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Abstract

This paper has two main objectives. The first objective is to propose a new indicator of core inflation, which is obtained by cleaning month on month relative price fluctuations from overall price changes and idiosyncratic dynamics. We use a factor model with the subcomponents of CPI inflation to extract this new core indicator. The second objective is to evaluate the performance of this new indicator and two widely used core indicators for Turkey, H and I, by the help of four criteria designed to assess the informativeness and the predictive power of these series for the analysis of overall inflation. The results suggest that the new indicator, Fcore, is a good measure of core inflation and a useful tool for policy analysis. Moreover, the core indicator H is a more informative measure of core inflation compared to core indicator I.

KEY WORDS: Inflation; Core inflation; Factor model; Bayesian time series.

1 Introduction

The term *core inflation* is widely used by academics, central bankers and economic analysts as a measure of inflation that excludes prices of certain items or some components of price series with volatile movements. The rationale is that unusual changes in prices are unlikely to be related to the overall inflation trend. The concept of core inflation

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was first introduced in 1975 by Robert J. Gordon, as the aggregate price growth excluding food and energy which is still one of the most commonly used measure. Although the need for core inflation measures is widely accepted in the literature, there is no consensus on how to measure them. The preferred core and overall inflation measures by the Federal Reserve in the U.S. are the core and overall Personal Consumption Expenditures (PCE) price indices, both of which are chained dollar indices. Before 2000, the Federal Reserve Board's semiannual monetary policy reports to Congress were using the CPI for the Board's outlook for inflation. However, since then, the Board describes the inflation outlook in terms of PCE.

There are at least nine core inflation measures published every month for the Turkish economy, each of which excludes different items from the basket of overall inflation. However, many policymakers depend on two of these core measures, H and I. The core measure H excludes unprocessed food products, energy, alcoholic beverages, tobacco products and gold from the consumer price index (CPI) whereas the measure I excludes food, energy, beverages (both non-alcoholic and alcoholic), tobacco products and gold.

In this study, we propose a new measure of core inflation based on a factor model, an econometric modeling technique with various possible applications in economics these days. Then, together with this new measure which we call *Fcore*, we analyze two most commonly used core inflation measures for the Turkish economy, as mentioned earlier H and I. We provide a comparative performance analysis of all the three core measures. To this end, we apply some criteria to assess their informativeness and usefullness for the analysis of overall inflation. We select criteria mainly to test their predictive ability and understand each core measure's information content with respect to current and future inflation.

Our results indicate that all three indicators H, I and Fcore are good measures of core inflation in terms of tracking the inflation trend, display a close relationship with overall inflation, and have predictive power within a two year horizon. Moreover, each indicator is weakly exogenous. That is, when overall inflation deviates from core inflation (call this "trend inflation"), it converges back to the core inflation; however this is not true when core inflation deviates from the overall inflation. These results are important for policymakers, academics and analysts since all rely on core measures to understand the underlying trend in target inflation and future inflation movements. Since changes in monetary policy affect inflation and also economic activity with a lag, monetary policy authorities are forward looking and policy makers can not influence inflation and economic activity in the short-run. Therefore policy makers want to understand the changes in inflation trend and future inflation dynamics in the medium-run and long-run.

In the literature, there are a few studies similar to ours. Clark (2001) compares the five measures of core inflation such as trimmed mean, median CPI and CPI excluding a small basket consisting of different items. He finds that the CPI excluding just energy and the trimmed mean appear superior to the rest. The closest work to ours is Reis and Watson (2010) where they derive a factor-based core inflation and relative price series, and explore interpretations for each of these components. Their results indicate that their core measure is barely correlated with money growth while it has a correlation of around 0.5 with nominal interest rates. Cristadoro, Forni, Reichlin and Veronese (2003) also use a factor model to extract a common component that can represent a core inflation measure. However, their extraction methodology is different from ours. Although there are more papers such as Bryan and Cecchetti (1994), Rich and Steindel (2007) on comparison of measures of core inflation, their focus is somewhat different. Their main focus is problems with measuring core inflation comparison of popular measures of core inflation whereas we propose a new core inflation indicator for the Turkish economy and provide a comparative analysis with existing measures which policy makers widely use in their policy decisions.

There is no consensus on either how to measure the core inflation indicator or how to define the core inflation indicator. Perhaps the most popular method "exclusion of certain price categories from the overall inflation rate" is also as controversial as any method that has been proposed or applied in the literature or in practice. Wynne (2008) is a nice survey on these issues and discussions. We do not claim that the method proposed in this paper is the best way and best definition to derive the core inflation. Using factor models, we just redefine a method that is discussed in the literature –the most recent example is Reis and Watson (2010)–, and show that, by employing some criteria taken from the literature, the proposed measure is quite useful for policy makers and economists and does a relatively better job compared to "exclusion" methods.

What is it we want a core inflation statistic to measure? There are different answers by different researchers and practitioners to this question, and various attempts to estimate a core inflation statistic. The older concepts of core inflation used to follow a behavioral approach such as cost of living whereas the newer approaches adopt the monetary concept of inflation and apply more statistical methods for core inflation analysis. Some examples of core inflation indicators are as follows. One common measure of core inflation excludes the effects of changes in indirect taxes from the overall inflation rate (Donkers et al. (1983)). The most popular measure applied by most central bankers is the "ex. food and energy" approach. However, these days more statistical measures are applied such as the factor model based approaches proposed by Bryan and Cecchetti (1993) and Reis and Watson (2010).

The paper is organized as follows. Section 2 outlines the factor model and discusses the first results. Section 3 presents the major findings of this study. The concluding remarks make up the final section.

2 Using Factor Models for Measuring Core Inflation: A New Core Inflation Indicator for Turkey

In this section, we explain the methodology to derive a new measure of core inflation. The method is a version of a factor model, an econometric modeling technique applied to many practical questions in economics these days. Before describing the model, we want to give a brief discussion to clarify why deriving a core indicator from a factor model makes sense and how this core indicator can be useful.

2.1 Why Use Factor Models?

Why do we use a factor model to extract a factor-based core inflation indicator? First, this type of core inflation definition is not the first and only definition in the literature. Many definitions and ideas support the core inflation indicator proposed in this study (see Bryan and Cecchetti (1993), Reis and Watson (2010), Clements and Izan (1987)). Reis and Watson (2010)'s paper describes a theoretical model that can support the idea of factor models in core and relative inflation analysis. They show that the structural macro models give rise to an analogous representation we will describe in this section for studying the components of inflation, where the components depend on the various shocks in the macro model.

Second, as discussed in Reis and Watson (2010), the component of core inflation in the model corresponds to the famous thought experiment that economists have used for more than hundred years: "imagine that all prices increase in the same proportion, but no relative price changes." An example of how this proportionate increase can happen is an exogenous but anticipated increase in the money supply. This increase in money supply will lead the price-setters to raise their prices almost in the same proportion. In addition to the Reis-Watson's paper, Cristadoro, Forni, Reichlin and Veronese (2003) shows empirical evidence to support these ideas. Todd (1997) and Bryan and Cecchetti (1993) also agree on this concept, saying that core inflation should capture just the component of the price change that is common to all items and exclude changes in the relative prices of goods and services.

Third, Bryan and Cecchetti (1993) gives statistical reasons why a factor model can be a solution method to measure the inflation in a simple but useful manner. They provide solutions for the two problems associated with using the CPI to measure inflation. The first problem is related to the transitory noise due to nonmonetary shocks, for example, sector-specific shocks and sampling errors. The second problem concerns two potential biases: The first is the weighting bias that comes from the expenditure-based weighting method in the CPI inflation and the second is a measurement bias that is created by persistent errors in measuring certain prices. In Bryan and Cecchetti (1994), they study the first of these problems. In Bryan and Cecchetti (1993), their objective is to compute a reduced-bias estimate of inflation from the CPI series and they apply a factor model to handle the second of the given problems because the index derived from a factor model is an unbiased estimate of the common component to each of the individual price changes. In both papers, their reasonings and discussions apply to the measurement of core inflation as well.

In the next section, we define the factor model for the estimation of a core inflation indicator. Some additional advantages of the proposed model structure are also provided in this section.

2.2 The Factor Model

The factor model employed in this study is an extension of Geweke and Zhou (1996) and a Bayesian version of Stock and Watson (1998) and Bai (2003). A similar methodology defined in this section to apply factor models on core inflation analysis is introduced in Reis and Stock (2010). Let $\mathbf{Y} = (\mathbf{y}_1, \mathbf{y}_2, ..., \mathbf{y}_T)$ be the $N \times T$ matrix of observable variables that represent inflation numbers in sectoral groups $i = 1, ..., N$ for $t = 1, ..., T$. Then the factor model is formulated as

$$\mathbf{y}_t = \boldsymbol{\beta}_0 + \boldsymbol{\beta}\mathbf{f}_t + \boldsymbol{\varepsilon}_t \tag{1}$$

where $\boldsymbol{\beta}_0$ is $N \times 1$ vector of deterministic coefficients, $\boldsymbol{\beta}$ is $N \times r$ matrix of factor loadings, $\mathbf{f}_t$ is $r \times 1$ vector of factors and $\boldsymbol{\varepsilon}_t$ is $N \times 1$ vector of idiosyncratic factors. In this study, we define two common factors $\mathbf{f}_t = (f_t^{core} f_t^{rel})'$, a core inflation factor and a relative price factor, respectively. The core inflation factor, f_t^{core}, represents the price changes that are common to all sectoral groups and relative price factor, f_t^{rel}, is only common to specific sectoral groups. The idiosyncratic component determines the price-specific or sector-specific dynamics. Since we identify the factors by core inflation and relative price factors, we need to put some identification restrictions on the factor loading matrix. The factor loading on the core inflation is unity by definition; therefore, the first column of $\boldsymbol{\beta}$ is a vector of ones.

To complete the model we need to define the factor equation (state equation) of the model. Common factors, $\mathbf{f}_t$, follow an autoregressive process:

$$\mathbf{f}_t = \mathbf{B}_0 + \mathbf{B}(L)\mathbf{f}_{t-1} + \mathbf{e}_t \tag{2}$$

where $\mathbf{B}(L)$ is a matrix of factor autoregressive coefficients.

We have the following further assumptions to complete the model:

$$\boldsymbol{\varepsilon}_t \overset{i.i.d.}{\sim} N(\mathbf{0}, \boldsymbol{\Sigma}) \qquad \mathbf{e}_t \overset{i.i.d.}{\sim} N(\mathbf{0}, \mathbf{D}) \qquad E(\boldsymbol{\varepsilon}_s \mathbf{e}_t') = \mathbf{0} \tag{3}$$

where $\boldsymbol{\Sigma}$ and $\mathbf{D}$ are diagonal positive definite matrices. As in most of the factor analysis literature, we also assume that factors are uncorrelated and their error variances are normalized to one as it is done in Kose, Otrok and Whiteman, (2003). We assume that only one lag of the factor is included.

There are several advantages of the methodological setup applied in this paper. We will rewrite the model first and explain two advantages of this model setup. Let y_{it} be the i^th component of inflation at time t. When we set $\boldsymbol{\beta}_0 = \mathbf{0}$, the factor model becomes

$$y_{it} = f_t^{core} + \beta_i f_t^{rel} + \varepsilon_{it} \tag{4}$$

where β_i is the factor loading on the i^th cross-sectional variable and ε_{it} is the i^th idiosyncratic factor at time t. For each factor j where $j \in \{core, rel\}$, we can rewrite the factor structure in (2) as follows

$$f_t^j = b_{j0} + \sum_{s=1}^{p} b_{js} f_{t-1}^j + e_t^j \tag{5}$$

where roots of $(1 - \sum_{s=1}^{p} b_{js} L^s) = 0$ lie outside the unit circle.

Before choosing a measure of core inflation we should specify what the core inflation measure is for. Eckstein (1981) defines the core inflation as the "trend rate of increase of the price of aggregate supply," which is the first formal definition of core inflation. One advantage of our methodology is a popular way to measure the trend rates for macroeconomic variables. We simply derive the trend rate of overall inflation to track the overall inflation path so we filter the cyclical component of the inflation to end up with the trend component because cyclical component is mainly the relative price component. Let the weight on each component of inflation be w_i. Then $\pi_t = \Sigma_i w_i y_{it}$. This leads us to $\pi_t = f_t^{core} + \Sigma_i w_i \beta_i f_t^{rel} + \Sigma_i w_i \varepsilon_{it}$. So we are extracting the trend component from the subcomponents of inflation.

The systematic changes in prices are not captured only by the core inflation component f_t^{core} but also by the relative price component f_t^{rel}. While the geometric mean models of core inflation requires the systematic component of each price change to be the same and leaves any long-term changes to relative prices, in the proposed factor model we extract the core inflation, relative price and idiosyncratic components of the prices. Therefore the systematic changes in prices can be captured by either the core or the relative price components depending on their time series dynamics.

One final note is about the estimation method. Bayesian methods are applied to estimate the latent factors and model parameters.

2.3 A Brief Look at the Core Measures

We employ twelve subcomponents of CPI inflation to derive the Fcore series and use the H and I measures reported by Turkish Statistical Institute (TUIK). All the CPI, H, I and Fcore series are seasonally adjusted in all the analysis of this study. The series used in the factor model are the monthly changes of twelve subcomponents and the sample range for all the series is 2003:M1 through 2010:M4. There is more information available in the Appendix A about the data.

The first factor described in the model section is the core inflation factor (f_t^{core}) and the second factor is the relative price factor (f_t^{rel}). However, we use a generic one-fit-for-all notation for all the core inflation, which is π_t^{core}, and relative price measures, which is π_t^{rel}, in most of the sessions and discussions of the paper. Our main interest in this research is the first factor, which is our new core inflation measure. Therefore, the discussions in the next sections are mainly based on the first factor.

To better understand what the core measures we consider do, we would like to present a discussion on the time series of the core measures. Before we start this discussion, it would be better to explain the two major differences between the Fcore and two popular measures of core inflation. First, the ingredients are different, that is, H and I excludes certain items whereas Fcore excludes sector-specific or price-specific changes or shocks in the prices but includes all the items. Second, Fcore assumes 'almost' equivalent increases in the price levels at around the 'same' time period. One should examine the results of this research under the light of these differences.

In figure 1, rather than presenting the monthly series we present three month moving averages of the three measures, H, I and Fcore, in order to have less volatile smoothed series and easy to understand pictures. All three measures have a close dynamic pattern over the 2003:M4-2010:M4 period. This figure can give us some useful information about the prices. Between May 2003 and March 2004, the core indicator I stays higher than H and Fcore while the core indicator H is larger than I and Fcore from September 2006 to June 2008. Looking at the definitions of H and I, we can see that the rise in the prices of at least some of the items excluded in these measures dominates the basket of the CPI prices so that they stay above the level of Fcore (remember that Fcore represents 'almost' equivalent price changes in all items). In the rest of the months (from April 2004 to August 2006 and from July 2008 to April 2010), the new measure Fcore is mostly higher than H and I. This indicates –for these months– that there is an overall rise in almost all prices which also includes the items excluded in H and I, that is, including food, energy, beverages (both non-alcoholic and alcoholic), tobacco products and gold as well. Figure 2 provides the annual rate of CPI inflation, annual rate of H and implied annual rate for Fcore. The comparison between H and Fcore in this figure is similar to three month averages in figure 1. In addition to this, one can observe that, since August 2005, in almost every month the core inflation H is below the overall CPI inflation. Nearly in these periods, Fcore is also below the CPI inflation except for the period Jan 2009-May 2009. At this point, we skip the detailed analysis on the figures to focus on the main purposes of this study.

3 Evaluating Measures of Core Inflation

We provide a comparative performance analysis of all three core indicators, H, I and Fcore. To this end, we apply some criteria to assess their informativeness and predictive power for the analysis of overall inflation. We select the criteria mainly to test their predictive content and to understand how much information each core indicator carries with respect to current and future inflation.

How can we assess the usefulness of core inflation indicators? We apply four criteria that answer four questions. How does each core indicator and inflation relate to each other in the short-, medium- and long-run? How well does each indicator track the inflation trend? How well does each indicator predict future overall inflation? Can inflation predict the core inflation indicator, that is, is core inflation weakly exogenous? We will try to answer each of these questions for evaluating the performance of each core indicator.

3.1 Dynamic Correlation Analysis

We apply the dynamic correlation (a measure of comovement for economic variables) developed by Croux, Forni and Reichlin (2001) to the relation between inflation and the core measures. In Table 2, we provide the dynamic correlation results. The results can be read as the short-run, medium-run and long-run relations that correspond to 0-1.5 years, 1.5-8 years and 8-plus years, respectively.

The application of dynamic correlation reveals that the inflation and the core measures are more related as time passes and all the core measures are positively related with inflation in all horizons explained above. According to three horizons considered, H, I and Fcore have a dynamic correlation of 0.37, 0.39 and 0.68, respectively, in the short-run whereas these correlation values rise to 0.59, 0.54 and 0.70 in the medium-run which is also referred as the "business cycle" period in the literature. It is quite clear that Fcore is highly related to the CPI inflation. One reason for this might be the content of Fcore: because the subcomponents excluded in H and I are also included in the derivation of Fcore, we can expect closer relation between Fcore and the CPI inflation. However, this is another advantage of the Fcore measure as well.

3.2 Deviation from Trend Inflation

Policymakers, economists and analysts prefer a core inflation indicator that neither understates nor overstates the long-term inflation trend and excludes short-term relative price dynamics. If the core inflation satisfies the following conditions, we can say it tracks the trend rate of inflation well. As discussed in Rich and Steindel (2007), a core indicator should have a mean comparable to the target inflation series over a long period of time. Moreover, the standard deviation of the core should be smaller than that of inflation because it is the smoothed measure of inflation after omitting relative shocks. Finally, a core measure should display a close coherence to the underlying trend in the target inflation series. This final condition is captured by the dynamic correlation method presented in the previous section.

By definition, a good measure of core inflation should be more stable and less volatile than the inflation itself and the average rate of core inflation should match the average rate of overall inflation. This can be seen in Table 1. According to Table 1, the monthly inflation mean is 0.78 and its standard deviation is 0.55. H and I have a mean of 0.62 and 0.60, respectively, and standard deviations of 0.36 and 0.39. Among the three core indicators, Fcore has the mean (0.65) closest to that of inflation and the smallest standard deviation (0.33). Thus, Fcore with the closest long-run mean has also the smallest deviation from the long-run inflation mean. Then comes the core indicator H. Combining the results of dynamic correlation analysis with these two results, we can conclude that Fcore does a better job in tracking the trend of inflation.

3.3 Predicting Future Inflation

In addition to tracking trend inflation, a good measure should help predict future overall inflation. One widely accepted approach to study the predictive ability is based on the idea that if current inflation deviates from the underlying trend rate, overall inflation should return back to the path of trend inflation. While the formulation of the model we present for predictability analysis is simple, it is consistent with the beliefs of some policymakers, economists and analysts who take changes in core inflation as signals of future changes in overall inflation.

The ability of core inflation to predict future overall inflation is quantified by using monthly data to estimate the regression:

$$\pi_{t+h} - \pi_t = \alpha + \lambda(\pi_t - \pi_t^{core}) + \varepsilon_t \tag{6}$$

where π_t denotes the inflation computed from the CPI index and π_t^{core} is the core inflation measure. Moreover, ε_t is the error and h denotes the horizon. What does this regression model tell us? Assuming that the core inflation corresponds to the underlying inflation trend, overall inflation should fall (rise) when current inflation is above (below) the core.

The predictive content in alternative measures of core inflation can be evaluated from this regression and is presented in Tables 3 and 4. The regression R squares are given in Table 3. The core measures H and I offer significant explanatory power for future inflation. However, the core measure with the most predictive content for future inflation is Fcore. Fcore has an average R square of 0.38 for the horizons of 1-24 months and 0.44 for the horizons of 12-24 months. These numbers are 0.34 and 0.39 for H, and 0.31 and 0.35 for I.

A nice attractive feature of equation (6) is that using some ideal or credible definitions of successful measure of core inflation, one can obtain restrictions on the equation parameters. As discussed in Rich and Steindel (2007), for example, suppose Bryan and Cecchetti's (1994) definition of core inflation is adopted as the ideal core measure, that is, "the component of price changes that is expected to persist over medium-run horizons of several years." This definition implies $\pi_t^{core} = E(\pi_{t+h}|I_t)$ where E is the expectations operator and I_t is the information on price changes through time period t. Bryan and Cecchetti's definition will hold under the joint restrictions $\alpha = 0$ and $\lambda = 1$. The value of λ indicates whether the core deviation is correctly measuring the magnitude of the transitory changes in inflation. If the value of λ is greater (less) than unity (in absolute value), then the deviation from core $(\pi_t - \pi_t^{core})$ understates (overstates) the magnitude of current transient because it understates (overstates) the changes in inflation.

In Table 4, the regression coefficients are reported. All coefficients are highly significant and have values changing around unity. If we follow the definition of Bryan and Cecchetti (1994), the core indicator Fcore understates whereas the indicator I overstates the transitory inflation movements. However, the indicator H has a better capture of the transitory movements in inflation.

3.4 Predicting Future Core Inflation

In the previous section, we explored how well each indicator predicts future overall inflation. Now we need to reverse the question to make sure that the overall inflation converges to core inflation but not the other way around. Can inflation predict the core inflation indicator, that is, is core inflation weakly exogenous?

Using the following equation, we can check if core inflation is weakly exogenous:

$$\pi_{t+h}^{core} - \pi_t^{core} = \alpha^{core} + \lambda^{core}(\pi_t - \pi_t^{core}) + \varepsilon_t^{core} \tag{7}$$

where π_t is the CPI inflation and π_t^{core} is the core inflation. Moreover, ε_t^{core} is the error and h denotes the horizon.

The results of this model are presented in Table 5 and Table 6. R-squared values for Fcore, H and I are quite small, with R squares of Fcore and I slightly bigger. The coefficient λ^{core} seems to be quite insignificant at almost all the horizons h. Moreover, the estimates of λ^{core} are quite small as well relative to those values in the predictive equation for overall inflation in (6). What do these results tell us? These results tell us that none of the three core indicators converge to the target inflation, that is, each one is weakly exogenous as expected from a core indicator of inflation.

4 Concluding Remarks

Using monthly data on the subcomponents of CPI series for the Turkish economy, we estimate a measure of core inflation based on a factor model. Then we study the performance and usefulness of the resulting core indicator, Fcore, and two popular core indicators, H and I. The results of this paper indicate that each core indicator performs quite well in terms of tracking the inflation trend, short-term and medium-term relation with overall inflation and predictive content. Moreover, we find that each indicator is weakly exogenous. That is, when inflation deviates from core inflation, it converges back to the core inflation; but not the other way around. One important finding is that the proposed measure of core inflation, Fcore, does a better job than the core measures, H and I, in almost all of our analysis. An interesting future work will be to extend the list of core inflation measures and run a more comprehensive analysis using more sophisticated methods whereas we intend to use less sophisticated methods because simple methods are more acceptable in the core inflation studies of central banks.

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Appendix

A Analysis of the Factor Model for Core Inflation Indicators

We employ twelve subcomponents of CPI inflation to derive the Fcore series and use the H and I measures reported by Turkish Statistical Institute (TUIK). All the CPI, H, I and Fcore series are seasonally adjusted in all the analysis of this study. The series used in the factor model are the monthly changes of twelve subcomponents and the sample range for all the series is 2003:M1 through 2010:M4.

Twelve subcomponents of CPI inflation used in the analysis and their weights in the CPI basket are reported in the following table. All factor models currently used in the literature estimate the factor loadings independent of any weights.

Subcomponents of Inflation and Their Weights

Grouping	Weights
Food-NonAlc.	27.60
Alcoholic B.	5.31
Clothing-Shoe	7.30
Housing etc.	16.83
Furniture etc.	6.78
Health	2.55
Transportation	13.90
Communication	4.94
Entertainment	2.83
Education	2.48
Rest.-Hotel	5.51
Other Com.-Ser.	3.97

Subcomponents of CPI inflation used in the analysis and their weights in the CPI basket are presented.

Table 1: ALL INFLATION MEASURES

Mean and Standard Deviation

Statistic	Inflation	H	I	Fcore
Mean	0.78	0.62	0.60	0.65
Std. Deviation	0.55	0.36	0.39	0.33

Mean of the core should represent the mean of inflation since relative shocks are mean-zero. Moreover, standard deviation of the core should be smaller than the inflation because it is the smoothed measure of inflation after omitting relative shocks.

Table 2: THE RELATION WITH INFLATION

Dynamic Correlation

Dyn.Corr.	Long-term	B.Cycle	Short-term
H	0.75	0.59	0.37
I	0.68	0.54	0.39
Fcore	0.76	0.70	0.68

The relation between the inflation from CPI index and core inflation measures is studied using the dynamic correlation definition of Croux, Forni and Reichlin (2001).

Table 3: PREDICTING INFLATION

Regression R Squares

Horizon	H	I	Fcore
1	0.32	0.25	0.32
3	0.26	0.20	0.35
6	0.39	0.35	0.39
12	0.36	0.38	0.41
18	0.38	0.32	0.42
24	0.37	0.29	0.48
1 to 24	0.34	0.31	0.38
12 to 24	0.39	0.35	0.44

Each entry is the R square for different horizons from the regression of future deviations of inflation on current deviations from core inflation. Last two rows are the averages taken from $h = 1$ to $h = 24$ and also from $h = 12$ to $h = 24$. Horizon is h months.

Table 4: PREDICTING INFLATION

Regression Coefficients

Horizon	*H* α	*H* λ	*I* α	*I* λ	*F-core* α	*F-core* λ
1	0.11	-0.74	0.10	-0.64	0.10	-0.88
	(0.06)	(0.12)	(0.06)	(0.12)	(0.06)	(0.14)
3	0.07	-0.74	0.06	-0.63	0.08	-1.03
	(0.07)	(0.14)	(0.07)	(0.14)	(0.06)	(0.15)
6	0.10	-1.02	0.11	-0.93	0.10	-1.21
	(0.07)	(0.14)	(0.07)	(0.14)	(0.07)	(0.17)
12	0.07	-1.04	0.09	-1.02	0.08	-1.33
	(0.08)	(0.16)	(0.08)	(0.15)	(0.08)	(0.19)
18	0.01	-0.91	0.03	-0.82	0.05	-1.18
	(0.07)	(0.14)	(0.07)	(0.15)	(0.07)	(0.17)
24	0.01	-1.06	0.02	-0.92	0.07	-1.40
	(0.08)	(0.18)	(0.09)	(0.18)	(0.08)	(0.19)

Coefficients are reported for different horizons from the regression of future deviations of inflation on current deviations from core inflation. In parenthesis are the standard deviations. Horizon is h months.

Table 5: PREDICTING CORE INFLATION

Regression R Squares

Horizon	H	I	Fcore
1	0.03	0.05	0.03
3	0.04	0.09	0.00
6	0.00	0.01	0.03
12	0.03	0.05	0.01
18	0.00	0.00	0.01
24	0.00	0.02	0.04
1 to 24	0.02	0.04	0.02
12 to 24	0.01	0.02	0.03

Each entry is the R square for different horizons from the regression of future deviations of core inflation on current deviations from inflation. Last two rows are the averages taken from $h = 1$ to $h = 24$ and also from $h = 12$ to $h = 24$. Horizon is h months.

Table 6: PREDICTING CORE INFLATION

Regression Coefficients

Horizon	H		I		F-$core$	
	α^{core}	λ^{core}	α^{core}	λ^{core}	α^{core}	λ^{core}
1	-0.03	0.10	-0.05	0.17	0.01	-0.13
	(0.03)	(0.07)	(0.04)	(0.08)	(0.04)	(0.09)
3	-0.06	0.20	-0.09	0.33	-0.01	-0.08
	(0.05)	(0.10)	(0.06)	(0.11)	(0.05)	(0.12)
6	-0.05	0.06	-0.06	0.11	-0.01	-0.19
	(0.05)	(0.11)	(0.06)	(0.11)	(0.05)	(0.14)
12	-0.11	0.19	-0.12	0.25	-0.03	-0.11
	(0.07)	(0.14)	(0.07)	(0.13)	(0.06)	(0.16)
18	-0.13	-0.02	-0.13	0.06	-0.07	-0.11
	(0.06)	(0.12)	(0.06)	(0.12)	(0.05)	(0.14)
24	-0.18	0.07	-0.20	0.16	-0.07	-0.23
	(0.07)	(0.15)	(0.07)	(0.14)	(0.06)	(0.14)

Coefficients are reported for different horizons from the regression of future deviations of core inflation on current deviations from inflation. In parenthesis are the standard deviations. Horizon is h months.

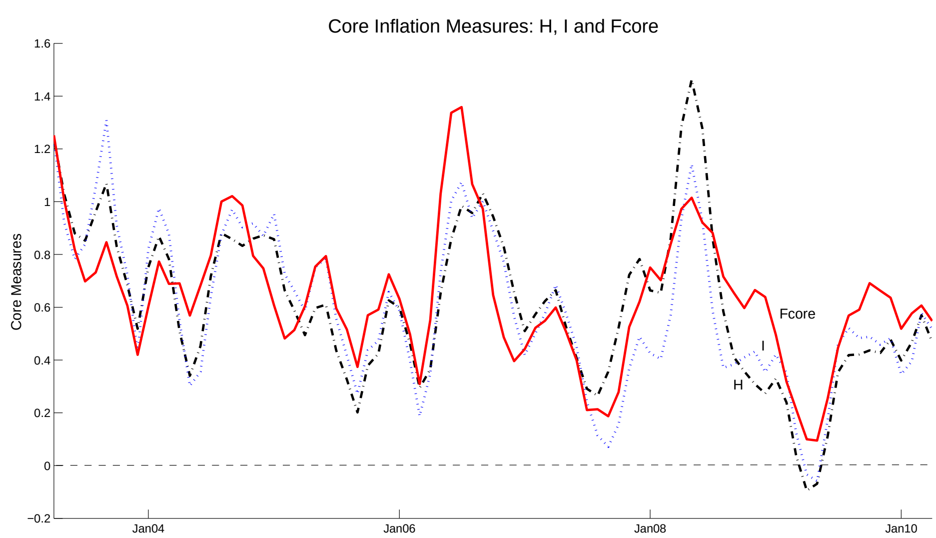

Figure 1: *Three month moving averages for the three core measures of inflation are presented for the period ranging from 2003:M4 to 2010:M4.*

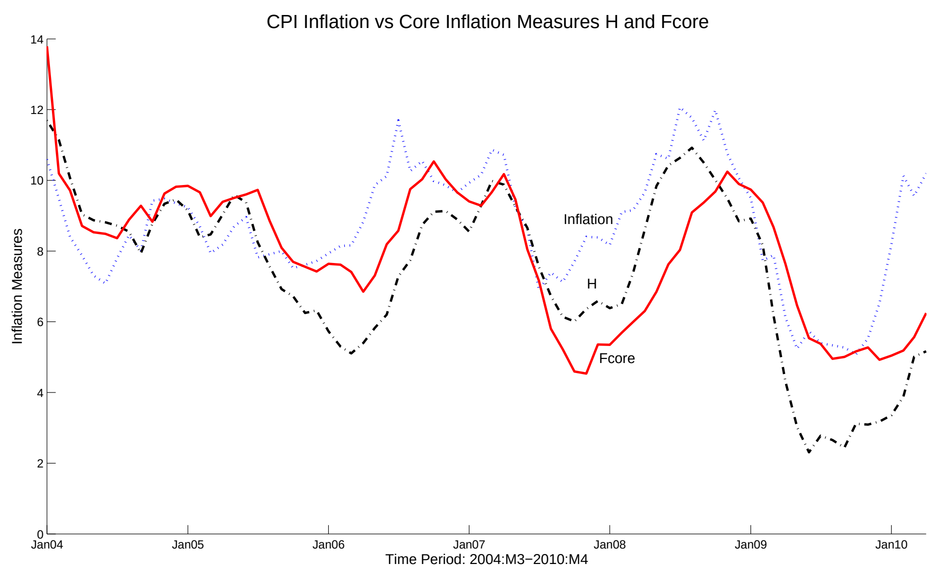

Figure 2: *Annual rates for CPI inflation and two core measures of inflation, H and Fcore, are presented for the period ranging from 2004:M1 to 2010:M4.*

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