (II) Smaller than 3% | | (III) Greater than 3% | |
|---|---|---|---|---|---|
| | $E_{jt\text{-}1}(\pi_{t\text{-}1}) - \pi_{t\text{-}1}$ | -0.022 | 0.024 | -0.041 | -0.021 |
| | | (0.048) | (0.030) | (0.047) | (0.028) |
| | $E_{jt\text{-}1}(r_{t\text{-}1}) - r_{t\text{-}1}$ | -0.094 | 0.081 | 0.064 | -0.005 |
| | | (0.198) | (0.061) | (0.076) | (0.045) |
| Surprise output growth | $E_{jt\text{-}1}(y_{t\text{-}2}) - y_{t\text{-}2}$ | 0.003 | **0.010** | **0.017**** | **0.008*** |
| | | (0.008) | (0.007) | (0.008) | (0.004) |
| Dif. wrt. CB inflation forecast | $E_{jt\text{-}1}(\pi_T) - \tilde{E}_{t\text{-}1}(\pi_T)$ | -0.008 | -0.008 | **-0.067*** | **-0.027** |
| | | (0.039) | (0.031) | (0.037) | (0.026) |
| Dif. wrt. CB growth forecast | $E_{jt\text{-}1}(Y_T) - \tilde{E}_{t\text{-}1}(Y_T)$ | -0.075 | -0.038 | **0.110**** | **0.082**** |
| | | (0.071) | (0.050) | (0.055) | (0.033) |
| | $\Delta p_{t-1}^{food}$ | 0.003 | -0.001 | -0.005 | 0.005 |
| | | (0.007) | (0.005) | (0.006) | (0.004) |
| Oil price changes | $\Delta p_{t-1}^{oil}$ | -0.002 | -0.001 | **-0.003**** | **-0.002***** |
| | | (0.002) | (0.001) | (0.001) | (0.001) |
| | $\Delta w_{t\text{-}1}$ | 0.0160 | 0.009 | 0.056 | 0.016 |
| | | (0.044) | (0.037) | (0.042) | (0.026) |
| Changes exchange rate | $\Delta fx_{t\text{-}1}$ | 0.003 | 0.004 | **0.010**** | 0.003 |
| | | (0.006) | (0.004) | (0.006) | (0.003) |
| Output gap | $gap_{t\text{-}1}$ | **0.042***** | **0.033***** | **0.049**** | 0.011 |
| | | (0.013) | (0.009) | (0.017) | (0.009) |
| Dif. wrt. MPR expectation | $E_{jt\text{-}1}(r_{t+10}) - \tilde{E}_{t\text{-}1}(r_{t+10})$ | **0.059*** | **0.060**** | **0.086***** | 0.016 |
| | | (0.033) | (0.025) | (0.027) | (0.019) |
| | # obs | 744 | 730 | 1,189 | 1,130 |
| | # respondents | 74 | 74 | 96 | 95 |
| | $R^2$ | 0.067 | 0.069 | 0.092 | 0.035 |
| | Trim | No | Yes | No | Yes |

Output gap has impact of both negatively and positively de-anchored expectations

# Estimations results 2: *Negative* and *positive* de-anchoring

II: $\forall E(\pi_t^{2Y}) < 3: E(\pi_t^{2Y}) - 3 = a + \delta_i + \varphi_t + \beta' x_{it} + \gamma' z_t + \varepsilon_{it}$

III: $\forall E(\pi_t^{2Y}) > 3: E(\pi_t^{2Y}) - 3 = \alpha + \delta_i + \varphi_t + \beta' x_{it} + \gamma' z_t + \varepsilon_{it}$

| | | (II) Smaller than 3% | | (III) Greater than 3% | |
|---|---|---|---|---|---|
| | $E_{jt\text{-}1}(\pi_{t\text{-}1}) - \pi_{t\text{-}1}$ | -0.022 | 0.024 | -0.041 | -0.021 |
| | | (0.048) | (0.030) | (0.047) | (0.028) |
| | $E_{jt\text{-}1}(r_{t\text{-}1}) - r_{t\text{-}1}$ | -0.094 | 0.081 | 0.064 | -0.005 |
| | | (0.198) | (0.061) | (0.076) | (0.045) |
| Surprise output growth | $E_{jt\text{-}1}(y_{t\text{-}2}) - y_{t\text{-}2}$ | 0.003 | **0.010** | **0.017**** | **0.008*** |
| | | (0.008) | (0.007) | (0.008) | (0.004) |
| Dif. wrt. CB inflation forecast | $E_{jt\text{-}1}(\pi_T) - \tilde{E}_{t\text{-}1}(\pi_T)$ | -0.008 | -0.008 | **-0.067*** | **-0.027** |
| | | (0.039) | (0.031) | (0.037) | (0.026) |
| Dif. wrt. CB growth forecast | $E_{jt\text{-}1}(Y_T) - \tilde{E}_{t\text{-}1}(Y_T)$ | -0.075 | -0.038 | **0.110**** | **0.082**** |
| | | (0.071) | (0.050) | (0.055) | (0.033) |
| | $\Delta p_{t-1}^{food}$ | 0.003 | -0.001 | -0.005 | 0.005 |
| | | (0.007) | (0.005) | (0.006) | (0.004) |
| Oil price changes | $\Delta p_{t-1}^{oil}$ | -0.002 | -0.001 | **-0.003**** | **-0.002***** |
| | | (0.002) | (0.001) | (0.001) | (0.001) |
| | $\Delta w_{t\text{-}1}$ | 0.0160 | 0.009 | 0.056 | 0.016 |
| | | (0.044) | (0.037) | (0.042) | (0.026) |
| Changes exchange rate | $\Delta fx_{t\text{-}1}$ | 0.003 | 0.004 | **0.010**** | 0.003 |
| | | (0.006) | (0.004) | (0.006) | (0.003) |
| Output gap | $gap_{t\text{-}1}$ | **0.042***** | **0.033***** | **0.049**** | 0.011 |
| | | (0.013) | (0.009) | (0.017) | (0.009) |
| Dif. wrt. MPR expectation | $E_{jt\text{-}1}(r_{t+10}) - \tilde{E}_{t\text{-}1}(r_{t+10})$ | **0.059*** | **0.060**** | **0.086***** | 0.016 |
| | | (0.033) | (0.025) | (0.027) | (0.019) |
| | # obs | 744 | 730 | 1,189 | 1,130 |
| | # respondents | 74 | 74 | 96 | 95 |
| | $R^2$ | 0.067 | 0.069 | 0.092 | 0.035 |
| | Trim | No | Yes | No | Yes |

CB's MPR outlook important for affecting de-anchored inflation expectations

# Comments on the coefficients of the variables that include CB projections

- Negatively de-anchored expectations:
  - Individual MPR projection higher than CB's outlook: Long-term inflation expectation **increases**. The agent believe that long-term inflation will be higher because of CB's expansive policy.
- Positively de-anchoring expectations: Furthermore:
  - Individual inflation projection higher than CB: Long-term inflation **decreases**. Confidence in CB's medium-term inflation forecasts.
  - Individual growth projection higher than CB: Long-term inflation expectation **increases**. No confidence in CB's medium-term growth forecast.

# Estimations results 3: Triggering factors

IV: $\forall E(\pi_t^{2Y}) < 3, E(\pi_{t-1}^{2Y}) = 3 : E(\pi_t^{2Y}) - 3$
$= c + \delta_i + \varphi_t + \beta' x_{it} + \gamma' z_t + \varepsilon_{it}$

V: $\forall E(\pi_t^{2Y}) > 3, E(\pi_{t-1}^{2Y}) = 3 : E(\pi_t^{2Y}) - 3$
$= c + \delta_i + \varphi_t + \beta' x_{it} + \gamma' z_t + \varepsilon_{it}$

VI: $\forall E(\pi_t^{2Y}) = 3, E(\pi_{t-1}^{2Y}) < 3 : E(\pi_t^{2Y}) - 3$
$= c + \delta_i + \varphi_t + \beta' x_{it} + \gamma' z_t + \varepsilon_{it}$

VII: $\forall E(\pi_t^{2Y}) = 3, E(\pi_{t-1}^{2Y}) > 3 : E(\pi_t^{2Y}) - 3$
$= c + \delta_i + \varphi_t + \beta' x_{it} + \gamma' z_t + \varepsilon_{it}$

# Estimations results 3: Triggering factors

| | | (IV) | (V) | (VI) | (VII) |
|---|---|---|---|---|---|
| Inflation surprises | $E_{jt\text{-}1}(\pi_{t\text{-}1}) - \pi_{t\text{-}1}$ | 0.105 | 0.028 | **0.073** | **-0.083** |
| | | (0.131) | (0.078) | (0.073) | (0.070) |
| MPR surprises | $E_{jt\text{-}1}(r_{t\text{-}1}) - r_{t\text{-}1}$ | 0.039 | 0.035 | -0.014 | **-0.270*** |
| | | (0.200) | (0.144) | (0.121) | (0.163) |
| | $E_{jt\text{-}1}(y_{t\text{-}2}) - y_{t\text{-}2}$ | 0.005 | 0.014 | 0.006 | -0.007 |
| | | (0.015) | (0.011) | (0.011) | (0.016) |
| | $E_{jt\text{-}1}(\pi_T) - \tilde{E}_{t\text{-}1}(\pi_T)$ | 0.047 | -0.020 | 0.093 | 0.025 |
| | | (0.089) | (0.058) | (0.081) | (0.074) |
| | $E_{jt\text{-}1}(Y_T) - \tilde{E}_{t\text{-}1}(Y_T)$ | 0.126 | 0.068 | -0.029 | -0.083 |
| | | (0.112) | (0.092) | (0.083) | (0.109) |
| Food price changes | $\Delta p_{t-1}^{food}$ | 0.011 | **0.018**** | -0.008 | -0.001 |
| | | (0.015) | (0.007) | (0.012) | (0.015) |
| Oil price changes | $\Delta p_{t-1}^{oil}$ | -0.002 | **-0.003** | 0.002 | -0.001 |
| | | (0.003) | (0.002) | (0.002) | (0.003) |
| | $\Delta w_{t\text{-}1}$ | 0.006 | -0.090 | 0.088 | -0.034 |
| | | (0.068) | (0.083) | (0.080) | (0.071) |
| Exchange rate changes | $\Delta fx_{t\text{-}1}$ | **0.012** | 0.005 | -0.013 | -0.002 |
| | | (0.011) | (0.00853) | (0.011) | (0.016) |
| Output gap | $gap_{t\text{-}1}$ | **0.062*** | -0.014 | -0.017 | 0.005 |
| | | (0.032) | (0.019) | (0.020) | (0.034) |
| | $E_{jt\text{-}1}(r_{t+10}) - \tilde{E}_{t\text{-}1}(r_{t+10})$ | 0.019 | 0.002 | -0.006 | 0.024 |
| | | (0.075) | (0.035) | (0.057) | (0.057) |
| Business tendency | $\Delta bs_{t\text{-}1}$ | | | | **0.010**** |
| | | | | | (0.004) |
| | # obs | 246 | 297 | 226 | 290 |
| | # respondents | 67 | 73 | 65 | 77 |
| | $R^2$ | 0.207 | 0.091 | 0.126 | 0.109 |
| | Trim | No | No | No | No |

Inflation surprises may re-anchor expectations.
(VI): Because of lower future MPR (?)

IV: $\forall E(\pi_t^{2Y}) < 3, E(\pi_{t-1}^{2Y}) = 3,$ V: $\forall E(\pi_t^{2Y}) > 3, E(\pi_{t-1}^{2Y}) = 3,$ VI: $\forall E(\pi_t^{2Y}) = 3, E(\pi_{t-1}^{2Y}) < 3,$ VII: $\forall E(\pi_t^{2Y}) = 3, E(\pi_{t-1}^{2Y}) > 3$

# Estimations results 3: Triggering factors

| | | (IV) | (V) | (VI) | (VII) |
|---|---|---|---|---|---|
| Inflation surprises | $E_{jt\text{-}1}(\pi_{t\text{-}1}) - \pi_{t\text{-}1}$ | 0.105 | 0.028 | **0.073** | **-0.083** |
| | | (0.131) | (0.078) | (0.073) | (0.070) |
| MPR surprises | $E_{jt\text{-}1}(r_{t\text{-}1}) - r_{t\text{-}1}$ | 0.039 | 0.035 | -0.014 | **-0.270*** |
| | | (0.200) | (0.144) | (0.121) | (0.163) |
| | $E_{jt\text{-}1}(y_{t\text{-}2}) - y_{t\text{-}2}$ | 0.005 | 0.014 | 0.006 | -0.007 |
| | | (0.015) | (0.011) | (0.011) | (0.016) |
| | $E_{jt\text{-}1}(\pi_T) - \tilde{E}_{t\text{-}1}(\pi_T)$ | 0.047 | -0.020 | 0.093 | 0.025 |
| | | (0.089) | (0.058) | (0.081) | (0.074) |
| | $E_{jt\text{-}1}(Y_T) - \tilde{E}_{t\text{-}1}(Y_T)$ | 0.126 | 0.068 | -0.029 | -0.083 |
| | | (0.112) | (0.092) | (0.083) | (0.109) |
| Food price changes | $\Delta p_{t-1}^{food}$ | 0.011 | **0.018**** | -0.008 | -0.001 |
| | | (0.015) | (0.007) | (0.012) | (0.015) |
| Oil price changes | $\Delta p_{t-1}^{oil}$ | -0.002 | **-0.003** | 0.002 | -0.001 |
| | | (0.003) | (0.002) | (0.002) | (0.003) |
| | $\Delta w_{t\text{-}1}$ | 0.006 | -0.090 | 0.088 | -0.034 |
| | | (0.068) | (0.083) | (0.080) | (0.071) |
| Exchange rate changes | $\Delta fx_{t\text{-}1}$ | **0.012** | 0.005 | -0.013 | -0.002 |
| | | (0.011) | (0.00853) | (0.011) | (0.016) |
| Output gap | $gap_{t\text{-}1}$ | **0.062*** | -0.014 | -0.017 | 0.005 |
| | | (0.032) | (0.019) | (0.020) | (0.034) |
| | $E_{jt\text{-}1}(r_{t+10}) - \tilde{E}_{t\text{-}1}(r_{t+10})$ | 0.019 | 0.002 | -0.006 | 0.024 |
| | | (0.075) | (0.035) | (0.057) | (0.057) |
| Business tendency | $\Delta bs_{t\text{-}1}$ | | | | **0.010**** |
| | | | | | (0.004) |
| | # obs | 246 | 297 | 226 | 290 |
| | # respondents | 67 | 73 | 65 | 77 |
| | $R^2$ | 0.207 | 0.091 | 0.126 | 0.109 |
| | Trim | No | No | No | No |

MPR surprises may re-anchor expectations: "CB knows what it is doing"

IV: $\forall E(\pi_t^{2Y}) < 3, E(\pi_{t-1}^{2Y}) = 3,$ V: $\forall E(\pi_t^{2Y}) > 3, E(\pi_{t-1}^{2Y}) = 3,$ VI: $\forall E(\pi_t^{2Y}) = 3, E(\pi_{t-1}^{2Y}) < 3,$ VII: $\forall E(\pi_t^{2Y}) = 3, E(\pi_{t-1}^{2Y}) > 3$

# Estimations results 3: Triggering factors

| | | (IV) | (V) | (VI) | (VII) |
|---|---|---|---|---|---|
| Inflation surprises | $E_{jt\text{-}1}(\pi_{t\text{-}1}) - \pi_{t\text{-}1}$ | 0.105 | 0.028 | **0.073** | **-0.083** |
| | | (0.131) | (0.078) | (0.073) | (0.070) |
| MPR surprises | $E_{jt\text{-}1}(r_{t\text{-}1}) - r_{t\text{-}1}$ | 0.039 | 0.035 | -0.014 | **-0.270**$^{*}$ |
| | | (0.200) | (0.144) | (0.121) | (0.163) |
| | $E_{jt\text{-}1}(y_{t\text{-}2}) - y_{t\text{-}2}$ | 0.005 | 0.014 | 0.006 | -0.007 |
| | | (0.015) | (0.011) | (0.011) | (0.016) |
| | $E_{jt\text{-}1}(\pi_T) - \tilde{E}_{t\text{-}1}(\pi_T)$ | 0.047 | -0.020 | 0.093 | 0.025 |
| | | (0.089) | (0.058) | (0.081) | (0.074) |
| | $E_{jt\text{-}1}(Y_T) - \tilde{E}_{t\text{-}1}(Y_T)$ | 0.126 | 0.068 | -0.029 | -0.083 |
| | | (0.112) | (0.092) | (0.083) | (0.109) |
| Food price changes | $\Delta p_{t-1}^{food}$ | 0.011 | **0.018**$^{**}$ | -0.008 | -0.001 |
| | | (0.015) | (0.007) | (0.012) | (0.015) |
| Oil price changes | $\Delta p_{t-1}^{oil}$ | -0.002 | **-0.003** | 0.002 | -0.001 |
| | | (0.003) | (0.002) | (0.002) | (0.003) |
| | $\Delta w_{t\text{-}1}$ | 0.006 | -0.090 | 0.088 | -0.034 |
| | | (0.068) | (0.083) | (0.080) | (0.071) |
| Exchange rate changes | $\Delta fx_{t\text{-}1}$ | **0.012** | 0.005 | -0.013 | -0.002 |
| | | (0.011) | (0.00853) | (0.011) | (0.016) |
| Output gap | $gap_{t\text{-}1}$ | **0.062**$^{*}$ | -0.014 | -0.017 | 0.005 |
| | | (0.032) | (0.019) | (0.020) | (0.034) |
| | $E_{jt\text{-}1}(r_{t+10}) - \tilde{E}_{t\text{-}1}(r_{t+10})$ | 0.019 | 0.002 | -0.006 | 0.024 |
| | | (0.075) | (0.035) | (0.057) | (0.057) |
| Business tendency | $\Delta bs_{t\text{-}1}$ | | | | **0.010**$^{**}$ |
| | | | | | (0.004) |
| | # obs | 246 | 297 | 226 | 290 |
| | # respondents | 67 | 73 | 65 | 77 |
| | $R^2$ | 0.207 | 0.091 | 0.126 | 0.109 |
| | Trim | No | No | No | No |

Commodity prices may cause positive de-anchoring. Sign for oil price could be because of expected growth effect.

IV: $\forall E(\pi_t^{2Y}) < 3, E(\pi_{t-1}^{2Y}) = 3,$ V: $\forall E(\pi_t^{2Y}) > 3, E(\pi_{t-1}^{2Y}) = 3,$ VI: $\forall E(\pi_t^{2Y}) = 3, E(\pi_{t-1}^{2Y}) < 3,$ VII: $\forall E(\pi_t^{2Y}) = 3, E(\pi_{t-1}^{2Y}) > 3$

# Estimations results 3: Triggering factors

| | | (IV) | (V) | (VI) | (VII) |
|---|---|---|---|---|---|
| Inflation surprises | $E_{jt\text{-}1}(\pi_{t\text{-}1}) - \pi_{t\text{-}1}$ | 0.105 | 0.028 | **0.073** | **-0.083** |
| | | (0.131) | (0.078) | (0.073) | (0.070) |
| MPR surprises | $E_{jt\text{-}1}(r_{t\text{-}1}) - r_{t\text{-}1}$ | 0.039 | 0.035 | -0.014 | **-0.270**$^{*}$ |
| | | (0.200) | (0.144) | (0.121) | (0.163) |
| | $E_{jt\text{-}1}(y_{t\text{-}2}) - y_{t\text{-}2}$ | 0.005 | 0.014 | 0.006 | -0.007 |
| | | (0.015) | (0.011) | (0.011) | (0.016) |
| | $E_{jt\text{-}1}(\pi_T) - \tilde{E}_{t\text{-}1}(\pi_T)$ | 0.047 | -0.020 | 0.093 | 0.025 |
| | | (0.089) | (0.058) | (0.081) | (0.074) |
| | $E_{jt\text{-}1}(Y_T) - \tilde{E}_{t\text{-}1}(Y_T)$ | 0.126 | 0.068 | -0.029 | -0.083 |
| | | (0.112) | (0.092) | (0.083) | (0.109) |
| Food price changes | $\Delta p_{t-1}^{food}$ | 0.011 | **0.018**$^{**}$ | -0.008 | -0.001 |
| | | (0.015) | (0.007) | (0.012) | (0.015) |
| Oil price changes | $\Delta p_{t-1}^{oil}$ | -0.002 | **-0.003** | 0.002 | -0.001 |
| | | (0.003) | (0.002) | (0.002) | (0.003) |
| | $\Delta w_{t\text{-}1}$ | 0.006 | -0.090 | 0.088 | -0.034 |
| | | (0.068) | (0.083) | (0.080) | (0.071) |
| Exchange rate changes | $\Delta fx_{t\text{-}1}$ | **0.012** | 0.005 | -0.013 | -0.002 |
| | | (0.011) | (0.00853) | (0.011) | (0.016) |
| Output gap | $gap_{t\text{-}1}$ | **0.062**$^{*}$ | -0.014 | -0.017 | 0.005 |
| | | (0.032) | (0.019) | (0.020) | (0.034) |
| | $E_{jt\text{-}1}(r_{t+10}) - \tilde{E}_{t\text{-}1}(r_{t+10})$ | 0.019 | 0.002 | -0.006 | 0.024 |
| | | (0.075) | (0.035) | (0.057) | (0.057) |
| Business tendency | $\Delta bs_{t\text{-}1}$ | | | | **0.010**$^{**}$ |
| | | | | | (0.004) |
| | # obs | 246 | 297 | 226 | 290 |
| | # respondents | 67 | 73 | 65 | 77 |
| | $R^2$ | 0.207 | 0.091 | 0.126 | 0.109 |
| | Trim | No | No | No | No |

Exchange rate and output gap may cause negatively de-anchored expectations.

IV: $\forall E(\pi_t^{2Y}) < 3, E(\pi_{t-1}^{2Y}) = 3,$ V: $\forall E(\pi_t^{2Y}) > 3, E(\pi_{t-1}^{2Y}) = 3,$ VI: $\forall E(\pi_t^{2Y}) = 3, E(\pi_{t-1}^{2Y}) < 3,$ VII: $\forall E(\pi_t^{2Y}) = 3, E(\pi_{t-1}^{2Y}) > 3$

# Estimations results 3: Triggering factors

| | | (IV) | (V) | (VI) | (VII) |
|---|---|---|---|---|---|
| Inflation surprises | $E_{jt\text{-}1}(\pi_{t\text{-}1}) - \pi_{t\text{-}1}$ | 0.105 | 0.028 | **0.073** | **-0.083** |
| | | (0.131) | (0.078) | (0.073) | (0.070) |
| MPR surprises | $E_{jt\text{-}1}(r_{t\text{-}1}) - r_{t\text{-}1}$ | 0.039 | 0.035 | -0.014 | **-0.270*** |
| | | (0.200) | (0.144) | (0.121) | (0.163) |
| | $E_{jt\text{-}1}(y_{t\text{-}2}) - y_{t\text{-}2}$ | 0.005 | 0.014 | 0.006 | -0.007 |
| | | (0.015) | (0.011) | (0.011) | (0.016) |
| | $E_{jt\text{-}1}(\pi_T) - \tilde{E}_{t\text{-}1}(\pi_T)$ | 0.047 | -0.020 | 0.093 | 0.025 |
| | | (0.089) | (0.058) | (0.081) | (0.074) |
| | $E_{jt\text{-}1}(Y_T) - \tilde{E}_{t\text{-}1}(Y_T)$ | 0.126 | 0.068 | -0.029 | -0.083 |
| | | (0.112) | (0.092) | (0.083) | (0.109) |
| Food price changes | $\Delta p_{t-1}^{food}$ | 0.011 | **0.018**** | -0.008 | -0.001 |
| | | (0.015) | (0.007) | (0.012) | (0.015) |
| Oil price changes | $\Delta p_{t-1}^{oil}$ | -0.002 | **-0.003** | 0.002 | -0.001 |
| | | (0.003) | (0.002) | (0.002) | (0.003) |
| | $\Delta w_{t\text{-}1}$ | 0.006 | -0.090 | 0.088 | -0.034 |
| | | (0.068) | (0.083) | (0.080) | (0.071) |
| Exchange rate changes | $\Delta fx_{t\text{-}1}$ | **0.012** | 0.005 | -0.013 | -0.002 |
| | | (0.011) | (0.00853) | (0.011) | (0.016) |
| Output gap | $gap_{t\text{-}1}$ | **0.062*** | -0.014 | -0.017 | 0.005 |
| | | (0.032) | (0.019) | (0.020) | (0.034) |
| | $E_{jt\text{-}1}(r_{t+10}) - \tilde{E}_{t\text{-}1}(r_{t+10})$ | 0.019 | 0.002 | -0.006 | 0.024 |
| | | (0.075) | (0.035) | (0.057) | (0.057) |
| Business tendency | $\Delta bs_{t\text{-}1}$ | | | | **0.010**** |
| | | | | | (0.004) |
| | # obs | 246 | 297 | 226 | 290 |
| | # respondents | 67 | 73 | 65 | 77 |
| | $R^2$ | 0.207 | 0.091 | 0.126 | 0.109 |
| | Trim | No | No | No | No |

Changes in the business sentiment may help re-anchor positively de-anchored expectations.

IV: $\forall E(\pi_t^{2Y}) < 3, E(\pi_{t-1}^{2Y}) = 3,$ V: $\forall E(\pi_t^{2Y}) > 3, E(\pi_{t-1}^{2Y}) = 3,$ VI: $\forall E(\pi_t^{2Y}) = 3, E(\pi_{t-1}^{2Y}) < 3,$ VII: $\forall E(\pi_t^{2Y}) = 3, E(\pi_{t-1}^{2Y}) > 3$

# Summary of results w.r.t. the step to and return from de-anchoring

- Different factors are the triggering ones for expectations to changes from / to de-anchoring.
- The following factors can cause de-anchoring
  - Negative: (Exchange rate) and the output gap.
  - Positive: Food and (oil) prices.
- If expectations are positively de-anchored, MPR surprises and changes in the business survey may cause that they become anchored again.

# Final remarks: Principal take-aways

- Different factors affect negatively and positively de-anchored expectations
- Positively de-anchored expectations seem to be easier to affect
  - Amongst other things by the central bank´s forecasts

- The triggering factors to / from de-anchoring also are different
  - Central bank´s policy actions may re-anchor positively de-anchored expectations

- This has implications for which variable the central bank should pay special attention to if there is a risk of negative or positive de-anchoring, respectively.