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# Overconfidence of the Chair of the Federal Reserve and Market Expectations: Evidence Based on Media Coverage\*

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## Abstract

This paper examines the relationship between the overconfidence expressed by the chair of the U.S. Federal Reserve and financial market expectations. I first use a media-based proxy to compute a measure of Fed chair's overconfidence for the period 1999M01-2017M07, the overconfidence indicator. The overconfidence indicator provides a quantitative measure of the overconfidence expressed by the Fed chair, which is covered by the media, and thus, perceived by financial market participants. I relate this variable to inflation and unemployment expectations of market participants. Our results show that an overconfident Fed chair is significantly associated with higher inflation expectations and lower unemployment expectations. These findings are robust to (i) the macroeconomic forecasts used to extract the exogenous component of the media-based proxy reflecting Fed chair's overconfidence (the Survey of Professional Forecasters and the Greenbook forecasts) and (iii) an alternative proxy of inflation expectations. These findings shed some new light on the impact of central bankers' communication on financial market expectations, and thus, on the effectiveness of their monetary policy decisions.

*Keywords:* Fed chair, overconfidence, media coverage, market expectations.

*JEL classification:* E52, E58

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# I Introduction

The recent global financial crisis (GFC) and the Covid-19 recession have pushed central bankers at the center stage and made their leadership even more important than before. This is exemplified by the aura acquired by the heads of central banks: Mario Draghi, the former president of the European Central Bank (ECB) (2011 - 2019), was often referred as “super Mario” by the media<sup>1</sup> and Ben Bernanke, the former president of the US Federal Reserve (Fed) (2006-2014), was named TIME’s 2009 “Person of the Year”. The appointment of Raghuram Rajan and Mark Carney as governors of the Reserve Bank of India (2013 - 2016) and the Bank of England (2013 - 2020), respectively, also show the importance of having personalities perceived as competent at the head of central banks. Following this line of thought, Neuenkirch and Tillman (2016) suggest that central bankers’ personality is crucial for the effectiveness of the (un)conventional policy measures. They find that superstar central bankers achieve a lower inflation rate and a better output-inflation trade-off.<sup>2</sup> This result is consistent with Berger et al. (2011), who argue that the success of a policy decision depends on the ability of policymakers to convince that the decision was appropriate. This ability may hinge on the personality of the central bankers who implement the policy decision.

Even though central bankers’ personality comprises several dimensions, a specific trait that may characterize them and affect the effectiveness of their monetary policy decisions is overconfidence. The psychology literature finds that overconfident policy-makers are characterized by optimism, which is linked to the “illusion of control”, where individuals believe they have greater control over uncertain events (Weinstein and Klein, 2002). As a case in point, Claussen et al. (2012) show that overconfidence yields predictions about monetary policymaking that is consistent with several stylized facts: (i) disagreement within monetary policy committees, (ii) provision of decision power to MPC members, and (iii) the fact that the chairman is never on the losing side in the vote. However, far nothing is known about the relationship between central bankers’ overconfidence and the effectiveness of their monetary policy decisions.

Against this background, this paper proposes to (i) measure the degree of overconfidence expressed by the Fed chair and covered by the media and (ii) to assess its relationship with financial market expectations. The rationale underlying this procedure is that monetary policy is essentially the art of managing expectations, and the ability of the central bank to affect the effectiveness of its monetary policy depends upon its ability to credibly influence market expectations of inflation and unemployment (Ehrmann and Fratzscher, 2007; Van Der Cruisjen and Demertzis, 2007; Neuenkirch, 2012). Furthermore, I rely on media coverage to measure the Fed chair’s overconfidence given that what matters for our empirical analysis is not the *actual* overconfidence of the Fed chair, but the overconfidence covered by the media and *perceived* by financial market participants. As a case in point, Hayo and Neuenkirch (2015) show that market

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<sup>1</sup>Wigglesworth, R. (2016). “Keep Faith in Super Mario”. *Financial Times*, April 21.

<sup>2</sup>Neuenkirch and Tillman (2016) define as superstars those central bankers who receive the top grade by the financial press.

participants are time-constrained and that they must rely on the media to assimilate the flood of information and to update their information sets.

To examine whether the Fed chair's overconfidence is significantly related to financial market expectations of inflation and unemployment, I proceed in four steps. First, I collect the articles published by four leading newspapers in economics and finance (*The New York Times*, the *Financial Times*, *The Economist* and *The Wall Street Journal*) that describe the Fed chair as confident, optimistic, or variants as overoptimistic.<sup>3</sup> Second, I count the words relating to confidence or its opposite in proximity to the central banker name. Third, I follow the literature in finance and use word count to quantify the degree of overconfidence expressed by the Fed chair and covered by the media (like, e.g., Malmendier and Tate, 2008; Malmendier et al., 2011). I call this measure the overconfidence indicator. I find that the pattern of the overconfidence indicator can be explained by the main U.S. macroeconomic events. As a result, the third step consists in orthogonalizing the overconfidence indicator from the economic and financial conditions that may affect it. The exogenous component of the overconfidence indicator obtained from this orthogonalization reflects the market perception of the Fed chair's overconfidence which is not affected by economic and financial conditions. Finally, I use the Generalized Method of Moments (GMM) to assess the relationship between the Fed chair's overconfidence and market expectations of inflation and unemployment.<sup>4</sup> Our results show that an overconfident Fed chair is significantly associated with higher inflation expectations and lower unemployment expectations, although the overconfidence-inflation expectations' relationship is stronger in terms of economic magnitude. These findings are robust to (i) the macroeconomic forecasts used to extract the exogenous component of the overconfidence indicator (the Survey of Professional Forecasters and the Greenbook forecasts) and (ii) an alternative proxy of inflation expectations. Finally, additional extensions show that even when using data at quarterly frequency and when considering the release date of the SPF forecasts in the empirical procedure, the overconfidence indicator is still positively (negatively) related to inflation (unemployment) expectations of financial market participants. Our results suggest that the Fed chair, by expressing confidence and optimism, significantly influences market expectations of inflation and unemployment and thus, the effectiveness of its monetary policy decisions. A policy implication of these findings is that the Fed chair could strategically use communication and cause the media to report his/her confidence to boost inflation expectations of market participants, in case it is below the inflation goal of 2 percent.

The remainder of this paper is structured as follows: Section 2 provides a short review of the literature, section 3 describes the overconfidence indicator and section 4 tests the relationship between the Fed chair's overconfidence and market expectations of inflation and unemployment.

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<sup>3</sup>The psychology literature finds that overconfident policy-makers are characterized by optimism, which is the overestimation of the likelihood of desirable outcomes (Moore and Schatz, 2017).

<sup>4</sup>I use inflation and unemployment expectations since the Fed chair often expresses confidence and optimism on the development of these variables based on our textual analysis of newspapers. Hence, if the Fed chair affects market expectations by expressing overconfidence, it is likely that it will involve inflation and unemployment expectations.

Finally, section 5 provides further extensions while the last section concludes.

## II Related literature

The importance of central bankers' personality dates back to Friedman (1962), who hypothesized that an accident of personality can have significant consequences for an institution such as a central bank, especially in times of economic crisis. As an illustration, Friedman and Schwartz (1963) show that it was the shift of power from Benjamin Strong to George L. Harrison at the head of the Bank of New York in 1928 that explains the difference between the monetary policy of the Fed before and after 1929, and which has contributed to the onset of the Great Depression. Friedman's (1962) hypothesis also played a central role in the theoretical literature on monetary policy. This is illustrated in the Rogoff (1985) model of the conservative central banker, which shows that the inflation bias can be reduced by delegating the management of monetary policy to a central banker who puts more weight on the cost of inflation than does society. Similarly, the model of Cukierman and Meltzer (1986) distinguishes between different central banker types, hawks, and doves, which implies different outcomes in terms of monetary policy.

More recently, the importance of central bankers' personality has been attributed to several factors: (i) the independence gained by central banks from political influence in the nineties which has made leadership important for their well-functioning (Blinder, 1999), and (ii) the need for central bankers to publicize and justify their policy decisions to be accountable. Hence so doing, central bankers sometimes use a jargon intended to soothe the public with their expertise. As suggested by Blinder (2008), this "impression management" is a key characteristic of modern central banking. Following this line of thought, the literature finds that the personalities of Paul Volcker and Alan Greenspan influenced the monetary policy of the Fed (Siklos, 2002), and the personalities of Jean-Claude Trichet and Mario Draghi the monetary policy of the ECB (Basham and Roland, 2014).

A specific dimension of central bankers' personality that might affect the effectiveness of their monetary policy decisions is overconfidence, which is an established cognitive bias in the psychology of judgment. The psychology literature finds that when policy-makers work in complex environments, such as for duties related to monetary policy, they tend to be overconfident and optimistic about the accuracy of their information (Odean, 1998), and thus, of the models and theories they use to understand the economy. This is exemplified by the congress testimony of Alan Greenspan in 2008 when he admitted that the GFC had exposed a mistake in the ideology which guided his 18-year chairmanship of US monetary policy.

Furthermore, the psychology literature suggests that policy-makers who have the ultimate say about the strategic decisions are likely to satisfy the conditions for the existence of overconfidence (March and Shapira, 1987). Indeed, such a position may induce policy-makers to believe that they can control the outcome, and thus, underestimate the likelihood of failure and be too optimistic. The Fed chair is a case in point since most decisions implemented by the Federal Open

Market Committee (FOMC) are made in a consensual manner, even if the latter is composed by heterogeneous policymakers who have different economic data (Romer, 2010; Berk and Bierut, 2011), and who disagree on how to react to these data (Bennani, 2016). Anecdotal evidence suggests that this consensus is possible thanks to the presence of a dominant chair who influences other committee members during the decision-making process. Several papers document the prominent role of the chair during the policy process (Chappell et al., 2005; Meade, 2005; Blinder, 2007), and describe him/her as holding a disproportionate influence over the FOMC decisions (Meyer, 2004).<sup>5</sup> The leadership role of the chair is also supported by the FOMC minutes, which show that he/she is always on the winning side of a vote, the great public attention that his/her communication generates (Ehrmann and Fratzscher, 2007), and the formal powers that he/she has during the decision-making process: spokesperson, manager, agenda-setter and coalition builder (Kettl, 1986). This situation is not specific to the Greenspan era, as Chappell et al. (2005) find that when Arthur Burns was chairing the FOMC, his opinion counted about as much as the 18 other committee members put together.

Consequently, there are theoretical and empirical pieces of evidence showing that the Fed chair is likely to have the same cognitive bias, overconfidence, as other decision-makers holding top positions, such as managers and investment bankers.

### III The overconfidence indicator

#### III.1 Measuring Fed Chair's overconfidence

Providing a quantitative measure of overconfidence is difficult as there is no direct instrument to measure a personality trait. However, the existing literature in finance classifies decision-makers as overconfident based on their portrayal in the major newspapers and magazines (Malmendier and Tate, 2008). As an illustration, Malmendier et al. (2011) use a media coverage proxy to classify a Chief Executive Officer (CEO) as overconfident if he/she is more frequently described as “confident” and “optimistic” relative to descriptors such as “frugal”, “conservative”, “cautious”, “practical”, “reliable” or “steady”.

The media-based proxy relies on trait theory, which suggests that traits constitute underlying personality dimensions on which individuals vary. Trait theory is widely used by psychologists to measure and explain personality and relies on a list of 18000 words compiled by Allport and Odbert (1936) to describe traits. More recently, the literature used factor analysis to reduce the number of traits in the list to five (McCrae and Costa, 1997), the Five-Factor Model (FFM).<sup>6</sup> As suggested by Brown and Sarma (2007), the FFM has been used by studies in many fields using

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<sup>5</sup>Former Governor Meyer argues that chairman Greenspan systematically influenced the preferences of the other Fed members prior to meetings: “the Chairman’s disproportionate influence on Fed decisions, his efforts to build consensus around his policy recommendations before FOMC meetings, and the strong tendency for Committee members to support the majority view - all these were secrets of the temple that I learned at my first FOMC meeting”, Meyer (2004, p. 50).

<sup>6</sup>The five factors are openness, conscientiousness, extroversion, agreeableness, and neuroticism.

different data sets and has been found to be universal across cultures, which makes the FFM able to uncover general laws of personality structure according to psychologists.

Our measure of Fed chair’s overconfidence is based on media portrayal and relies on the FFM. I use media coverage as a proxy to measure the market perception of Fed chair’s overconfidence for the period 1999M01-2017M07: (i) Alan Greenspan (1999M01-2006M01), (ii) Ben Bernanke (2006M02-2014M01), and (iii) Janet Yellen (2014M02-2017M07). I follow the literature and collect data on how the main financial and economic media portray each central banker during the sample period using the Factiva database. For each central banker, I collect the articles published in *The Wall Street Journal*, *The New York Times*, the *Financial Times* and *The Economist* that portray the central banker as (a) “confident”, “overoptimistic”, “optimistic” and (b) “cautious”, “conservative”, “steady”, “pessimistic”, “gloomy”, “not confident” or “not optimistic” (Table 6 in the Appendix provides the frequency of the keywords appearing in the articles).<sup>7</sup> In a second step, I read each article to check whether the keywords describe the central banker and whether they are negated. Interestingly, I find that the Fed chair usually expresses confidence and optimism regarding the level of inflation and unemployment: “*Mr. Bernanke called the inflation fears way overstated and said he had 100% confidence he could act quickly enough to keep prices in check.*”<sup>8</sup> or “*This month Ms. Yellen said her confidence in the inflation outlook had been ‘bolstered’ by recent strong jobs numbers [...].*”<sup>9</sup>

As a final step, I compute the overconfidence indicator (OI) using word count. For each month, I compare the number of words used in the published articles and related to the “confident” terms, i.e., category (a), with the number of words related to the “cautious” terms, i.e., category (b). Following Malmendier et al. (2011), I consider that a Fed chair is overconfident if he/she is more described by the terms related to the category (a) than by the terms of the category (b). I measure overconfidence for each Fed chair at month  $t$  as follows:

$$OI_t = \frac{a_t - b_t}{Total_t}; \quad (1)$$

where  $a_t$  reflects the number of words used in the published articles at month  $t$  and related to the “confident” terms,  $b_t$  the number of words related to the “cautious” terms and  $Total_t$  the number of articles that mention the Fed chair. I normalize by the total number of articles to address any potential bias due to different coverage through time.  $OI_t$  is a continuous variable that can be positive (negative) if the number of words related to the “confident” terms is higher (lower) than the number of words related to the “cautious” terms. Fig. 1 shows the overconfidence indicator through the sample period 1999M01-2017M07 (Fig. 4 in the Appendix shows the overconfidence indicator as well as the number of newspaper articles discussing the degree of overconfidence of

<sup>7</sup>Words such as “disciplined”, “conscientious”, “reliable”, “frugal”, and “practical” are used in the literature to describe CEO overconfidence but are not used to describe central bankers in the media.

<sup>8</sup>Sudeep Reddy, S. (2010). “U.S. News: Inflation Risk Is Low, Fed Says”. *The Wall Street Journal*, December 5.

<sup>9</sup>Fleming, S. (2015). “Set for lift-off: All eyes on Fed’s signals as rate rise expected”. *Financial Times*, December 15.

the Fed chair).

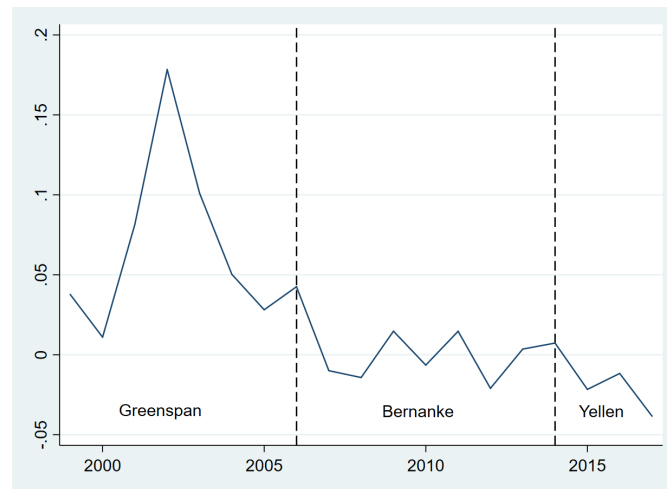


Figure 1: The overconfidence indicator

Fig. 1 shows the media coverage of Fed chair's overconfidence. The figure suggests that following the burst of the dot-com bubble in the late 1990s and the resulting drop of the overconfidence indicator, the media were describing the Fed chair (Alan Greenspan) as confident during the first years of the 2000s ( $OI_t > 0$ ). This happened at a time of economic expansion and when the Fed was implementing a loose monetary policy. However, from 2003 onward, the OI started to decline progressively until attaining the trough with a negative value in mid-2008, a period coinciding with the collapse of Lehman Brothers and the start of the GFC. The quick Fed response to the burst of the crisis may explain the increase of the articles describing the Fed chair as confident during that period.<sup>10</sup> Nevertheless, the triggering of the sovereign debt crisis from the end of 2009 led to fiscal tensions in the euro area, and the uncertainty generated was felt in the global financial markets, including the US one. This has raised some doubts about the soundness of the US financial markets, which may explain the low and sometimes negative value of the OI throughout that period (2009-2012). However, the additional policies implemented by the Fed over that period may explain the constant and positive value of the OI during 2013.<sup>11</sup> Interestingly, the sudden drop of the OI from 2014 coincides with the new chairmanship of Janet Yellen at the head of the Fed. This drop may be due to the criticisms that the Fed faced following the fuzzy communication of its chair about the future pace of the unconventional policy measures and the resulting confusion felt by market participants and the media.<sup>12</sup>

On the one hand, the advantage of the overconfidence indicator is that it is less likely to suffer from

<sup>10</sup>For instance, by cutting its key interest rates until reaching the zero lower bound, supporting critical institutions (e.g., the American International Group) to avoid their collapse and providing liquidity to borrowers and investors (e.g., the Large Scale Asset Purchases and Maturity Extension Programs).

<sup>11</sup>Like, e.g., the maintenance of the temporary currency liquidity swaps with various central banks and the adoption of the forward guidance.

<sup>12</sup>See: Luce E., (2015). "Waiting for Yellen". *Financial Times*, September 20.



endogeneity. For instance, it is difficult to argue that the way a central banker is described by the media influences his/her behavior in a way consistent with the description (like, e.g., describing a central banker as cautious causes him/her to take more cautious decisions). However, the OI may be affected by the prevailing economic and financial conditions, i.e., an economic expansion (recession) may lead the Fed chair to express more (less) confidence. To avoid the problem of endogeneity with the business cycle, I orthogonalize the overconfidence indicator with past, current, and future economic developments. I consider the residual from this regression as the exogenous component of the overconfidence indicator.

### III.2 The exogenous component of the overconfidence indicator

I use the quarterly forecasts of inflation, real activity, and unemployment made by the Survey of Professional Forecasters (SPF) and published by the Federal Reserve Bank of Philadelphia to orthogonalize the overconfidence indicator on the economic conditions. In the surveys published by the Philadelphia Fed, the forecasters provide quarterly projections for five quarters. I use the mean forecasts of the unemployment rate, the real gross domestic product, and the CPI inflation rate. Specifically, I use a linear interpolation procedure to interpolate these variables into a monthly frequency. I also use the shadow rate of Wu and Xia (2016) to control for the overall policy stance and the presence of a zero lower bound on nominal interest rates. Moreover, I control for financial market volatility by including the CBOE volatility index in the estimation procedure. Finally, since there could be omitted variables, for instance, related to animal spirits, that may vary considerably over time and drive both the overconfidence indicator and financial market expectations; I use the Consumer Confidence Index (CCI) to control for variations in animal spirits. The CCI is obtained from the Consumer Surveys made by the Conference Board. I regress the overconfidence indicator on these variables and consider the residual from this regression as the exogenous component of the indicator. The residual acts as a proxy of the Fed's chair overconfidence, which is not expressed in response to information about economic developments. The specification is estimated over the period 1999M01-2017M07 and takes the following form:

$$OI_t = \alpha + \delta i_t + \sum_{i=1}^6 \beta_i \pi_{i,t} + \sum_{i=2}^6 \gamma_i y_{i,t} + \sum_{i=1}^6 \eta_i u_{i,t} + \theta VIX_t + \zeta CCI_t + \varepsilon_{OI_t}; \quad (2)$$

$OI_t$  is the overconfidence indicator and  $i_t$  the shadow rate as measured by Wu and Xia (2016).  $\pi_{i,t}$ ,  $y_{i,t}$  and  $u_{i,t}$  reflect the forecast horizon  $i$  of inflation, real output growth and the unemployment rate published by the SPF at time  $t$ , respectively. I distinguish among the horizons of the forecasts by appending 1 to 6. The number 1 represents the forecast for the quarter prior to the quarter in which the survey is conducted.<sup>13</sup> The number 2 represents the forecast for the current quarter, while the numbers 3 to 6 represent the forecasts for the four quarters after the current

<sup>13</sup>The forecasters know the values of the variables for this quarter at the time they submit their projections.

quarter. The use of several forecasts horizons enables us to deal with the fact that information sets available to policy-makers include a large number of variables.<sup>14</sup> Finally,  $VIX_t$  represents the CBOE volatility index,  $CCI_t$  the Consumer Confidence Index, while the residual  $\varepsilon_{OI_t}$  is the exogenous component of the OI.

Table 7 in the Appendix shows the estimated coefficients of eq. (2) and highlights the significant relationship between the SPF forecasts and the overconfidence indicator. I find that a positive variation of output growth forecast for the fourth-quarter ahead ( $\tilde{y}_6$ ) and a negative variation of unemployment during the previous quarter ( $\tilde{u}_1$ ) are associated with higher overconfidence. Fig. 2 shows the residual of eq. (2), i.e., the exogenous component of the overconfidence indicator.

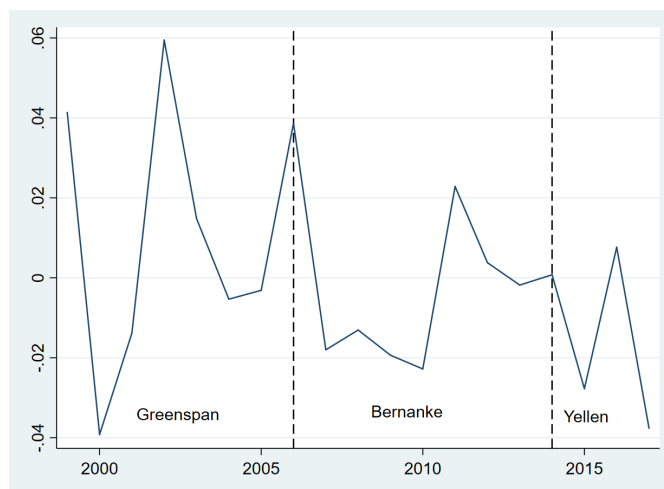


Figure 2: The exogenous component of the OI

The exogenous component of the overconfidence indicator represented in Fig. (2),  $\varepsilon_{OI_t}$ , has a similar trend as the indicator represented in Fig. (1), although with more volatility. The last years of the 1990s were characterized by a sudden drop of  $\varepsilon_{OI_t}$ , which contrasts with the first years of the 2000s, a period where it reached its maximum value. Nevertheless, the triggering of the subprime mortgage crisis implied a fall of  $\varepsilon_{OI_t}$  through the years 2007-2010. However, from 2010 there was a rise of  $\varepsilon_{OI_t}$  during the Bernanke era until the chairwomanship of Janet Yellen in February 2014, where  $\varepsilon_{OI_t}$  decreased.

## IV Empirical Setup and Results

### IV.1 Fed chair's overconfidence and inflation expectations

To assess the relationship between the Fed chair's overconfidence and inflation expectations, I estimate a model by considering the one-year expected inflation as a dependent variable. For the

<sup>14</sup>Forecasts encompass rich information sets and Bernanke et al. (2005) show that a data-rich environment has important implications.

right-hand side variables, I first consider inflation expectations inertia by including the lagged dependent variable and the exogenous component of the overconfidence indicator. I also consider several variables that reflect short-term aggregate demand and supply shocks on inflation expectations. I follow the New Keynesian literature on the Phillips curve and consider for the demand shock the output growth as a measure of domestic economic activity (Galí et al., 2007).<sup>15</sup> Regarding the supply shock, I consider international oil price changes. External factors, such as the relative changes in the trade-weighted exchange rate and import prices, may imply inflation expectations pressures and are also considered in the specification. Moreover, when the FOMC considers that its objectives of inflation stability and maximum employment are not complementary under specific circumstances, it may sacrifice the goal of low and stable inflation by using expansionary monetary policies to achieve lower short-term unemployment or financing public deficits. Hence, I include the fiscal surplus and the unemployment rate in the estimation. I also consider the monetary policy regime by including a dummy variable that takes the value one when there is an inflation targeting (IT) regime and zero otherwise.<sup>16</sup> Finally, I consider the current inflation rate as an additional regressor. The empirical specification takes the following form:

$$\begin{aligned} \tilde{E}_t \pi_{t+12}^e = & \alpha + \beta_1 \tilde{E}_{t-1} \pi_{t+12}^e + \beta_2 \varepsilon_{OI_t} + \beta_3 Y_t + \beta_4 U_t + \beta_5 CPI_t + \\ & \beta_6 Oil_t + \beta_7 Fiscal_t + \beta_8 REER_t + \beta_9 M_t + \beta_{10} IT_t + \varepsilon_t; \end{aligned} \quad (3)$$

where  $\tilde{E}_t \pi_{t+12}^e$  is the median of the one-year ahead expected inflation published by the SPF at time  $t$  and  $\tilde{E}_{t-1} \pi_{t+12}^e$  its lagged value.<sup>17</sup>  $\varepsilon_{OI_t}$  is the exogenous component of the overconfidence indicator, and  $Y_t$  the output growth, reflecting the annual GDP change.  $U_t$  is the unemployment rate and  $CPI_t$  the current inflation rate.  $Oil_t$  is the crude oil price expressed with U.S. dollars per barrel and which represents the average of three spot prices: Dated Brent, West Texas Intermediate, and the Dubai Fateh.  $Fiscal_t$  is the year-over-year change of the ratio of fiscal surplus to GDP, and  $REER_t$  the yearly change of a weighted average of foreign exchange values of the U.S. dollar against a subset of currencies of US trading partners.  $M_t$  is the yearly change of the import price index and  $IT_t$  a dummy variable representing the inflation targeting regime. Finally,  $\varepsilon_t$  is an i.i.d. error term. All data are at a monthly frequency except for the inflation expectations and the GDP growth, which are available every quarter. I use a linear interpolation procedure to transform these variables into a monthly frequency.<sup>18</sup> All variables are taken from

<sup>15</sup>I also consider the output gap as an alternative measure of demand shock and find similar qualitative and quantitative results. The output gap is measured as the difference between the annual change of GDP and its trend, obtained with a Hodrick–Prescott filter with a parameter  $\lambda$  set at 129600. Results available upon request.

<sup>16</sup>During the estimated period (1999M01-2017M07), the Fed has adopted an inflation targeting regime in January 2012 when it issued a statement indicating that the Committee judges that inflation at the rate of 2% is most consistent over the longer run with the Federal Reserve’s statutory mandate.

<sup>17</sup>The lagged value is the monthly lagged value of the dependent variable derived from the interpolation of the quarterly data.

<sup>18</sup>I also use a set of alternative interpolation procedures (cubic, cubic spline, cubic hermite, and nearest neighbor) to compute monthly data for inflation expectations. I find the results of the estimations to be qualitatively and quantitatively similar, whatever the interpolation procedure used to compute the monthly data. To save some space, results are available upon request.

Macrobond and the Fred St-Louis databases. Tables 8 and 9 in the Appendix provides the summary statistics and the correlation table of the data used in the estimation.

Since there is a possibility of endogeneity as the left-hand side and the right-hand side variables are interdependent and simultaneously determined in the same period, the estimated coefficients ( $\beta_n$  with  $2 < n < 10$ ) may be biased and inconsistent. To tackle this issue, the independent variables related to those coefficients are instrumentalized. However, an additional issue is the presence of heteroskedasticity, which invalids the diagnostic tests for endogeneity and over-identification. As suggested by Baum et al. (2003), this problem can be addressed with the Generalized Method of Moments (GMM) introduced by Hansen (1982). The GMM uses the orthogonality conditions to allow for efficient estimation in the presence of heteroskedasticity of unknown form. For the instruments, I use a constant and the lagged values of the explained and the explanatory variables since they should signal future developments of the independent variables while being uncorrelated with the error term. Moreover, I face the problem that some instrumental variables are not necessary and distort our results. Hansen (1982) suggests a test for the validity of instruments by making a standard  $J$ -test for the validity of the over-identifying restrictions. Table 1 shows the results of the estimation for the period 1999M01-2017M07.

Table 1: Fed chair’s overconfidence and inflation expectations (1999M01-2017M07)

| Variable                      | Specification 1      | Specification 2      |
|-------------------------------|----------------------|----------------------|
| $\alpha$                      | 0.81***<br>(0.09)    | 0.69***<br>(0.11)    |
| $\tilde{E}_{t-1}\pi_{t+12}^e$ | 0.44***<br>(0.04)    | 0.52***<br>(0.05)    |
| $\varepsilon_{OI_t}$          |                      | 0.83***<br>(0.01)    |
| $Y_t$                         | 0.06***<br>(0.005)   | 0.05***<br>(0.006)   |
| $U_t$                         | -0.03***<br>(0.005)  | -0.03***<br>(0.007)  |
| $CPI_t$                       | 0.18***<br>(0.01)    | 0.15***<br>(0.02)    |
| $Oil_t$                       | 0.002***<br>(0.0003) | 0.001***<br>(0.0005) |
| $Fiscal_t$                    | -0.06***<br>(0.005)  | -0.05***<br>(0.007)  |
| $REER_t$                      | 0.001<br>(0.001)     | 0.003<br>(0.002)     |
| $M_t$                         | 0.0006<br>(0.001)    | 0.002*<br>(0.001)    |
| $IT_t$                        | -0.06***<br>(0.02)   | -0.03<br>(0.03)      |
| $J$ -test                     | 0.9                  | 0.9                  |
| Adjusted $R^2$                | 0.95                 | 0.95                 |
| Observations                  | 220                  | 220                  |

Standard errors are shown in between brackets. Estimates are obtained using two-steps GMM. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.  $J$ -test is the  $p$ -value of the test of over-identifying restrictions. The list of instrumental variables includes a constant and the lags of the dependent variable, the output growth, the unemployment rate, the inflation rate, oil price changes, the fiscal surplus, the real effective exchange rate and the import prices. The statistical significance of the coefficients is robust to the number of lags of instruments.

Table 1 show that the estimation results are in accordance with the theoretical and empirical evidence about the determinants of inflation expectations (Castelnuovo, 2010), and the validity of the instruments is confirmed by the Hansen’s  $J$ -test in both specifications. Furthermore, the value of the Variance Inflation Factor (VIF) highlights the absence of multicollinearity between the independent variables ( $VIF < 5$ ). Both specifications exhibit strong evidence of inflation expectations inertia as reflected by the significant and positive coefficient related to the lagged term  $\tilde{E}_{t-1}\pi_{t+12}^e$ .

The specification including the exogenous component of the overconfidence indicator,  $\varepsilon_{OI_t}$ , shows that when the number of newspaper articles portraying the Fed chair with the “confident” terms exceeds the number of articles using “cautious” terms, inflation expectations of market

participants are likely to increase. In terms of economic magnitude, a one standard-deviation (SD) increase of the overconfidence indicator is associated with an increase of 0.23 SD of inflation expectations. Regarding the effect of the output growth, the unemployment rate, the current inflation rate, the oil prices, and the fiscal surplus on inflation expectations, both specifications deliver similar results in terms of value and significance. Specifically, I find that a positive variation of unemployment and the fiscal surplus are negatively related to inflation expectations, while oil prices, output growth, and the current inflation rate are positively associated with inflation expectations. As an illustration, a one SD increase of output growth (unemployment) is associated with an increase (decrease) of 0.35 (0.19) SD of inflation expectations. Finally, I find no influence of external factors on inflation expectations, as shown by the non-significant coefficient related to the exchange rate.

## IV.2 Fed Chair’s overconfidence and unemployment expectations

Turning now to the relation between Fed chair’s overconfidence and unemployment expectations, I consider the one-year ahead U.S. unemployment expectations as a dependent variable in the empirical specification. For the right-hand side variables, I follow the empirical literature (Bassanini and Duval, 2009) and consider a set of institutional, policy, and economic factors. Therefore, variables such as the tax wedge between labor cost and take-home pay (for a single earner worker), union membership rate (which proxies trade-union bargaining power), public expenditures on labor market policies, and minimum wages constitute major policy and institutional determinants of unemployment. Furthermore, employment protection legislation and product market regulation also affect the level of unemployment expectations (Blanchard and Giavazzi, 2003). I also control for the impact of aggregate demand on unemployment expectations by adding the output growth as well as an additional variable that captures more directly the impact of demand, the real interest rate shock.<sup>19</sup> I augment the model by adding the current inflation rate. Finally, I use the exogenous component of the overconfidence indicator to highlight its relationship with unemployment expectations.

The empirical specification is consistent with the theoretical models of labor market equilibrium and takes the form of a standard job-search and wage-setting/price-setting model (Nickell and Layard, 1999). The estimation takes the following form:

$$\begin{aligned} \tilde{E}_t U_{t+12}^e = & \alpha + \beta_1 \tilde{E}_{t-1} U_{t+12}^e + \beta_2 \varepsilon_{OI_t} + \beta_3 CPI_t + \beta_4 Y_t + \beta_5 Union_t + \beta_6 PubExp_t + \\ & \beta_7 Tax_t + \beta_8 MinWage_t + \beta_9 Interest_t + \beta_{10} PMR_t + \beta_{11} EPL_t + \varepsilon_t; \end{aligned} \quad (4)$$

where  $\tilde{E}_t U_{t+12}^e$  is the median of the one-year ahead expected unemployment rate published by the SPF at time  $t$  and  $\tilde{E}_{t-1} U_{t+12}^e$  its lagged value.<sup>20</sup>  $\varepsilon_{OI_t}$  is the exogenous component of the

<sup>19</sup>I consider the output gap as an alternative measure of demand shock and find similar qualitative and quantitative results. The output gap is measured as the difference between the annual change of GDP and its trend, obtained with a Hodrick–Prescott filter with a parameter  $\lambda$  set at 129600. Results available upon request.

<sup>20</sup>The lagged value is the monthly lagged value of the dependent variable derived from the interpolation of the

overconfidence indicator,  $CPI_t$  the year-over-year change of the inflation rate, and  $Y_t$  the output growth, reflecting the annual change of the real GDP.  $Union_t$  is the trade union density, which corresponds to the ratio of wage and salary earners that are trade union members divided by the total number of wage and salary earners.  $PubExp_t$  corresponds to public expenditure (as a percentage of GDP), which is explicitly targeted at groups of persons with difficulties in the labor market.  $Tax_t$  is defined as the ratio between the amount of taxes paid by an average single worker with no children and the corresponding total labor cost for the employer and  $Interest_t$  is the real interest rate shock, reflecting the difference between the 10-year nominal government bond yields and the annual GDP growth rate.  $MinWage_t$  represents the hourly minimum wage at current prices.  $PMR_t$  is an indicator that measures the economy-wide regulatory and market environment while  $EPL_t$  is a synthetic indicator of the strictness of regulation on dismissals and the use of temporary contracts. Finally,  $\varepsilon_t$  is an i.i.d. error term.

Since the overconfidence indicator is a monthly variable, the annual labor market data ( $Union_t$ ,  $PubExp_t$ ,  $Tax_t$ ,  $MinWage_t$ ,  $PMR_t$ , and  $EPL_t$ ) are set into a monthly frequency using piecewise constant interpolation. Regarding the quarterly survey and macroeconomic data (unemployment expectations and output growth), the monthly frequency is computed using a linear interpolation procedure.<sup>21</sup> All data are from the OECD Labor statistics and the Macrobond databases. Tables 10 and 11 in the Appendix provide the summary statistics of the data used in eq. (4).

Furthermore, a potential concern when estimating eq. (4) is the risk of reverse causality, which would reflect the endogeneity of policies and institutions with respect to the level of unemployment expectations. To address this potential issue, I control for endogeneity by instrumenting the independent variables and using the GMM. In addition, I check the validity of the instruments by making a standard  $J$ -test for the validity of the over-identifying restrictions. Table 2 shows the results of the estimation for the period 1999M01-2017M07.

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quarterly data.

<sup>21</sup>Estimation results are similar qualitatively and quantitatively regardless of the interpolation procedure used to compute the monthly data. Alternative test results available upon request.

Table 2: Fed chair's overconfidence and unemployment expectations (1999M01-2017M07)

| Variable                    | Specification 1     | Specification 2     |
|-----------------------------|---------------------|---------------------|
| $\alpha$                    | 3.26***<br>(0.71)   | 3.44***<br>(0.62)   |
| $\tilde{E}_{t-1}U_{t+12}^e$ | 0.93***<br>(0.008)  | 0.93***<br>(0.008)  |
| $\varepsilon_{OI_t}$        |                     | -0.24***<br>(0.008) |
| $CPI_t$                     | -0.08***<br>(0.02)  | -0.09***<br>(0.01)  |
| $Y_t$                       | -0.02***<br>(0.009) | -0.02***<br>(0.009) |
| $Union_t$                   | 0.04<br>(0.03)      | 0.04<br>(0.03)      |
| $PubExp_t$                  | -0.15**<br>(0.07)   | -0.17**<br>(0.07)   |
| $Tax_t$                     | -0.12***<br>(0.013) | -0.13***<br>(0.01)  |
| $MinWage_t$                 | 0.08*<br>(0.04)     | 0.07*<br>(0.04)     |
| $Interest_t$                | 0.04***<br>(0.009)  | 0.04***<br>(0.009)  |
| $PMR_t$                     | 0.22<br>(0.19)      | 0.24<br>(0.18)      |
| $EPL_t$                     | -0.06<br>(0.46)     | -0.06<br>(0.42)     |
| $J$ -test                   | 0.9                 | 0.9                 |
| Adjusted $R^2$              | 0.9                 | 0.9                 |
| Observations                | 220                 | 220                 |

Standard errors are shown in between brackets. Estimates are obtained using two-steps GMM. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.  $J$ -test is the  $p$ -value of the test of over-identifying restrictions. The list of instrumental variables includes a constant and the lags of the dependent variable, the inflation rate, the output growth, the unemployment rate, the trade union density, public expenditures, the tax wedge, the minimum wage, and the interest rate shock. The statistical significance of the coefficients is robust to the number of lags of instruments.

The results shown in Table 2 are in line with the theoretical and empirical findings of the determinants of unemployment expectations, and the validity of the instruments is confirmed by the Hansen's  $J$ -test in both estimations. The value of the VIF suggests the absence of multicollinearity between the independent variables ( $VIF < 5$ ). The coefficient related to the overconfidence indicator is negative and significant, thus showing that an overconfident Fed chair is associated with lower unemployment expectations. However, the economic magnitude of this relationship is rather weak. Hence, a one SD increase of the overconfidence indicator is associated with a decrease of 0.01 SD of unemployment expectations. Concerning the macroeconomic variables, the relationship between unemployment expectations and inflation (output) is negative and sig-



nificant in both specifications. In terms of economic significance, a one SD deviation increase of inflation and output is associated with a decrease of 0.02 SD of unemployment expectations.

Regarding the institutional determinants, the effect of trade union density ( $Union_t$ ) on unemployment expectations is not significant, while a higher level of public expenditures ( $PubExp_t$ ) is associated with lower unemployment expectations. This finding is in line with the literature showing the beneficial effect of public expenditures on employment (Elmeskov et al., 1998). I also find a negative relationship between the tax wedge and unemployment expectations. The effect of labor taxes on unemployment is in accordance with previous empirical studies showing that higher labor taxes do not necessarily increase unemployment as theoretical studies would suggest (Macculloch and Di Tella, 2005). Finally, the real interest rate shock ( $Interest_t$ ) has a positive and significant relation with unemployment expectations while the coefficients related to policy factors, such as product market regulation “ $PMR_t$ ” and employment protection legislation “ $EPL_t$ ”, are not significant.

All in all, these findings confirm that the Fed chair’s overconfidence has a significant relationship with financial market expectations, more specifically with inflation expectations and, to a lower extent, unemployment expectations. Therefore, by publicly expressing confidence and optimism through public statements, the Fed chair is likely to move financial market expectations and, thus, to affect the effectiveness of its monetary policy decisions. Hence, I provide empirical evidence showing that the public perception of the Fed chair’s overconfidence matters for the effectiveness of its implemented policy measures.

## V Robustness tests

### V.1 Alternative forecasts to extract the exogenous component of the overconfidence indicator

To check whether the relationship between the Fed Chair’s overconfidence and financial market expectations is robust to the macroeconomic forecasts used to compute the exogenous component of the overconfidence indicator, I replace the SPF forecasts in eq. (2) by the Greenbook forecasts. The Greenbook forecasts are prepared for each regularly scheduled FOMC meeting by the Division of Research and Statistics of the FOMC and, therefore, are part of the information set the Fed chair has at hand when making its decision. I regress the overconfidence indicator on the Greenbook projections of the unemployment rate, the real gross domestic product, and the CPI. Furthermore, I use the additional variables included in eq. (2) (i.e., the shadow rate, the VIX, and the Consumer Confidence Index) to control for the economic and financial environments. The estimation period is 1999M01-2012M10 and is as follows:

$$OI_t = \alpha + \delta i_t + \sum_{i=1}^6 \beta_i \pi_{i,t} + \sum_{i=2}^6 \gamma_i y_{i,t} + \sum_{i=1}^6 \eta_i u_{i,t} + \theta X_t + \zeta CCI + \varepsilon_{OI_{GB,t}}; \quad (5)$$

where  $\pi_{i,t}$ ,  $y_{i,t}$  and  $u_{i,t}$  represent the Greenbook forecasts of inflation, output growth and unemployment, respectively.  $\varepsilon_{OI_{GB,t}}$  is the exogenous component of the overconfidence indicator computed with the Greenbook forecasts. The rest of the right-hand side variables and the time indicators are similar to those of eq. (2).<sup>22</sup> Fig. 3 shows the value of the residual obtained from the estimation of eq. (5).

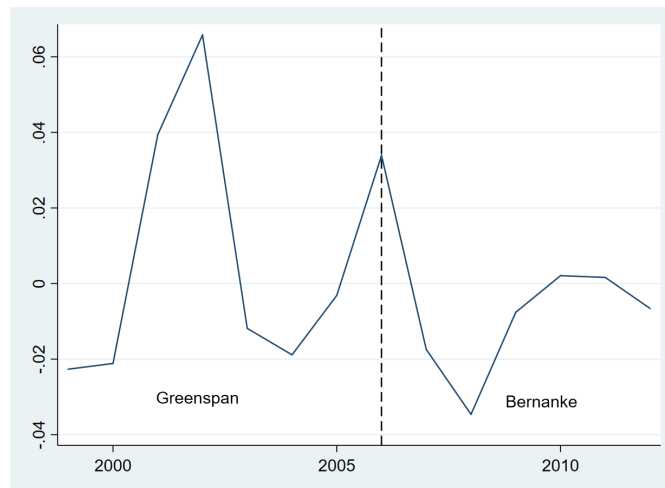


Figure 3: Exogenous component of the OI

The correlation between the exogenous component computed with the Greenbook forecasts ( $\varepsilon_{OI_{GB,t}}$ ) and the exogenous component computed with the SPF forecasts ( $\varepsilon_{OI_t}$ ) is high (0.87). This shows that the value of the residual is not sensitive to the macroeconomic forecasts used in the first step. Nevertheless, and as shown in Fig. 3, the residual obtained from eq. (5) is less volatile than the one obtained from eq. (2).

As a next step, I highlight the relationship of  $\varepsilon_{OI_{GB,t}}$  with inflation and unemployment expectations of market participants. For that purpose, I replace  $\varepsilon_{OI_t}$  in eqs. (3) and (4) by  $\varepsilon_{OI_{GB,t}}$  and re-estimate these equations. However, since the sample period ends in October 2012, I do not consider the dummy variable corresponding to the inflation targeting regime included in eq. (3) nor the policy factors ( $EPL$  and  $PML$ ) included in eq. (4). Tables 3 and 4 show the results of the estimations for the period 1999M01-2012M10.

<sup>22</sup>To save some space, estimation results of eq. (5) are available upon request.

Table 3: Fed chair's overconfidence and inflation expectations (1999M01-2012M10)

| Variable                      | Specification 1      | Specification 2      |
|-------------------------------|----------------------|----------------------|
| $\alpha$                      | 1.1***<br>(0.1)      | 0.68***<br>(0.12)    |
| $\tilde{E}_{t-1}\pi_{t+12}^e$ | 0.49***<br>(0.03)    | 0.57***<br>(0.04)    |
| $\varepsilon_{OIGB,t}$        |                      | 1.89***<br>(0.028)   |
| $Y_t$                         | 0.04***<br>(0.003)   | 0.03***<br>(0.005)   |
| $U_t$                         | -0.05***<br>(0.005)  | -0.02***<br>(0.007)  |
| $CPI_t$                       | 0.08***<br>(0.01)    | 0.14***<br>(0.02)    |
| $Oil_t$                       | 0.001***<br>(0.0003) | 0.0009**<br>(0.0003) |
| $Fiscal_t$                    | -0.04***<br>(0.004)  | -0.02***<br>(0.008)  |
| $REER_t$                      | -0.002*<br>(0.001)   | -0.001<br>(0.002)    |
| $M_t$                         | -0.001**<br>(0.0008) | 0.003*<br>(0.001)    |
| $J$ -test                     | 0.9                  | 0.9                  |
| Adjusted $R^2$                | 0.9                  | 0.9                  |
| Observations                  | 160                  | 160                  |

Standard errors are shown in between brackets. Estimates are obtained using two-steps GMM. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.  $J$ -test is the  $p$ -value of the test of over-identifying restrictions. The list of instrumental variables includes a constant and the lags of the dependent variable, the output growth, the unemployment rate, the inflation rate, oil price changes, the fiscal surplus, the real effective exchange rate and the import prices. The statistical significance of the coefficients is robust to the number of lags of instruments.

Table 4: Fed chair's overconfidence and unemployment expectations (1999M01-2012M10)

| Variable                    | Specification 1    | Specification 2    |
|-----------------------------|--------------------|--------------------|
| $\alpha$                    | 0.49<br>(0.81)     | -1.71*<br>(0.96)   |
| $\tilde{E}_{t-1}U_{t+12}^e$ | 0.89***<br>(0.008) | 0.9***<br>(0.009)  |
| $\varepsilon_{OI_{GB,t}}$   |                    | -0.66***<br>(0.01) |
| $CPI_t$                     | -0.1***<br>(0.01)  | -0.07***<br>(0.01) |
| $Y_t$                       | -0.07***<br>(0.01) | -0.08***<br>(0.01) |
| $Union_t$                   | 0.06***<br>(0.19)  | 0.1<br>(0.02)      |
| $PubExp_t$                  | -0.07<br>(0.05)    | -0.09<br>(0.06)    |
| $Tax_t$                     | -0.02<br>(0.02)    | 0.02<br>(0.01)     |
| $MinWage_t$                 | 0.13<br>(0.02)     | 0.13<br>(0.02)     |
| $Interest_t$                | -0.003<br>(0.01)   | -0.01<br>(0.01)    |
| $J$ -test                   | 0.9                | 0.9                |
| Adjusted $R^2$              | 0.9                | 0.9                |
| Observations                | 150                | 150                |

Standard errors are shown in between brackets. Estimates are obtained using two-steps GMM. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.  $J$ -test is the  $p$ -value of the test of over-identifying restrictions. The list of instrumental variables includes a constant and the lags of the dependent variable, the inflation rate, the output growth, the unemployment rate, the trade union density, public expenditures, the tax wedge, the minimum wage, and the interest rate shock. The statistical significance of the coefficients is robust to the number of lags of instruments.

Tables 3 and 4 show that the value of the coefficients related to the macroeconomic variables (inflation, output growth, unemployment, oil prices, and fiscal surplus) is similar, in terms of value and significance, to the baseline model (see Tables 1 and 2). Moreover, an increase in the overconfidence indicator is associated with higher (lower) inflation (unemployment) expectations. The relationship of the overconfidence indicator with financial market expectations is also economically significant, although slightly different from the one of the baseline model: a one SD increase of the indicator is associated to an increase (decrease) of 0.5 (0.03) SD of inflation (unemployment) expectations. These findings show that the relationship between the Fed chair's overconfidence and financial market expectations is robust to the macroeconomic forecasts used to compute the exogenous component of the overconfidence indicator.

## V.2 Alternative Measure of Inflation Expectations

Inflation expectations are commonly measured in two ways: (i) from surveys of economists and (ii) from expected inflation rates implied in market interest rates. Even though measures of expected inflation based on surveys have been found to be generally superior to market-based measures, the resulting data points are widely spaced, given that respondents to forecast inflation rates are asked for non-contiguous time horizons. Therefore, the use of alternative measures of inflation expectations may provide additional insights on the relation between the Fed chair's overconfidence and market expectations of inflation. I thus use a market-based measure of inflation expectations: the TIPS breakeven inflation rate.<sup>23</sup>

The TIPS breakeven inflation rate reflects market-based expectations for future headline CPI inflation. Given that the TIPS breakeven inflation rates are reliable only at longer maturities, I consider the 20-Year breakeven inflation rate as a proxy for inflation expectations. The 20-Year breakeven inflation rate represents a measure of expected inflation derived from the 20-Year Treasury Constant Maturity Securities and the 20-Year Treasury Inflation-Indexed Constant Maturity Securities. While I can consider risk premiums to extract actual inflation expectations (using models such as Gürkaynak et al., 2010), I use raw unadjusted market rates. Hence so doing, our results are not dependent on the choice of a specific model. I re-estimate eq. (3) considering the 20-Year breakeven inflation rate as a dependent variable:

$$T20YIEM_t = \alpha + \beta_1 T20YIEM_{t-1} \pi_{t+12} + \beta_2 \varepsilon_{OI_t} + \beta_3 Y_t + \beta_4 U_t + \beta_5 CPI_t + \beta_6 Oil_t + \beta_7 Fiscal_t + \beta_8 REER_t + \beta_9 M_t + \beta_{10} IT_t + \varepsilon_t; \quad (6)$$

where  $T20YIEM_t$  is the 20-Year breakeven inflation rate and  $T20YIEM_{t-1}$  its lagged value. Right-hand side variables are similar to those of eq. (3). Table 5 below shows the results of the empirical specification for the period 1999M01-2017M07.

<sup>23</sup>Another market-based measure of inflation expectations is the inflation swaps introduced in the mid-2000s. Unfortunately, inflation swap rates are available from Thomson Reuters from mid-2007 only.

Table 5: Fed chair's overconfidence and the TIPS breakeven inflation rate (1999M01-2017M07)

| Variable             | Specification 1      | Specification 2     |
|----------------------|----------------------|---------------------|
| $\alpha$             | 0.26***<br>(0.09)    | 0.49***<br>(0.13)   |
| $T20YIEM_{t-1}$      | 0.83***<br>(0.03)    | 0.73***<br>(0.04)   |
| $\varepsilon_{OI_t}$ |                      | 1.34***<br>(0.02)   |
| $Y_t$                | 0.08***<br>(0.01)    | 0.08***<br>(0.01)   |
| $U_t$                | -0.009<br>(0.006)    | -0.008<br>(0.007)   |
| $CPI_t$              | -0.05*<br>(0.02)     | -0.04<br>(0.03)     |
| $Oil_t$              | 0.002***<br>(0.0006) | 0.001<br>(0.0007)   |
| $Fiscal_t$           | -0.08***<br>(0.01)   | -0.12***<br>(0.01)  |
| $REER_t$             | -0.005*<br>(0.002)   | -0.02***<br>(0.001) |
| $M_t$                | -0.01***<br>(0.001)  | -0.01***<br>(0.002) |
| $IT_t$               | -0.13***<br>(0.02)   | 0.02<br>(0.03)      |
| $J$ -test            | 0.9                  | 0.9                 |
| Adjusted $R^2$       | 0.8                  | 0.8                 |
| Observations         | 220                  | 220                 |

Standard errors are shown in between brackets. Estimates are obtained using two-steps GMM. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.  $J$ -test is the  $p$ -value of the test of over-identifying restrictions. The list of instrumental variables includes a constant and the lags of the dependent variable, the output growth, the unemployment rate, the inflation rate, oil price changes, the fiscal surplus, the real effective exchange rate, and the import prices. The statistical significance of the coefficients is robust to the number of lags of instruments.

Table 5 suggest that the overconfidence indicator is significantly and positively associated with inflation expectations, as measured by the 20-Year breakeven inflation rate, and with a similar economic magnitude. Hence, a one SD increase of the overconfidence indicator is associated with a 0.25 SD increase of inflation expectations. Regarding the rest of the macroeconomic variables, the coefficients related to the output growth, the oil prices, the fiscal surplus, and the inflation targeting regime have the same value and significance as in the baseline model (see Table 1). Nevertheless, some differences are worth highlighting for the unemployment rate, which is not significantly associated with inflation expectations, and the real exchange rate, and the import prices, which have a significant and negative relationship with inflation expectations.

The findings of this subsection thus show that the relationship between the overconfidence indica-

tor and inflation expectations is robust to the measure chosen to compute inflation expectations, i.e., survey-based and market-based measures. Hence, this confirms that an overconfident Fed chair is significantly associated with higher inflation expectations.

### V.3 Further robustness tests

Finally, I provide additional robustness tests related to the frequency, the timing and the nature of the data used in the empirical specifications (see table 12 in the Appendix):

- *Data at a quarterly frequency*

While the overconfidence indicator is computed on a monthly basis, the inflation and unemployment forecasts employed are only available at a quarterly frequency. Given the importance of timing to the overall identification strategy, I make a robustness test using data at quarterly frequency in the first step, eq. (2), and the second steps, eqs. (3) and eqs. (4).<sup>24</sup> The results show the overconfidence indicator is still positively (negatively) and significantly related to inflation (unemployment) expectations of market participants.

- *Controlling for the timing of publication of the SPF forecasts*

Bauer and Swanson (2020) show that both the Fed and the private sector respond to the same public news. Hence, the timing of publication of the SPF forecasts important to analyze the relationship between Fed chair’s overconfidence and market expectations of inflation and unemployment. To make sure that any overconfidence level of the Fed chair recorded after the release of the survey is not affected by the survey release itself, I realize an additional robustness test. Specifically, (i) I identify the exact release date of each SPF at every quarter  $q$ , and (ii) I relate the monthly overconfidence indicator with the SPF forecasts corresponding to quarter  $q$  before the release date of the SPF.<sup>25</sup>

The results show that even when considering the release date of the SPF forecast in the empirical procedure, the relationship between the media-based proxy of Fed chair’s overconfidence and inflation (unemployment) expectations is positive (negative) and significant.

- *Controlling for correlation between unemployment and output*

It is well-known that the unemployment rate and the economic growth are highly correlated and are usually not introduced simultaneously in regressions. For instance, in Taylor-type reactions functions the existing literature have used them as alternatives, with the level of the output gap used in Clarida et al. (2000) and the unemployment rate gap used in Blinder and

<sup>24</sup>Given the strong inertia of some variables included in the unemployment equation, I remove the tax wedge between labor cost and take-home pay, the minimum wage, the employment protection legislation and the product market regulation, when estimating eq. (4) at a quarterly frequency.

<sup>25</sup>For instance, the release date of the SPF for the first quarter of 1999 is February 22. Therefore, the overconfidence level related to this quarter includes the months of January and February 1999, while the overconfidence expressed by the Fed chair on March 1999 is related with the SPF published in the second quarter of 1999.

Reis (2005). Therefore, I conduct a robustness test excluding either the unemployment forecasts when computing the exogenous component of the overconfidence indicator. I include the residuals obtained in the first step in eqs. (3) and (4). The results show that the Fed chair's overconfidence is positively (negatively) associated to inflation (unemployment) expectations of financial market participants.

- *Controlling for the SPF forecast horizons*

I conduct a robustness test excluding several forecast horizons for inflation, unemployment and output growth in the first step. I find that the relationship between the Fed chair's overconfidence and the expectations of market participants is robust to the number of forecasts horizons chosen in the first step.

## Conclusion

Drawing on the theoretical and empirical evidence showing the importance of central bankers' personality and communication for the effectiveness of their monetary policy decisions, this paper uses a media-based proxy to compute a measure of Fed chair's overconfidence for the period 1999M01-2017M07, the overconfidence indicator. As a second step, I orthogonalize the overconfidence indicator from the economic and financial conditions that may affect it, and I consider the residual as the exogenous component of the overconfidence indicator. The latter is supposed to reflect media coverage and, thus, market perception of a specific dimension of the Fed chair's overconfidence that is not affected by the economic environment. As a final step, I examine the relationship between the exogenous component of the overconfidence indicator and market expectations of inflation and unemployment using the General Method of Moments. Our results show that an overconfident Fed chair is associated with higher inflation expectations and lower unemployment expectations. These findings are robust to (i) the macroeconomic forecasts used to extract the exogenous component of the overconfidence indicator (the Survey of Professional Forecasters and the Greenbook forecasts) and (ii) an alternative proxy of inflation expectations. These results thus shed some new light on the importance of central bankers' communication for the effectiveness of their monetary policy decisions.



## Appendix

Table 6: Frequency of the keywords

| Keywords       | Fequency |
|----------------|----------|
| confident      | 140      |
| optimistic     | 358      |
| overoptimistic | 14       |
| cautious       | 267      |
| conservative   | 9        |
| steady         | 12       |
| pessimistic    | 16       |
| gloomy         | 21       |
| not confident  | 13       |
| not optimistic | 12       |

This table reports the number of words used in the articles and published in *The Wall Street Journal*, *The New York Times*, the *Financial Times* and *The Economist* to describe the Fed chair during the period 1994M01-2017M07.

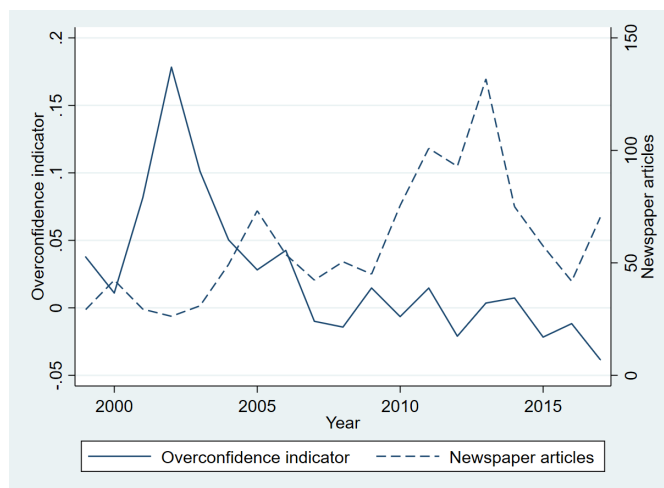


Figure 4: The overconfidence indicator and the number of newspaper articles mentioning the confidence of the Fed chair

Table 7: Extracting the Exogenous Component of the Overconfidence Indicator

|                | Coefficient | Standard error |
|----------------|-------------|----------------|
| $\alpha$       | -0.31**     | (0.15)         |
| $\delta$       | 0.0008      | (0.004)        |
| $\beta_1$      | -0.001      | (0.004)        |
| $\beta_2$      | -0.001      | (0.007)        |
| $\beta_3$      | -0.019      | (0.032)        |
| $\beta_4$      | 0.04        | (0.039)        |
| $\beta_5$      | 0.004       | (0.045)        |
| $\beta_6$      | 0.008       | (0.053)        |
| $\gamma_2$     | -0.005      | (0.01)         |
| $\gamma_3$     | 0.005       | (0.015)        |
| $\gamma_4$     | 0.005       | (0.028)        |
| $\gamma_5$     | -0.009      | (0.034)        |
| $\gamma_6$     | 0.065*      | (0.033)        |
| $\eta_1$       | -0.01**     | (0.05)         |
| $\eta_2$       | 0.21        | (0.2)          |
| $\eta_3$       | -0.23       | (0.45)         |
| $\eta_4$       | 0.29        | (0.53)         |
| $\eta_5$       | 0.10        | (0.51)         |
| $\eta_6$       | -0.27       | (0.27)         |
| $\theta$       | 0.001       | (0.001)        |
| $\zeta$        | 0.0006      | (0.0006)       |
| Adj. $R^2$     | 0.15        |                |
| D.W. statistic | 1.91        |                |
| Observations   | 224         |                |

Dependent variable:  $OI_t$ . Estimates are obtained using OLS with robust standard errors. \*, \*\* denote significance at the 10% and 5% level, respectively. Standard errors in between parentheses.

Table 8: Summary Statistics - Overconfidence and inflation expectations

|                           | Mean  | Median | St. dev. | Min    | Max    |
|---------------------------|-------|--------|----------|--------|--------|
| $\tilde{E}_t \pi_{t+1}^e$ | 2.16  | 2.17   | 0.27     | 1.51   | 2.71   |
| $Y_t$                     | 2.08  | 2.2    | 1.73     | -4.06  | 5.26   |
| $U_t$                     | 6.04  | 5.5    | 1.76     | 3.8    | 10     |
| $Oil_t$                   | 59.75 | 54.51  | 28.7     | 12.01  | 133.88 |
| $Fiscal_t$                | -0.12 | 0.03   | 1.24     | -5.63  | 4.01   |
| $REER_t$                  | -0.11 | -0.41  | 4.54     | -9.33  | 11.84  |
| $CPI_t$                   | 1.99  | 2.06   | 0.45     | 0.60   | 2.93   |
| $M_t$                     | 1.72  | 1.93   | 7.28     | -19.11 | 21.39  |

Table 9: Correlation table - Overconfidence and inflation expectations

|                | Inf. exp. | L.inf. exp. | CPI   | Output | Unemp. | Oil prices | Exchange rate | Inf. target | Fiscal surplus | Import prices |
|----------------|-----------|-------------|-------|--------|--------|------------|---------------|-------------|----------------|---------------|
| Inf. exp.      | 1         |             |       |        |        |            |               |             |                |               |
| L.inf. exp.    | 0.97      | 1           |       |        |        |            |               |             |                |               |
| CPI            | 0.76      | 0.77        | 1     |        |        |            |               |             |                |               |
| Output         | 0.35      | 0.29        | -0.06 | 1      |        |            |               |             |                |               |
| Unemp.         | -0.75     | -0.75       | -0.63 | -0.41  | 1      |            |               |             |                |               |
| Oil prices     | -0.23     | -0.22       | -0.23 | -0.26  | 0.53   | 1          |               |             |                |               |
| Exchange rate  | -0.15     | -0.14       | 0.17  | -0.25  | -0.17  | -0.46      | 1             |             |                |               |
| Inf. target    | -0.23     | -0.24       | -0.08 | 0.01   | 0.05   | 0.31       | 0.37          | 1           |                |               |
| Fiscal surplus | 0.17      | 0.16        | 0.01  | 0.56   | -0.17  | 0.2        | -0.31         | 0.33        | 1              |               |
| Import prices  | 0.39      | 0.38        | 0.03  | 0.34   | -0.04  | 0.36       | -0.73         | -0.37       | 0.31           | 1             |

Table 10: Summary Statistics - Overconfidence and unemployment expectations

|                          | Mean  | Median | St. dev. | Min   | Max   |
|--------------------------|-------|--------|----------|-------|-------|
| $\tilde{E}_t U_{t+12}^e$ | 5.98  | 5.33   | 1.64     | 4.1   | 9.8   |
| $CPI_t$                  | 1.99  | 2.06   | 0.45     | 0.60  | 2.93  |
| $Y_t$                    | 2.08  | 2.2    | 1.73     | -4.06 | 5.26  |
| $Union_t$                | 11.69 | 11.56  | 0.83     | 10.65 | 13.36 |
| $PubExp_t$               | 0.55  | 0.43   | 0.26     | 0.28  | 1.23  |
| $Tax_t$                  | 30.71 | 30.58  | 0.56     | 29.84 | 31.71 |
| $MinWage_t$              | 6.17  | 6.15   | 0.99     | 5.15  | 7.25  |
| $Interest_t$             | 1.60  | 1.12   | 1.83     | -1.42 | 5.15  |
| $PMR_t$                  | 1.09  | 1.17   | 0.08     | 1.004 | 1.17  |
| $EPL_t$                  | 1.55  | 1.58   | 0.07     | 1.43  | 1.62  |

Table 11: Correlation table - Overconfidence and unemployment expectations

|                | Unemp. exp. | L.unemp. exp. | Output | CPI   | EPL   | Union | Tax wedge | PMR  | Pub. exp. | Interest shock | Min. wage |
|----------------|-------------|---------------|--------|-------|-------|-------|-----------|------|-----------|----------------|-----------|
| Unemp. exp.    | 1           |               |        |       |       |       |           |      |           |                |           |
| L.unemp. exp.  | 0.95        | 1             |        |       |       |       |           |      |           |                |           |
| Output         | -0.52       | -0.48         | 1      |       |       |       |           |      |           |                |           |
| CPI            | -0.55       | -0.57         | -0.08  | 1     |       |       |           |      |           |                |           |
| EPL            | 0.69        | 0.7           | -0.39  | -0.46 | 1     |       |           |      |           |                |           |
| Union          | -0.32       | -0.35         | 0.02   | 0.36  | -0.73 | 1     |           |      |           |                |           |
| Tax wedge      | -0.37       | -0.35         | 0.23   | -0.08 | 0.06  | -0.31 | 1         |      |           |                |           |
| PMR            | 0.34        | 0.33          | -0.31  | 0.01  | 0.52  | -0.02 | 0.12      | 1    |           |                |           |
| Pub. exp.      | 0.69        | 0.66          | -0.7   | -0.17 | 0.36  | 0.23  | -0.53     | 0.36 | 1         |                |           |
| Interest shock | 0.12        | 0.08          | -0.77  | 0.37  | -0.16 | 0.50  | -0.28     | 0.13 | 0.62      | 1              |           |
| Min. wage      | 0.67        | 0.69          | -0.26  | -0.51 | 0.96  | -0.81 | 0.17      | 0.48 | 0.19      | -0.3           | 1         |

Table 12: Further robustness tests: results

|                      | Inflation expectations  | Unemployment expectations |
|----------------------|---|---------------------------|
|                      | <i>Data at quarterly frequency</i>                                    |                           |
| $\varepsilon_{OI_t}$ | 0.24***   | -0.3**                    |
|                      | <i>Controlling for the timing of publication of the SPF forecasts</i> |                           |
| $\varepsilon_{OI_t}$ | 0.08***   | -0.02***                  |
|                      | <i>Controlling for correlation between unemployment and output</i>    |                           |
| $\varepsilon_{OI_t}$ | 0.03***   | -0.08***                  |
|                      | <i>Controlling for the SPF forecasts horizons</i>                     |                           |
| $\varepsilon_{OI_t}$ | 0.04***   | -0.05***                  |

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