Forecasting and tracking real-time data revisions in inflation persistence

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1 November 2011

Forecasting and Tracking Real-Time Data Revisions in Inflation Persistence

By

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Working Draft

Abstract

This paper presents three local nonparametric forecasting methods that are able to utilize the isolated periods of revised real-time PCE and core PCE for 62 vintages within a historic framework with respect to the nonparametric exclusion-from-core inflation persistence model. The flexibility, provided by the kernel and window width, permits the incorporation of the forecasted value into the appropriate time frame. For instance, a low inflation measure can be included in other low inflation time periods in order to form more optimal forecasts by combining values that are similar in terms of metric distance as opposed to chronological time. The most efficient nonparametric forecasting method is the third model, which uses the flexibility of nonparametrics to its utmost by making forecasts conditional on the forecasted value.

KEY WORDS: Inflation Persistence, Real-Time Data, Monetary Policy, Nonparametrics, Forecasting

JEL Classification Codes: E52, C14 , C53

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I would like to thank in alphabetical order the following people for their gracious comments: Marcelle Chauvet, Zeynep Senyuz, Jack Strauss, and Emre Yoldas, and last but not least, the participants of the 19th Annual Symposium of the Society for Nonlinear Dynamics and Econometrics (2011). I also give a very special thanks to Dean Croushore for graciously sharing his knowledge of real-time data.

1. Introduction

Recent economic events do not seem to be the usual temporary deviations from the trend but could quite possibly be the start of a series of new temporary trends or periods of isolated local behavior that is characteristic to that given time period but which could very easily have ties to some other time period. For instance, a low inflationary period, a few years apart, has more in common in terms of behavior and magnitude that a more contemporaneous time period that consists of a high inflationary time period. This makes forecasting as well as the incorporation of new data a little more complicated, but not impossible, especially when a model can automatically include the new data in the most relevant time period.

As it pertains to analyzing inflation persistence, one such model is the nonparametric exclusion-from-core inflation persistence model, which has an automatic dynamic gain parameter as opposed to the constant gain parameter such as that used in the recursive discounted least squares model utilized by Cogley (2002). The weighting kernel of the nonparametric framework automatically gives more weight, i.e. more importance to observations that are similar to the conditioning observation in terms of metric distance. One of the main reasons for extending Cogley's (2002) exclusion-from-core inflation persistence model into a nonparametric model is that it permits one to simultaneously analyze the relationship between total and core inflation in a stationary, flexible framework.

This flexibility also makes the nonparametric exclusion-from-core inflation persistence model suitable for incorporating and using revisions to real-time data. Real-time data is organized by vintages with each vintage containing a newly released datum, which is the last observation of the vintage, as well as the revision of data that has been previously released. Data revisions can be revised up to three years after its initial release and which consist of incorporating new or corrected data (Croushore and Stark 2001, Croushore 2008). Another source of data revisions is due to benchmark revisions, which are changes in the data collection methodology (Croushore and Stark 2003).

For this paper, 62 vintages are examined beginning with vintage V_1996:Q1 and ending with vintage V_2011:Q2. The prefix of "V_" precedes a vintage in order to be able to better distinguish it from the notation of a given observation.

Tierney (2011) finds that the nonparametric exclusion-from-core inflation persistence model is also able to utilize data revisions, which are often small in magnitude. These small revisions can very easily be lost in aggregation or in the presences of outliers which can dominate the parametric exclusion-from-core inflation persistence model. At the local nonparametric level, Tierney (2011) finds that data revisions do produce statistically different model parameters.

The real-time measure of U.S. Personal Consumption Expenditure (PCE) price index is used as the measure of total inflation and the real-time measure of U.S. core PCE is used to capture the trend of inflation by removing the volatile components of food and energy.[1] The real-time data of PCE and core PCE are used because this is what the Federal Reserve uses to forecast total and core PCE (Croushore 2008). Hence, a better understanding of the local behavior of PCE and core PCE will be helpful for policy decisions.

The main purpose of this paper is to extend the work of Tierney (2011) into out-of-sample forecasting at the local nonparametric level by presenting three different local nonparametric forecasting methods. This paper finds that the three local nonparametric methods out-perform the parametric and global nonparametric forecasts, which uses the average of the local nonparametric estimated coefficients in order to form the forecasts.

Much of the previous work on nonparametric forecasts concerns the nearest-neighbor method (Barkoulas, Baum, and Onochie 1997; Diebold and Nason 1990, etc). The main focus of this paper is to utilize periods that are similar in magnitude and behavior as opposed to solely being focused within a certain time frame. By doing so, one can properly incorporate useful information from the past appropriately through the use of the window width.

In forming the three different local nonparametric forecasting methods, a first local nonparametric forecast method, *f1*, which uses the last local nonparametric conditional regression parameters of the training set, to form the forecasts. This model shows promise for models that use variables with a high degree of persistence or in non-AR model, where the forecasted data is harder to form.

The second local nonparametric forecast method, *f2*, uses a method similar to Matzner-Løfber, Gooijer, and Gannoun (1998), Gooijer and Gannoun (1999), and Gooijer and Zerom (2000). For the aforementioned paper, the conditioning observation used to form the forecast is some measure of central tendency such as the median or mode. Since the emphasis in this paper is to make the most of the local behavior, the forecasts are made conditional on the last observation of the training set. When used in this manner, this

[1] Real-time PCE and Real-time core PCE are obtained from the Real-Time Data Research Center at the Federal Reserve Bank of Philadelphia.

forecast model is not as successful as the first local nonparametric forecast method, *f1*, or the next local nonparametric forecast method, *f3,* which is to be discussed shortly. The *f2* model is better equipped to handle outliers since it does use the kernel to form its forecasts.

The third and final local nonparametric forecast method, *f3* is that of Vilar-Fernández and Cao (2007), which incorporates the forecasted value into the kernel. This is the model that produces the most efficient forecasts because it produces the smallest root mean square errors (RMSE) and mean absolute errors (MAE).

Aside from contributing the use of three local nonparametrics to aid in the forecasting of real-time data, this paper also contributes to the existing literature by noting and documenting the effects that the changes in real-time data has on the variables in a regression especially when a variable is lagged. In addition, this paper notes the usefulness in identifying and isolating outliers in the nonparametric methodology. A more detailed description of this paper is itemized in the Conclusion.

The structure of this paper is of the following format: Section 2 presents the theoretical models. Section 3 contains the empirical results and the conclusion is presented in Section 4.

2. The Theoretical Model and Forecasting Methods

The exclusion-from-core inflation persistence model is used to analyze whether core inflation is able to capture the overall trend of total inflation, which avoids the problem of nonstationarity through the definition of the variables used in the regression models.[2] Specifically, the regressand, $Y_t = \left(\pi_{t+h} - \pi_t\right)$, is the *h*-period-ahead *change* in total inflation at time *t*, and the regressor, $X_t = \left(\pi_t^{core} - \pi_t\right)$, is the difference between core inflation and total inflation at time *t*, which is the exclusions-from-core measure of inflation.

For this paper, five different in-sample forecast horizons of the exclusion-from-core inflation persistence model are examined. Each regression is labeled according to its in-sample forecast horizon with h denoting the in-sample forecast horizon and is as follows: $h = \{h_1, h_2, h_3, h_4, h_5\} = \{1, 2, 4, 8, 12\}$. In order to facilitate discussion of the five regressions using five in-sample forecast horizons, a regression is referenced by its *h*-quarter changed in total inflation, which is used as the regressand. For example, the *h1*-regression refers to

[2] For more on the exclusion-from-core inflation persistence model please see Johnson (1999), Clark (2001), Cogley (2002), Rich and Steindel (2005), Lafléche and Armour (2006), and Tierney (2011, 2012).

the regression utilizing the *1*-quarter change in total inflation as the regressand. In the presentation of the theoretical exclusion-from-core inflation persistence model, the model is portrayed with respect to only one vintage, i.e. one real-time dataset without a loss of generality.

The primary focus of this paper is to explore the out-of-sample forecasting abilities of the local nonparametric exclusion-from-core inflation persistence model. The parametric model and the closest nonparametric alternative to the parametric model, which is the global nonparametric model, are presented so that a comparison of the parameters against those produced by the local nonparametric model can be made even though a direct comparison is not possible. The forecasting methods of the parametric and global nonparametric model are completely not comparable to the forecasts of the local nonparametric model since they are formed using different methodologies, which are further discussed in Section 2.2.

The parametric and the global and local nonparametric theoretical models are presented in Section 2.1. Section 2.2 presents the different forecasting methods which also includes the three different local nonparametric forecasting methods. Two different forecast evaluation methods are presented in Section 2.3.

2.1 The Parametric and Nonparametric Models

The data consists of $\left\{\left(X_t, Y_t\right)\right\}_{t=1}^{T}$. The parametric and local nonparametric regression models are a conditional mean model of $m(\cdot)=E\left(Y_t \middle| X_t=\cdot\right)$ with $E\left(\varepsilon_t \middle| X_t\right)=0$.

The parametric conditional mean model is denoted as $m\left(X_t\right)=m_p\left(X_t\right)$ with the subscript *p* referring to the parametric regression. The OLS regression model is of the following form:

$$Y_t = m_p\left(X_t\right)+u_t \quad (1)$$

$$Y_t = \alpha+\beta X_t+u_t, \quad (2)$$

with $u_t \sim \left(0,\sigma_t^2\right)$ and where $m_p\left(X_t\right)=\alpha+\beta X_t$. Hence, only one set of regression parameters is produced for each dataset.

Alternatively, for the local nonparametric model, *T* sets of local conditional regression parameters conditional on each and every observation of the regressor, X_t are produced and the model is as follows with the subscript *np* referring to the local nonparametric regression:

$$Y_t = m_{np}\left(X_t\right) + \varepsilon_t \tag{3}$$

$$Y_t = \alpha(x) + \beta(x) X_t + \varepsilon_t = \hat{Y}_t + \varepsilon_t \tag{4}$$

where the fitted model is $\hat{Y}_t = m_{np}\left(X_t\right) = \alpha(x) + \beta(x) X_t$ and $\varepsilon_t \sim \left(0, \sigma^2(x)\right)$.

The LLLS local nonparametric model, which is also known as the Kernel Weighted Least Squares (KWLS) nonparametric regression model, is able to produce *T* sets of local conditional regression parameters because it fits a line within a certain bandwidth, i.e. window width conditional on each and every observation, *x* in the dataset, which helps to balance the bias-variance trade-off and produce *T*-sets of time-varying coefficients.[3]

In addition to having good minimax properties, the KWLS nonparametric regression model provides an adaptive learning framework through the use of the weighting function, which is the kernel, and the window width. This is particularly beneficial in modeling data revisions that can be small in magnitude and restricted to only the latter three years of data of a real-time dataset. The kernel automatically incorporates new data based on relevance, which in this case is metric distance, in relation to the conditioning observation for each and every single *x*. It should also be noted that the KWLS nonparametric regression model is essentially a weighted least squares model, i.e., a generalized least squares (GLS) model, and is thereby efficient.

Conditional on any given *x*, the univariate Gaussian kernel is used as the smoothing, i.e. weighting function, which is of the form:

$$K = \sum_{t=1}^{T} K(\psi), \tag{5}$$

where $K(\psi) = \frac{1}{(2\pi)^{\frac{1}{2}}} exp\left(-\frac{1}{2}\left(\frac{x_t - x}{d_T}\right)^2\right)$ with $\psi = \left(\frac{x_t - x}{d_T}\right)$ and d_T denotes the window width. The closer any given x_t is to the conditioning observation, *x*, the higher the weight and vice versa. Hence, the window width functions as the smoothing parameter of the model, which also provides the flexibility of the nonparametric model (Li and Racine 2007).

[3] For more information regarding the nonparametric methodology, please refer to Ruppert and Wand (1994), Wand and Jones (1995), Fan and Gijbels (1996), Atkeson, Moore, and Schaal (1997), Pagan and Ullah (1999), Wasserman (2006), and Tierney (2011, 2012).

The choice of window width can severely affect the estimation of the local conditional regression parameters.[4] The integrated residual squares criterion (IRSC) method of Fan and Gijbels (1995) is used to obtain the window width, which is a pre-asymptotic, data-driven, residual-based approach.[5] The use of the IRSC minimizes the squared bias and the variance of the regression parameters, which provides a constant window width for each dataset, but it is not constant across the vintages of real-time data (Fan and Gijbels 1995, Marron 1988, and Härdle and Tsybakov 1997).[6]

Based upon Equation (4), the nonparametric exclusion-from-core inflation persistence model is:

$$\left(\pi_{t+h}-\pi_{t}\right)=\alpha(x)+\beta(x)\left(\pi_{t}^{core}-\pi_{t}\right)+\varepsilon_{t} \qquad (6)$$

where $x=\left(\pi^{core}-\pi\right)$ and $m\left(X_{t}\right)=\alpha(x)+\beta(x)\left(\pi_{t}^{core}-\pi_{t}\right)$. Equation (6) is calculated conditional on each and every single observation of the regressor x, which is denoted as $\left(\pi^{core}-\pi\right)$, in the dataset and hence produces a total of T local conditional nonparametric regressions.

The global nonparametric parameters are obtained by taking the mean of the T local conditional nonparametric regression parameters of Equation (6), which is used as a more direct comparison to the parametric benchmark.[7]

Aside from being better able to incorporate real-time data revisions, the flexibility of the KWLS nonparametric regression model has the potential of being a very useful diagnostic tool. As new and revised data are included, there should be a sense of gradual change in the local nonparametric parameters. For instance, as more data points are incorporated into the sample, the window width should decrease which is on of the asymptotic properties of a well-functioning window width (Pagan and Ullah 1999). This should also be reflected in the regression parameters especially with respect to real-time data since the changes should be systematic.

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[4] The Curse of Dimensionality is a non-issue since a univariate model is used in this paper (Cleveland and Devlin 1988, Härdle and Linton 1994).

[5] The Average Residual Squares Criterion (ARSC) is used to approximate the IRSC for this paper.

[6] For other papers that use the residual-based window, please see Cai (2007), Cai and Chen (2006), Cai, Fan, and Yao (2000), Chauvet and Tierney (2009), Fan and Yao (1998), Fujiwara and Koga (2004), Wand and Jones(1995).

[7] The global nonparametric method is not the preferred way of using nonparametrics because the error terms are not obtained by minimizing the mean squared error.

If the window widths depart from the emerging pattern, this signals that there is some sort of problem that warrants investigation. There could be a data collection problem or that some sort of change has occurred to the data such as the signaling of a recession or spikes in gasoline prices, which is further discussed in Sub-Section 3.2.

Outliers also can be problematic to the nonparametric regression but not as much as it is in an aggregated model. In an aggregated model such as the parametric model, which produces only one set of parameters, an outlier has the potential of dominating the regression results. The local nonparametric methodology on the other hand, is able to isolate the outlier so that its effects are contained *within* the local nonparametric regression results conditional on the outlier (Wand and Jones 1995). Härdle (1994) refers to this as a sparsity of data problem. In order to have an optimal or respectable performance, nonparametrics requires that there to be enough data, the more the merrier of course, within the window otherwise the data can be window width driven meaning that the conditioning observation is driving the regression results (Härdle 1994).

Some of the estimated parameters of a local nonparametric model can be unusually large and this needs to be examined in the proper context since it may or may not be a problem. If there is a problem, this could be due to having a sparsity of data problem, which has just been previously discussed. It could also be the case that the estimated coefficients might not make sense alone but combined with the regressors to form the fitted portion of the model, a clearer pattern of the regressand emerges (Tierney 2012). So, having large estimated regression coefficients are not automatic indications that there is some sort of data problem such as sparsity.

Thus, when it comes to examining the behavior of the local nonparametric forecasts, the fitted portions of the out-of-sample forecasts will be graphed against the regressand to see how well the nonparametric forecasts perform.

2.2 Forecasting Methods

Since the exclusion-from-core inflation persistence model is not the typical autoregressive (AR) model, the regression variables are not formed in same manner as an AR model in the five different forecasting methods, which are the parametric, global nonparametric, and three local nonparametric forecasts. Instead, following along the reasoning of Rich and Steindel (2005), the existing data as it pertains to the exclusion-from core inflation is readily available due to the formation of the *h*-period in-sample forecasts of the exclusion-from-core inflation persistence model.

The main difference between the forecasting method of the OLS model used by Rich and Steindel (2005) and the local nonparametric model is flexibility. It is this flexibility that enables three different local nonparametric forecasting methods while the parametric model only permits one method. There is no exact way of comparing the performance of the parametric and local nonparametric models except through the use of the global nonparametric method because the parametric model does not produce time-varying parameters. When it comes to comparing the global nonparametric model against the local nonparametric model, the same issues that the parametric model has in regards to forming the forecasts also arises. This is further discussed in the next sub-section.

2.2.1. The Parametric and Global Nonparametric Forecasting Methods

The forecasting methods for both the parametric and global nonparametric methodologies are the same because each involves only one set of parameters. The parametric forecasts require that the regressor varies rather than the parameters, which is possible in the nonparametric model. Following the forecasting methods of Rich and Steindel (2005), the forecast errors are the distance between the estimated model and the estimated model created by iterating the regressor *h* quarters ahead, which provides the *h*-quarter-ahead forecast of inflation. For instance, the sum of the squared parametric forecast errors, ε_g^p are as follows:

$$\sum_{g=1}^{12}\left(\varepsilon_g^p\right)^2=\sum_{g=1}^{12}\left(\left[\alpha_p+\beta_p\left(\pi_{(t+g)}^{core}-\pi_{(t+g)}\right)\right]-\left[\alpha_p+\beta_p\left(\pi_{((t+g)+h)}^{core}-\pi_{((t+g)+h)}\right)\right]\right)^2 \tag{7}$$

The sum of the squared global nonparametric forecast errors are formed in the same manner as in Equation (7) except for the global nonparametric parameters, α_{gnp} and β_{gnp} being used in place of α_p and β_p.

2.2.2 The Nonparametric Forecasting Method

The nonparametric framework permits the incorporation of new data without the need of iterating the fitted model *h*-steps ahead in order to form the forecasts, which is needed in the OLS model since it only produces one set of regression parameters.[8] Keeping *ceteris paribus* in mind, for the local nonparametric forecasts, the variables in the

[8] For more on the forecasting of the OLS exclusion-from-core inflation persistence model, please see Rich and Steindel (2005).

regressions are kept the same for both the actual and out-of-sample regressions so that the performance of the time-varying parameters can be directly compared.

In order to form the out-of-sample-forecasts, the dataset for each of the five *h*-regressions is divided into the training set and the test set. The observations of the training set are $t = \{1, \cdots, n\}$ where $n = (T - 12)$ since *12* observations are used in the test set. The last *12* observations of a given real-time dataset form the subset needed for the out-of-sample forecasts and is denoted as $g = \{1, \cdots, 12\}$. This paper presents three different local parametric methods with respect to the exclusion-from-core inflation persistence model. Each of the three forecasting methods are denoted as $f1$, $f2$, and $f3$.

The First Local Nonparametric Forecasting Method

The first method, $f1$, uses the estimated local nonparametric coefficients conditional on the last observation of the training set, X_n to form the out-of-sample forecasts, which is as follows:

$$Y_t = \alpha(X_n) + \beta(X_n) X_t + \varepsilon_t \tag{8}$$

The estimated regression coefficients conditional on X_n, $\alpha(X_n)$ and $\beta(X_n)$, are used in conjunction with the last *12* observations of the dataset, $\{(X_g, Y_g)\}_{g=1}^{12}$ to form the forecasted values of

$$Y_g = \alpha(X_n) + \beta(X_n) X_g + \varepsilon_g^{f1} = \hat{Y}_g^{f1} + \varepsilon_g^{f1} \tag{9}$$

where Y_g, $\hat{Y}_g^{f1}$, and ε_g^{f1} are the forecasted value of Y_{n+g}, the forecasted fitted model, $\hat{Y}_{n+g}$ and the forecast error, ε_{n+g} respectively for the first method, $f1$.

The heuristic reason behind the first method is that inflation is persistent and since the future is unknown one could "guesstimate" that the next measure of inflation could very easily be close to X_n and thereby within the window width of X_n. The potential problem is that as the forecast horizon, g increases, the relationship could very easily break down.

The Second Local Nonparametric Forecasting Method

The second method, $f2$ would be particularly useful if one used the mean, median, or mode to create conditional local nonparametric estimates as has been intended by Matzner-Løfber, Gooijer, and Gannoun (1998), Gooijer and Gannoun (1999), and Gooijer and Zerom (2000). For this paper, the observation of interest is the last observation of the training set since the latest 'local' information needs to be utilized. As Tierney (2011) demonstrates, the average behavior tends to miss the activity at the local level especially where the revisions to real-time data are concerned.

Conditional on only the last observation of the training set, X_n while incorporating new data, the second method, $f2$, utilizes the methodologies of De Gooijer and Gannoun (2000) and Matzner-Løfber, De Gooijer, and Gannoun (1998). Hence, the kernel will have the following form:

$$K^{f2} = \sum_{t=1}^{n+g} K^{f2}\left(\psi_n\right), \tag{10}$$

where $K^{f2}\left(\psi_n\right) = \frac{1}{\left(2\pi\right)^{\frac{1}{2}}} exp\left(-\frac{1}{2}\left(\frac{x_t - X_n}{d_T}\right)^2\right)$ with $\psi_n = \left(\frac{x_t - X_n}{d_T}\right)$ and d_T the window width remains the same as for the training set. The significance of the summation of the kernel ending in $n+g$ means that both observations from the training test and the test set are incorporated with each out-of-sample forecast horizon until $g=12$. Using matrix notation for the forecasted coefficients, the forecasts using the second forecast method, $f2$ are

$$Y_g = X_g \beta_g^{f2}\left(X_n\right) + \varepsilon_g^{f2}\left(X_n\right) = \hat{Y}_g^{f2} + \varepsilon_g^{f2} \tag{11}$$

where Y_g, $\hat{Y}_g^{f2}$, and ε_g^{f2} are is the forecasted value of Y_{n+g}, the forecasted fitted model, $\hat{Y}_{n+g}$ and the forecast error, ε_{n+g} for the second method, $f2$, respectively.

The problem with $f2$ is that the farther a forecasted regressor is from the conditioning observation, X_n, the smaller the weight it is assigned, which one would expect as the out-of-sample forecast horizon, g increases. This could lead to a loss of information by not incorporating the forecasted regressor into the forecast since it could be outside the window width conditional on X_n.

The Third Local Nonparametric Forecasting Method

The third method, $f3$ is similar to $f2$ and uses the method proposed by Vilar-Fernández and Cao (2007). $f3$ differs from $f2$ by creating forecasts conditional on each and every observations from the test set, X_g while $f2$ creates forecasts conditional on X_n. The kernel would now be of the form:

$$K^{f3} = \sum_{t=1}^{n+g} K^{f3}\left(\psi_g\right), \tag{12}$$

where $K^{f3}\left(\psi_g\right)=\frac{1}{(2\pi)^{\frac{1}{2}}}exp\left(-\frac{1}{2}\left(\frac{x_t-X_g}{d_T}\right)^2\right)$ with $\psi_g=\left(\frac{x_t-X_g}{d_T}\right)$ and d_T the window width remains the same as for the training set and $g=\{1,\cdots,12\}$. The forecast regression is:

$$Y_g = X_t\beta_g^{f3}\left(X_g\right)+\varepsilon_g^{f3}\left(X_g\right)=\hat{Y}_g^{f3}+\varepsilon_g^{f3} \tag{13}$$

where Y_g, $\hat{Y}_g^{f3}$, and ε_g^{f3} are is the forecasted value of Y_{n+g}, the forecasted fitted model, $\hat{Y}_{n+g}$ and the forecast error, ε_{n+g} respectively for the third forecasting method, $f3$.

Heuristically, the third forecasting method, $f3$ provides an adaptive learning framework for the forecasted regressor, X_g through the use of the kernel, by incorporating the forecasted regressor with observations that are within the same window width. Hence, the kernel acts as a data-driven, dynamic gain parameter for the forecasts.

2.3 Evaluation of the Forecasting Methods

In order to measure the performance of the out-of-sample forecasts, three methodologies are implemented. The first method is applies the Harvey, Leybourne, and Newbold (1998) form of the Diebold-Mariano (1995) Test in order to test whether the three different local nonparametric methods are statistically equivalent. The second method involves the formation of out-of-performance efficiency ratios from the forecast Root Mean Square Error (RMSE) and the forecast Mean Absolute Error (MAE) (Vilar-Fernández and Cao 2007).

The Harvey, Leybourne, and Newbold (1998) Test

The Harvey, Leybourne, and Newbold (HLN) (1998) form of the Diebold-Mariano (1995) is used to test for the statistical equivalency of the three local nonparametric forecasting methods in a pair-wise manner since it takes into account autocorrelation. Autocorrelation is present due to the lagging of the dependent variable. The number of autocovariance terms used to form the HLN Test Statistic depends upon the formation of the regressand that takes into account the *h*-period change in total inflation. For instance, for the H1-regression, only one autocovariance term is used due to the regressand being formed by taking into account the one-quarter change in total inflation. Similarly, the *h4*-regression uses eight autocovariance terms since the regressand is formed by taking into account the eight-quarter change in total inflation.

The critical values of the HLN Test Statistic are obtained from the Student's t distribution with *(g-1)* degrees of freedom (Harvey, Leybourne, and Newbold 1997, 1998) where *g=12*, which is the total number out-of-sample forecast horizons for this paper.[9] The null of the HLN Test of two nonparametric forecasting methods producing statically equivalent forecasts is evaluated at the 5% and 10% significance level with the critical values being 1.796 and 1.363 respectively.

The RMSE, MAE, and the Out-of-Performance Efficiency Ratios

For this paper, the forecast measurements of the RMSE and the MAE are used instead of the Mean Square Errors (MSE) because they are in the same units as the error terms.[10] The RMSE and the MAE of the parametric and global nonparametric models are presented as just a precursory look at the forecasting abilities of the aggregated models before proceeding to the local nonparametric forecasts.

The formulae for the RMSE and MAE are as follows:

$$RMSE_z = \sqrt{MSE_z} = \sqrt{\frac{1}{g}\sum_{g=1}^{12}\left(\hat{Y}_{t+g} - \hat{Y}_g^{fz}\right)^2} \tag{14}$$

$$MAE_z = \frac{1}{g}\sum_{g=1}^{12}\left|\hat{Y}_{t+g} - \hat{Y}_g^{fz}\right|^2 \tag{15}$$

where fz denotes the three different local nonparametric forecasts, $f1$, $f2$, and $f3$ and z also denotes the three different forecasting methods that takes the values of *{1, 2, 3}.* The actual value of the regressand at time $t+g$ is denoted as Y_{t+g} and the forecasted value for a given forecasting method is denotes as Y_g, which is the same for all three local nonparametric forecasts.

In order to facilitate the comparison of the three local nonparametric forecasting methods, Vilar-Fernández and Cao's (2007) out-of-performance efficiency ratios are formed from the RMSE and MAE. Without a loss of generality, using the RMSE as an example, let z and z' denote the three different forecasting methods such that $z \neq z'$. Suppose the out-of-performance efficiency ratio is greater than unity:

$$\frac{RMSE_z}{RMSE_{z'}} > 1 \tag{16}$$

This states that $RMSE_{z'}$ is more efficient to $RMSE_z$ since it has the smaller RMSE. The

[9] Please see Wasserman (2006) for more on the use of the Student's t distribution in nonparametrics.
[10] The empirical results of the MSE are available upon request.

alternate would be true if the out-of-performance efficiency ratio is less than unity. The same analysis holds for the MAE.

3. The Empirical Results

Before commencing with the interpretation of the out-of-sample forecasts, it is important to highlight the significance of real-time data and the benefits and limitations of nonparametrics as it pertains to real-time data. Sub-Section 3.1 provides an analysis of real-time data and Sub-Section 3.2 discusses the nonparametric regression results along with a discussion of the parametric and global nonparametric models. The out-of-sample forecasting results are presented in Sub-Section 3.3.

3.1 Data Analysis

The variables used in the exclusion-from-core inflation persistence model are stationary, which have been verified by the Augmented Dickey-Fuller Test and the Phillips-Perron Test. This is also supported by the previous literature (Clark 2001, Cogley 2002, Rich and Steindel 2005, and Tierney 2011, 2012).

A total of 62 vintages are examined in this paper. The real-time dataset of core PCE and PCE begins with the first vintage of V_1996:Q1 and ends with vintage V_2011:Q2 and is available from the Federal Reserve Bank of Philadelphia. The starting vintage is V_1996:Q1 since this is the first vintage when both real-time core PCE and real-time PCE are available. The benchmark vintages are V_1996:Q1, V_1999:Q4, V_2003:Q4, and V_2009:Q3, which generally occur every five years and can include new data and methodological changes. Especially due to the methodological changes of the benchmark vintages, it is important to compare results that utilize the same methodology.[11]

Each of the vintages begins with the observation of 1983:Q4 before the calculation of inflation and ends one quarter before the date of a given vintage. For instance, V_1996:Q1 denotes that the data samples ends with observation 1995:Q4 but becomes available to the general public in the following quarter of 1996:Q1. Thus, the last vintage examined in this paper is V_2011:Q2 with the data sample going from 1983:Q4 to 2011:Q1. Table 1 provides the number of observations as well as the sample period for each h in-sample regression with the minimum number of observations in the full sample being 46 and the maximum being 110.

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[11] Please see Croushore and Stark (2001) and Croushore (2008) for more information regarding the data collection methods of the real-time dataset.

The vintages that contain the most number of revisions are in the third quarter of any given year and this is due to more information becoming available to government agencies (Croushore and Stark 2003, Croushore 2008). With the exclusion of the benchmark years and V_1996:Q2 to V_1996:Q3 and V_1997:Q2 to V_1997:Q3, a cross-vintage comparison of vintages released in Q2 (Vintage:Q2) are compared against the vintages released in Q3 (Vintage:Q3) for the last ten pairs of Vintage:Q2 and Vintage:Q3 beginning in V_1998:Q2 and V_1998:Q3 and ending in V_2010:Q2 and V_2010:Q3. The comparison of V_1996:Q2 against V_1996:Q3 is not included in this paper since the majority of the real-time data revisions are measured in the thousandths. The difference in PCE between V_1997:Q2 to V_1997:Q3 shows that 17 of the observations change aside from some of the earlier observations demonstrating a difference of 0.001, which potentially indicates that the data has undergone some underlying change. For the other ten vintage comparisons, there are thirteen data revisions to be examined, so for the sake of a uniform comparison the benchmark years and V_1996:Q2 to V_1996:Q3 and V_1997:Q2 to V_1997:Q3 are excluded from the forecast analysis.

The differences in the level real-time measures of PCE and Core PCE are presented in Tables 7 and 8 respectively. The minima and maxima, in absolute value terms, are noted in bold print. The minimum difference between the two vintages for PCE is of 0.295, which occurs in 1995:Q1 and the maximum difference of 1.016 occurs in 1998:Q1, both of which are noted in bold print as is shown in Table 7. Table 8 shows that the minimum difference between the two vintages for Core PCE is 0.32, which occurs during 1995:Q2 and the maximum difference is 1.08, which occurs in 1998:Q1. The majority of the largest maxima in absolute value terms occur generally, but not always, in the last observation that the two vintages have in common. This is the last observation of Vintage:Q2 and the second to the last observation of Vintage:Q3.

The differences in the level data are important to note because these differences also affect the regression variables. After the data is transformed into inflation measures, it is then further transformed into the regressor, which is the difference between core and total inflation at time t and the regressands are the h-period change in total inflation, which can be utilized by the local nonparametric model.

Excluding the newly released datum of Vintage:Q3 since there is on counterpart in Vintage:Q2, the last thirteen observations have significant data revisions in the raw data, while the transformed data used in the *h1*-regressions have a maximum of twelve observations, which is due to losing one of the data revisions in forming the regressand, the *1*-quarter change in total inflation (Tierney 2011). This also holds true for the remaining *h*-regressions.

Tables 2 and 3 displays the subtracted values for the Vintage:Q3 from Vintage:Q2 of the regressors and regressands for the *h1*-regressions. A negative sign in front of the value indicates that the datum of Vintage:Q2 has been revised upward. There seems to be a mix between upward and downward revisions with a slight advantage towards downward revisions as denoted by the positive values.

The magnitudes of the differences in the regressands are larger than those of the regressors especially as the lagging process becomes larger. For the contemporaneous difference between core inflation and total inflation, which forms the regressors, the regressors in the *h5*-regressions are not greatly affected by the data revisions other than for a handful of observations.[12] Alternatively, the differences between Vintage:Q2 and Vintage:Q3 in the regressands for the *h5*-regressions that involves the *12*-quarter change in total inflation are larger when compared to the *h1*-regressions as is shown in Table 4. The difference is particular noticeable when magnitudes in absolute value terms are considered. This indicates that the data revisions have more of an effect on lagged variables with the larger the lagging process, the larger the effects of data revisions.

For both the regressors and regressands, as the vintages progress, the data revisions seem to be larger in magnitude so identifying one particular vintage to use for forecasting purposes can be difficult (Elliott 2002). This could be due to having more information available or it could reflect the uncertainty in the U.S. economy stemming from the effects of the Financial Crisis of 2008, the Great Recession, which is from 2007:Q4 to 2009:Q2, and the lingering recovery.

Tables 5 and 6 provide the means and maxima of the absolute value differences between Vintage:Q2 and Vintage:Q3 in order to show the magnitudes of the effects that data revisions have on the variables used in the regressions. The average differences in the regressors and regressands tend to be approximately 0.1 and 0.3 respectively, but there is a great deal of local variability. For the regressands in Table 6, the differences between V_2008:Q2 and V_2008:Q3 have a mean of 0.684 and 0.827 for the *h1*- and *h2*-regressions, which is in the midst of the Great Recession and the end of a spike in oil prices. This also further supports the notion that data revisions may play a larger roll in lagged variables.

[12] The vast majority of the differences are zero, and hence the information is not displayed in a table.

It is important to note the magnitude, the timing of the data revisions, and the vintage because an aggregate-driven model such as OLS might not be able to utilize the data revisions effectively while a local nonparametric model is able to do so (Tierney 2011).

3.2 Regression Results with Respect to Real-Time Data

The flexibility of nonparametrics comes from partitioning the dataset and grouping the data, conditional on each and every observation, based upon metric distance within an interval that is determined by the window width. This flexibility can also make the nonparametric model very sensitive to changes by providing clear signals as to when and where there is a problem such as a sparsity of data or there is some sort of underlying change to the data.

Examining both the dot plot and the histogram with a bin size equivalent to the window width is a good starting point. The dot plot permits one to identify both the timing and magnitude of an outlier while the histogram is able to provide the frequency of a give measure.

Graph 1 is a dot plot of the *h1* regressor for V_2011:Q2 and a few outliers are able to be noted with the largest regressor value being 6.6 in 2008:Q4.[13] A histogram of the same data, Graph 2, with a bin size of 0.41, which is the corresponding window width to this vintage also shows there to be a few more outliers the farther the data gets from ± 1.

The next step would be to examine the window widths, which are provided in Table 1A, for any irregularities in the data. The abnormally small window width of 0.04 for V_2000:Q1, which is approximately 80% less than the window widths of surrounding neighboring vintages, indicates that this vintage warrants further investigation, which revealed that the data for V_2000:Q1 came from two different sources.[14]

Not all window widths that deviate from the general trend signal a problem in the data. For vintages V_2007:Q2 to V_2008:Q2, there is not a data problem, but there is the sudden increase in oil prices as well as the start of a recession, which occurred during this time frame that could explain why these vintages function differently.[15] The increase in the size of the window widths from around 0.15 between V_2004:Q3 to V_2007:Q1 to sizes of 0.31 and 0.41 after V_2009:Q3 indicates that potentially there has been some sort of

[13] The shaded areas in the graphs represent NBER recession dates.
[14] Dean Croushore kindly provided the information of the two different data sources for V_2000:Q1.
[15] The lack of a data problem for these vintages has been confirmed by Dean Croushore, who has offered the given explanations for the smaller window widths.

underlying structure change to data, which at the moment, formal structural breaks tests are not able to find any discernable structural breaks after the Great Recession.[16]

The benefit of using local parametric methodology is clearly demonstrated in Graphs 3 and 4, which shows the estimated slopes of the parametric and global and local nonparametric models for the *h2*- and *h3*-regressions that involve the *2-quarter* and *4-quarter* change in total inflation as the regressors, respectively.[17] Graphs 3 and 4 demonstrate that the local behavior is not necessarily indicative of the aggregate behaviour.

The estimated slopes corresponding to the regressions of V_2001:Q1 and V_1999:Q4 are not included due to data problems that are found using the local nonparametric regressions. Upon further investigation, the large estimated coefficients of V_2001:Q1 also indicated that there is a problem with this vintage aside from the abnormally small window width. V_1999:Q4 produces abnormally large estimated coefficients, due to the observations pre-1994:Q1 needing to be interpolated and is therefore eliminated from the graphs in order to maintain the scale.[18]

The behavior of the last regressor of the training set, which is $n=(T-12)$ with T being the total number of observations in a given vintage, is tracked across vintages for all five *h*-period regressors in Graphs 1A and 2A.[19] As the vintages increase, the magnitudes of the regressors increase especially for the *h1*-and *h2*-regressions. Even though Tables 5 and 6 provide the average and maximum values for vintages with the most number of data revisions, the average does not seem to be representative of the local behavior or the regressor and regressand. Table 2A also confirms this pattern but in relation to the estimated slopes of the parametric, global nonparametric, and T^{th} local nonparametric model.

In regards to the interpretation of the regression results with respect to the exclusion-from-core inflation persistence model, the estimated slopes for all three models are closer to unity and exceed unity in quite a few cases at the local nonparametric level as

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[16] In order to test for structural breaks, the Bai-Quant Structural Break Test, the Quandt-Andrews Test, and the Andrews-Ploberger Test are applied to PCE and Core PCE of V_2011:Q2 through the use of Bruce Hansen's (2001) program for testing for structural changes is used and is available from the following web address: http://www.ssc.wisc.edu/_bhansen/progs/jep_01.html.
[17] More information on the ability of the local nonparametric model to detect changes to the regression parameters due to data revisions can be found in Tierney (2011).
[18] The last observation of V_1996:Q1 is also interpolated with the interpolation method being kindly provided by Dean Croushore.
[19] The tables and graphs that appear in the appendix will be followed by "A" in order to denote its appearance in the Appendix portion of this paper.

the vintages increase. This indicates that the changes to the *h*-quarter change in total inflation at time *t* are greater than the changes to core inflation at time *t*, which means that the transitory movements in the exclusion-from-core measure of inflation is understated especially in the latter vintages (Johnson 1999, Lafléche and Armour 2006).

Hence, regarding real-time data, the local nonparametric model is a useful tool in diagnosing potentially problematic time periods. Even when the local nonparametric model *appears* to be malfunctioning, it is actually functioning as a warning. These supposed *mistakes* can in and of itself be a very useful tool when it comes to data revisions because it could function as a warning that this datum might be revised downward at some future point or it may signal some sort of underlying change to the data.

3.3 Forecasting Results

As has been mentioned in Section 2, the formation of the parametric and global nonparametric out-of-sample forecasts are vastly different from the three local nonparametric forecasting methods especially since the local nonparametric forecasts utilize varying parameters as opposed to varying the regressors. The RMSE of the parametric and global nonparametric forecasts are given in Table 3A and an average of the RMSE is given in Table 9 along with the average MAE. The average RMSE and MAE are much larger compared to the three local nonparametric methodologies.

When compared to the parametric model, the global nonparametric model produces smaller RMSE with a few exceptions such as in the h2-regression in V_1997:Q3 to V_1999:Q3, which coincides with the timing of the Asian Financial Crisis. The RMSE also increase in magnitude after 2007:Q3 for the *h1*-and *h2*- regressions in both the parametric and global nonparametric model.

The forecasts involving the *h2*-regressions seem to have the largest average RMSE and MAE for the parametric, global nonparametric and three local nonparametric forecasts. This could be a reflection of the uncertainty with respect to the movement of inflation or with respect to data revisions.

The Local Nonparametric Forecasts Results

Based upon just the size of the RMSE and MAE, the three local nonparametric forecasts out-perform the parametric and global nonparametric forecasts. The average RMSE and Average MAE for the three local nonparametric forecasting techniques are presented in Tables 9 and 10 with the average of the forecasted slopes presented in Table 4A. The results for V_2000:Q1 are included in order to provide a more complete idea of the functioning of the nonparametric forecasting methods and to demonstrate that when it does not work well, the mistakes are easy to detect.

The third local nonparametric forecasting method is the most efficient due to its having the smallest average RMSE and MAE, which is given in Tables 9 and 10. Even with the outliers removes, the third local nonparametric forecasting method performs better.

The outliers that could be inflating the RMSE and MAE for the first and second nonparametric methods are presented in Tables 11 and 12. The vintages with the most number of outliers are mostly in the latter vintages of V_2008:Q2 and V_2009:Q2, which is during the Great Recession and V_2010:Q2.

The flexibility and sensitivity of the nonparametric forecasts could be its greatest assets. The appearance that the nonparametric forecasts could be malfunctioning can actually be beneficial. For instance, any kind of deviation in behavior from the results of the other vintages could indicate that there is some sort of underlying problem, which also shows the need for as many vintages as possible instead of just a few (Elliott 2002). The underlying problem could be due to data revisions, a data collection problem as is the case in V_2000:Q1 or it could simply reflect a period of uncertainty in the economy. For the sake of policy implementation, it is important to identify the cause of the local deviation in behavior since one would not want to implement policy decisions based upon a data collection problem.

In V_2011:Q2, the regressor for observation 2008:Q4 has a value of 6.6. This would be the last observation in V_2009:Q1. Upon further scrutiny of the average local nonparametric forecasting regressions provided in Table 4A, the average forecasted slopes produced by the first local nonparametric method has a value of -17.584, while the other two local nonparametric forecast methods produce values of -0.801 and 2.919. In this case, the first local nonparametric method does not perform well because it does not use the window width to measure the metric distance, i.e. important of the given observation to the conditioning observation and therefore, is not properly discounted. Thus, the second and third local nonparametric methodologies produce smaller forecasted values of the slopes by heavily discounting the outlier.

Interpretation of the Local Nonparametric Forecast Graphs

As has been previously mentioned in the Introduction, the last five years have shown a great deal of local unique economic behavior that could very easily affect the formation of inflation. Under these conditions the three local nonparametric methods are examined in more detail.

Graphs 5, 6, and 7 display the three local nonparametric forecasting results for the *h2*-regression for vintages V_2007:Q2 and V_2007:Q3, which is shortly before the start of the Great Regression, which officially began in 2007:Q4. At observation 2005:Q3, the first and second local nonparametric forecasting methods are not able to capture the downward spike in V_2007:Q2 while the third nonparametric forecasting method is able to mimic the curvature of the *h2*-regression even in 2005:Q3 for both V_2007:Q2 and V_2007:Q3 with a slight deviation in 2005:Q4. Overall, the third nonparametric forecasting method is the best fit for this time period.

The same pattern emerges for Graphs 8, 9, and 10, which shows the local nonparametric forecasts of the *h1*-regression for vintages V_2008:Q2 and V_2008:Q3. This coincides with the time period right after the U.S. Housing Market experienced its steepest decline in 25 years. The third local nonparametric forecasting method is better able to capture the curvature of the model.

Graphs 11 and 12 appear to be identical for the forecasts of the *h3*-regession using vintages V_2010:Q2 and V_2010:Q3, but this is not the case. The forecasts for the first and second local nonparametric forecasting methods are just very close in magnitude. It should be noted that the first and second local nonparametric forecasting methods are not able to capture the downward spike in 2007:Q4, which is the official NBER starting date of the Great Recession. The third local nonparametric forecasting method is able to close the gap between the forecast and the actual value of the regressand in 2007:Q4, but interestingly enough at the observation 2007:Q4, V_2010:Q2 performs very slightly better.

Graph 14 shows the three different local nonparametric results in one graph for V_2010:Q3. The one with the best performance is the third local nonparametric forecasting method with the forecasts of the first and second local nonparametric forecasting methods again being just very close in magnitude.

Visually, the three local nonparametric methods have performed rather well with the best performance being given by the third local nonparametric method. This naturally leads to the quantitative measurements of the three forecasts.

Interpretation of the HLN Test and the RMSE and MAE Efficiency Ratios

In order to evaluate the forecasts, aside from examining the average RMSE and the MAE, the results of the HLN Test and the efficiency ratios of the RMSE and the MAE are ascertained (Harvey, Leybourne, and Newbold 1998; Vilar-Fernández and Cao 2007). For the *h1*- and *h2*-regressions, approximately half of the vintages reject the null of statistically equivalent forecasts at the 5% significance level with an increase of approximately ten vintages when the significance level is 10%. The reason why the results of the HLN Test at the 5% and 10% significance levels are given is to show that the majority of the times that the forecasts are found to be statistically different is at the stricter standard at the 5% significance level.

The exact values of the HLN Test for the testing first local nonparametric forecast method against the second is given in Table 5A and against the third method is given in Table 6A at the 10% significance level and in Tables 8A and 9A for the 5% significance levels, respectively. Tables 7A and 10A give the results of the HLN Test for the testing second local nonparametric forecast method against the third. All six tables show that the regressions involving the *h4*-regressions, which uses the *8-quarter* change in total inflation as the regressand, have the most number of instances when the forecasts are statistically not equivalent. 60% of the time, the HLN Test rejects the null of statistical equivalent forecasts at the 5% and 70% of the time, the HLN Test rejects the null of statistical equivalent forecasts at the 10% significance levels for the regressions involving the *h4*-regressions.

The efficiency ratios provide an alternative way of comparing the RMSE and MAE forecasts in a pair-wise manner without just trying to compare the magnitudes, which can be difficult given that 62 vintages are simultaneously begin examined. According to Table 15, the third local nonparametric forecasting model outperforms the first and second local nonparametric forecasting models in almost all instances. This third local nonparametric forecasting model uses the nonparametric methodology to its fullest by including the forecasted observation as a conditioning observation, which seems to give a more complete picture of the data. The next best local nonparametric forecasting model is the first one, which uses the local nonparametric regression coefficients conditional on the last observation of the training set to form the forecasted values. The second local nonparametric forecasting model, which makes conditional forecasts based upon the last observation of the training set, does not appear to incorporate the forecasted values as well. If it forecasted values are not included within the window width, then they are completely discounted by being given very little weight in the forecast regressions.

The exact values of the efficiency ratios are provided in Tables 11A to 13A and can be used to indicate when the two methods being compared are the most similar or dissimilar. In some instances, the efficiency ratio can be exceedingly large especially if the third local nonparametric forecasting model is used in the comparison, which can be due to the RMSE or the MAE of the third method being close to zero.

Each of the nonparametric forecast methods can have its use. In this instance due to the formation of the regressands, one has access to the data and is thus able to incorporate the data into the forecasts (Rich and Steindel 2005). In the instance where the data is not readily available or harder to obtain such as when one is not using an AR model, then the first local nonparametric forecasting model could be of use since the average RMSE and MAE are within an acceptable range. It might be useful for forming short-terms forecasts for models involving variables that show a high degree of persistence.

In conclusion, the overall most promising model as it related to real-time date is the third local nonparametric forecasting model, which can be used to form counterfactual forecasts, which is to be an extension of this paper.

4. Conclusion

This paper makes contributions to real-time data on three fronts. The first front is that it provides a deeper analysis of real-time data with respect to the effects that real-time data has on the variables of the regression model. The next contribution relates to the way that local nonparametric methodology can be used to facilitate analysis of real-time data, which is through its ability to potentially identify and then utilize the information from problematic periods. The third and final front concerns the three different local nonparametric forecasting methodologies, which is particularly suitable for real-time data.

In order for a more structured presentation of the findings of this paper, the contributions of each front are listed and are as follows:

Contributions from the Analysis of Real-Time Data:

1. The most number of data revisions occur in Vintage:Q3 with up to 13 observations being revised in the raw data with the exception of the comparison between 1997:Q2 and 1997:Q3.
2. Data revisions are large enough so as to be transmitted to the transformed variable such as using a price index to form inflation as evidenced by the differences in the regressors and regressands between certain vintages.

3. Data revisions have a larger impact on lagged variables, which can have a larger effect when the lagging process is larger.
4. As the vintages increase so do the magnitudes of the changes in regressors and regressands which can be due to an increased availability of information compared to previous vintages. It could also reflect the uncertainty surrounding the economy especially around the Financial Crisis of 2008, the Great Recession, and the slow recovery.
5. These changes to the regressors and regressands cause by data revisions can be utilized by a flexible model such as the local nonparametric model.

Contributions from the Regression Results with Respect to Real-Time Data

1. Any significant change in the size of the window width can signal a potential data problem or function as a warning that the economy is undergoing some change such as the spike in oil prices in 2007 and 2008.
2. Similar to the function of the window width, any abnormally large estimated nonparametric regression coefficients can function as a potential outlier warning that would warrant further scrutiny.
3. Regarding the nonparametric methodology, outliers are a problem when they are used as the conditioning observation. This is referred to as a sparsity of data problem thereby causing the results to be window width driven (Härdle 1994). Otherwise, the contribution of outliers to the regression results is very heavily discounted by being given very little weight to it by the kernel when not conditioning on the outlier.
4. As the vintages increase, the magnitudes of the parametric and the global and local nonparametric model are either close or exceed unity, which indicates that core inflation is closer to reflecting the trend of overall inflation or it over-shoots the trend in that the exclusion-from-core inflation is understated.

Contributions from the Forecasts using Real-Time Data

1. The parametric, global nonparametric, and three local nonparametric forecasts have the largest RMSE and MSE in the *h2*-regressions which could be due to the uncertainty regarding inflation or the uncertainty regarding data revisions.

2. By just examining the magnitude of the forecast errors, the three local nonparametric forecasts outperform the parametric and global nonparametric forecasts by having smaller RMSE and MAE and are thereby more efficient.
3. In the nonparametric forecasts that utilize the window width such as in the second and third nonparametric forecast methods, outliers are only problematic when they are the conditioning observation, which creates a sparsity of data problem.
4. In reference to the three local nonparametric forecast methods, the ability of being able to identify the outlier is advantageous because it also identifies problematic time periods that could be due to data revisions, a problem in the underlying data collecting method or a reflection of a period of uncertainty in the economy. The identification of each possibility has the potential of being very important in policy implementation. This is offered as an alternative to a model where the results could be outlier-driven, which could very easily occur in an aggregated model such as the parametric or global nonparametric model.
5. The regressions, involving the *8-quarter* change in total inflation as the regressand, reject the null of statistically equivalent forecasts approximately 60% of the time and 70% at the 5% and 10% significance levels, respectively.
6. The most efficient local nonparametric forecast method is the third one, which permits forecasts to be made conditional on the forecasted values. This model is also particularly useful for counterfactual analysis, which will be an extension of this work.
7. The next most efficient local nonparametric forecast method is the first model, which uses the local nonparametric regression coefficients conditional on the last observation of the data set to form the forecasted values. This model is particularly useful in models whose variables show a high degree of persistence or in non-AR model, where the data is harder to form.

Thus, since the three local nonparametric forecast methods have proven to be useful especially in the exclusion-from-core inflation persistence model, the extensions of this paper are to further develop stylized facts as it pertains to particular vintages especially those involving Vintages:Q2 and Vintages:Q3 and to aid in policy implementation by using the three local forecasting methods in counterfactual analyses.

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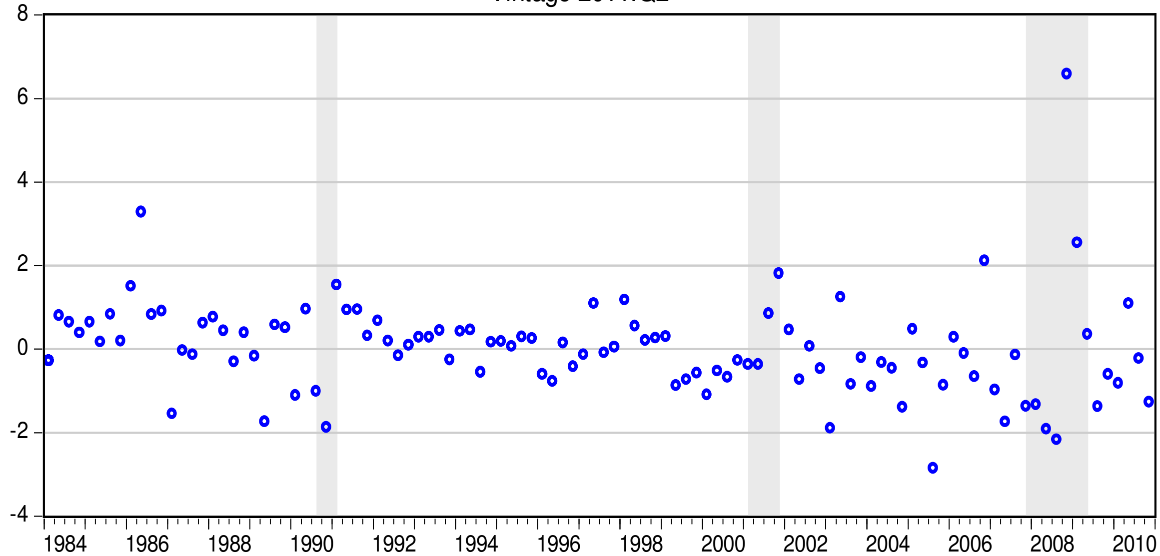
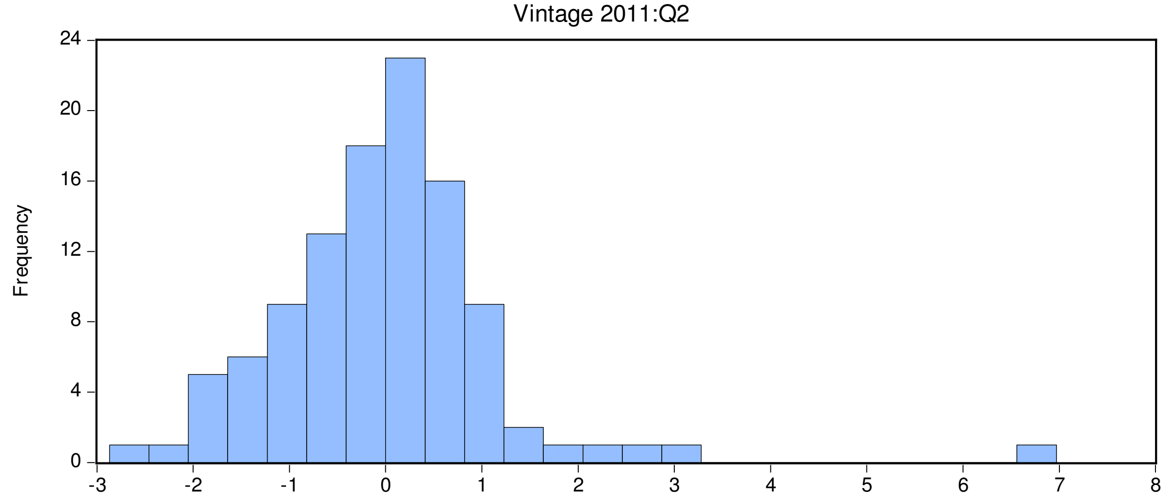
Graph 1
Dot Plot of h1 Regressor
Vintage 2011:Q2

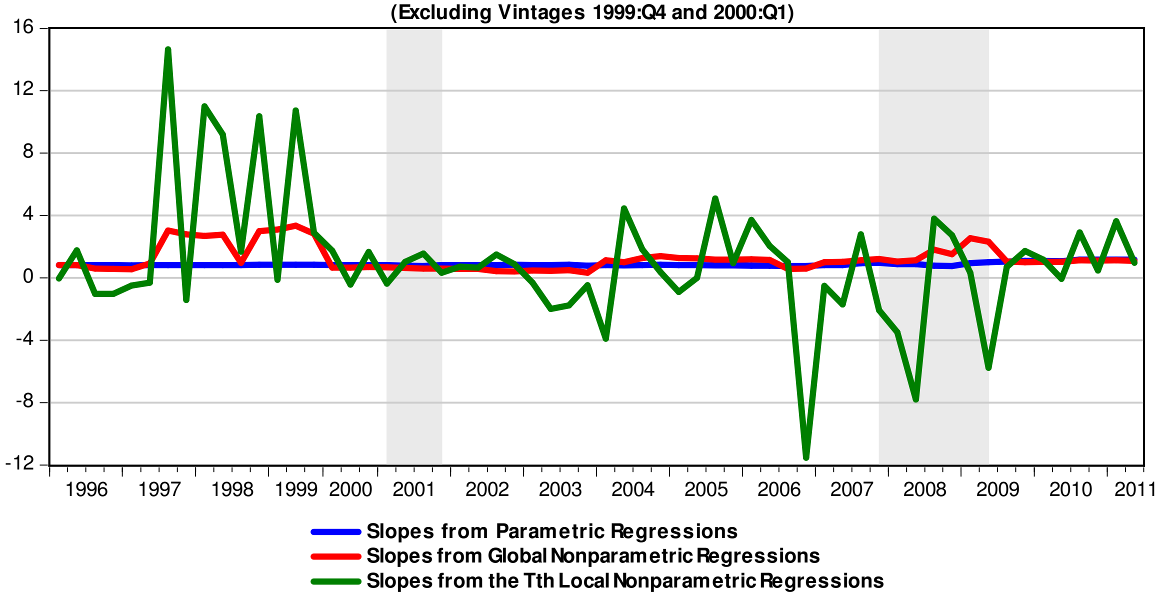


Graph 2
Histogram of h1 Regressor
(Bin Size = Window Width - 0.41)
Vintage 2011:Q2



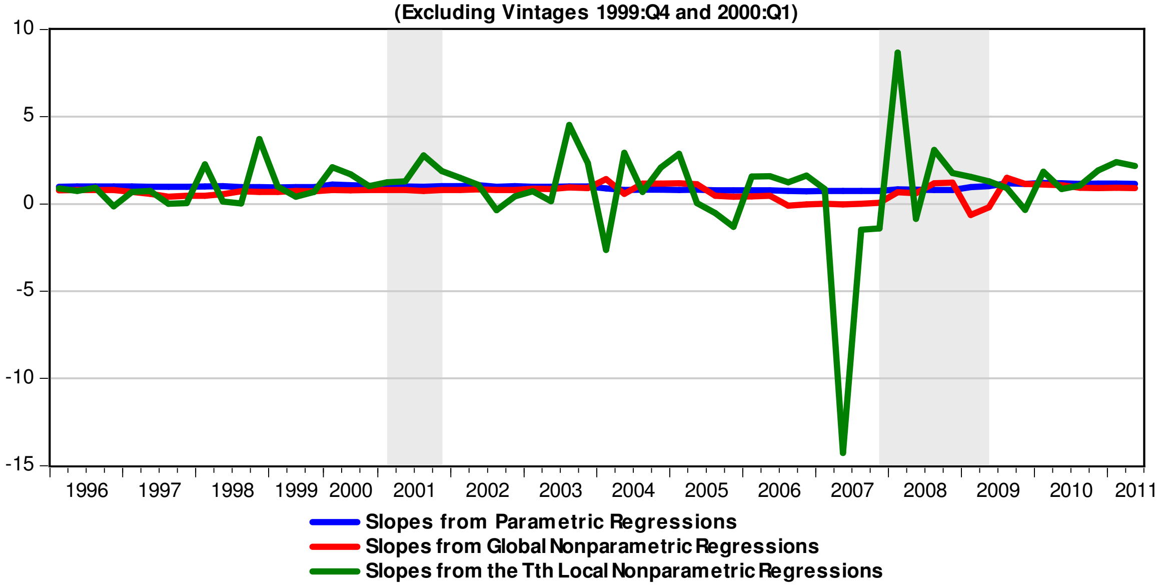
Graph 3

Slopes for h2 In-Sample Regressions
Vintages 1996:Q1 to 2011:Q2
(Excluding Vintages 1999:Q4 and 2000:Q1)



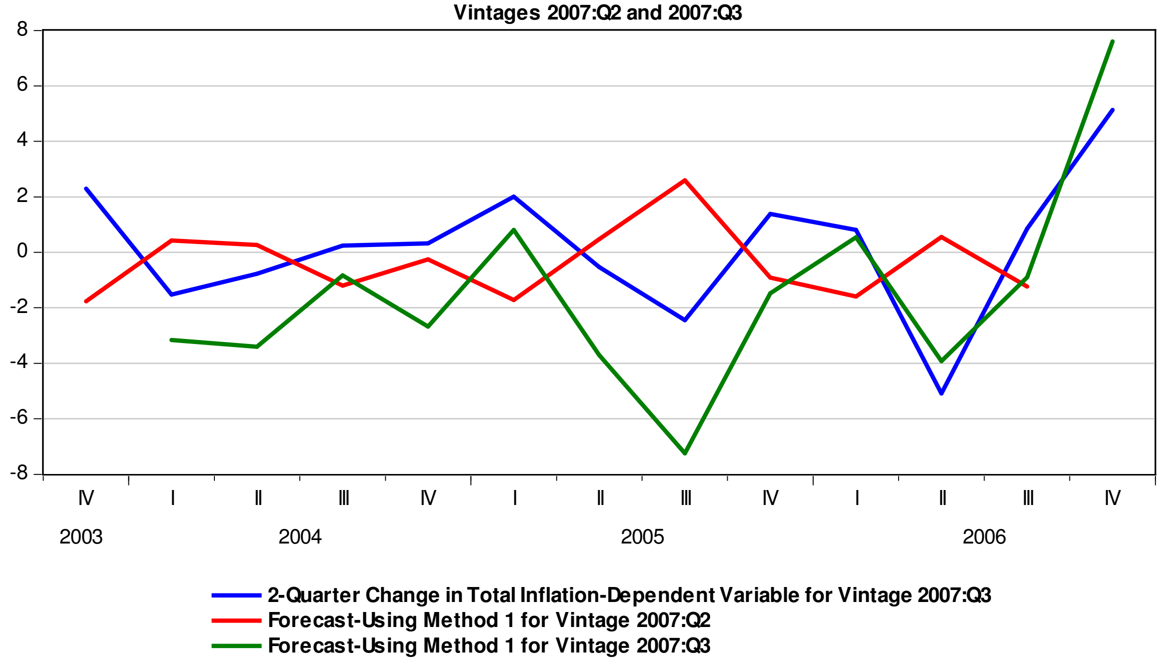
Graph 4

Slopes for h3 In-Sample Regressions
Vintages 1996:Q1 to 2011:Q2
(Excluding Vintages 1999:Q4 and 2000:Q1)



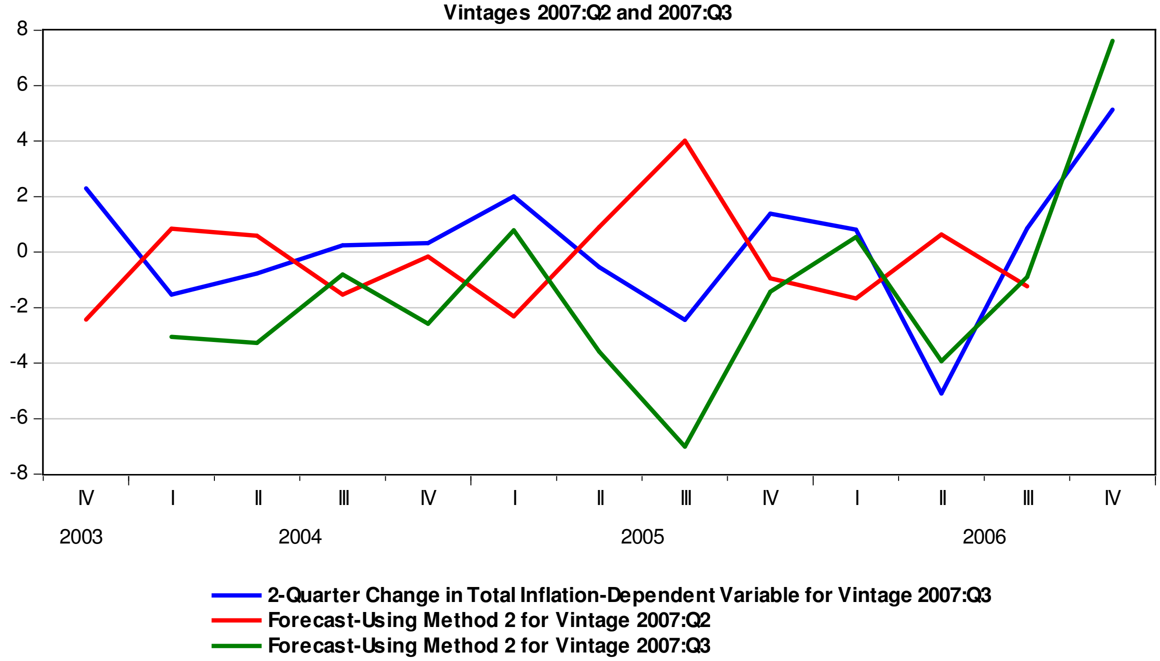
Graph 5

Out-of-Sample Forecast-Method 1
for h2-Regression
Vintages 2007:Q2 and 2007:Q3

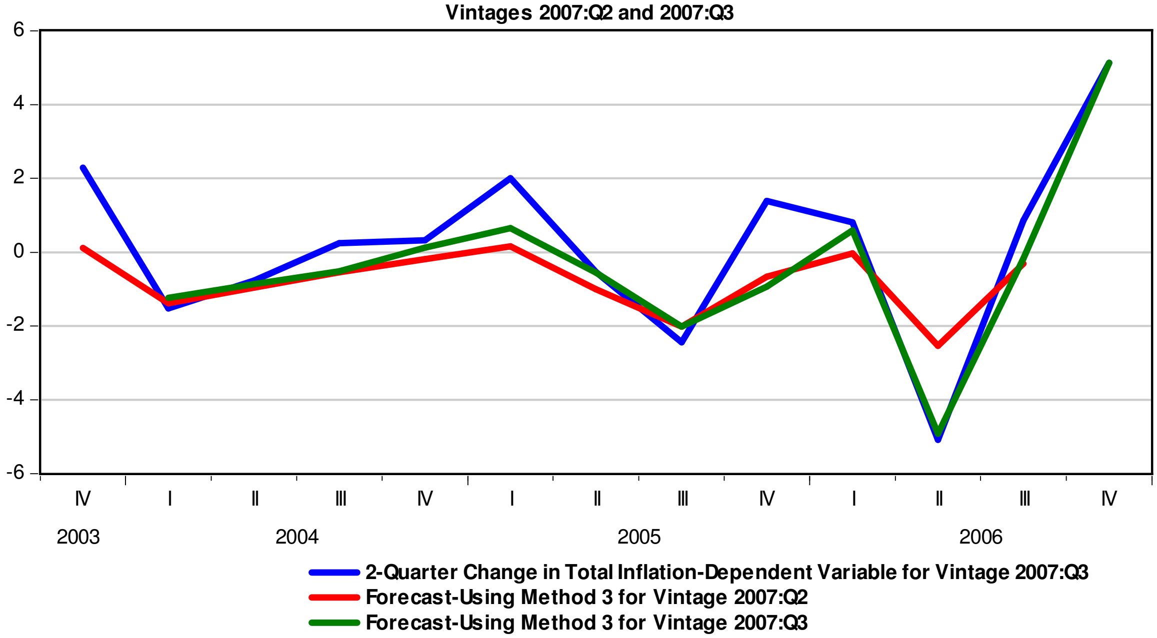


Graph 6

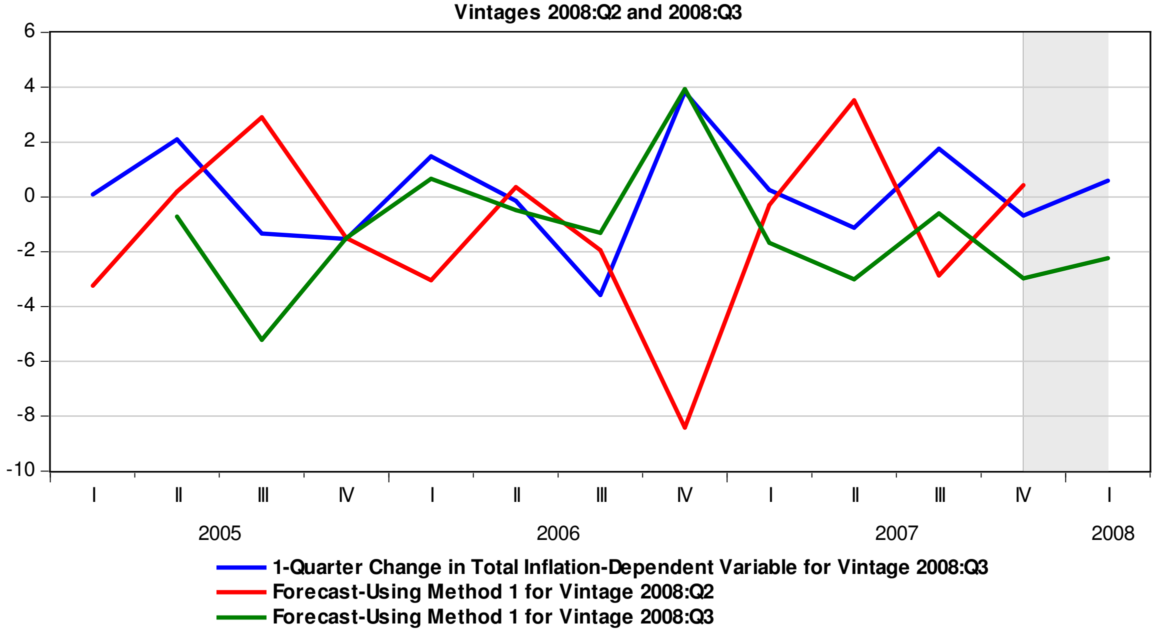
Out-of-Sample Forecast-Method 2
for h2-Regression
Vintages 2007:Q2 and 2007:Q3



Graph 7
Out-of-Sample Forecast-Method 3
for h2-Regression
Vintages 2007:Q2 and 2007:Q3

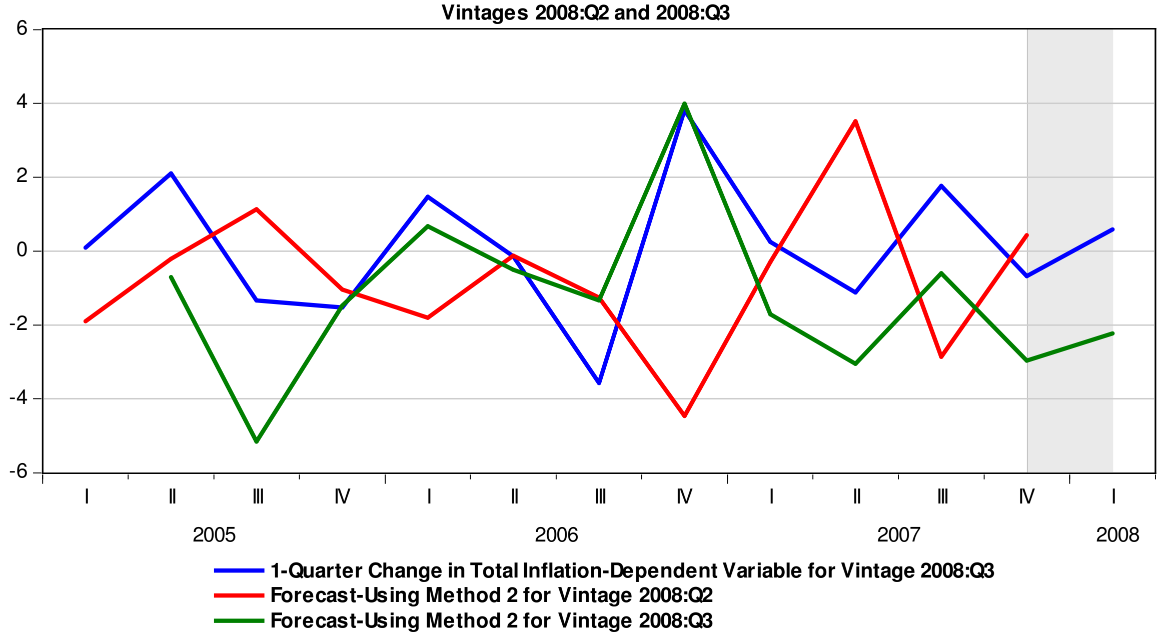


Graph 8
Out-of-Sample Forecast-Method 1
for h1-Regression
Vintages 2008:Q2 and 2008:Q3



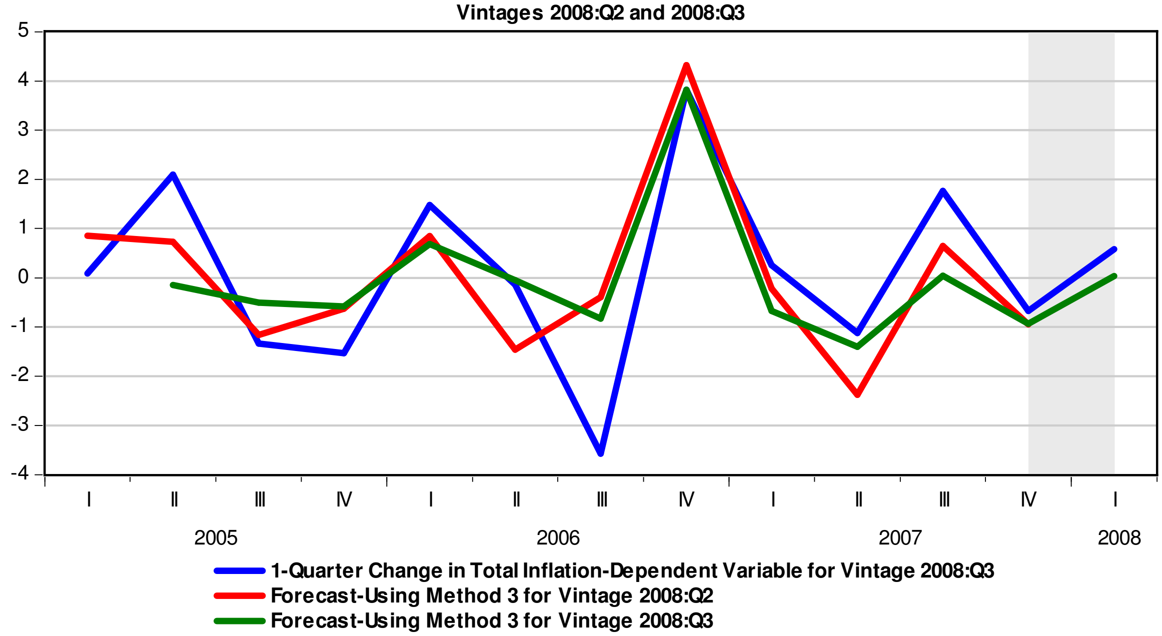
Graph 9

Out-of-Sample Forecast-Method 2 for h1-Regression Vintages 2008:Q2 and 2008:Q3

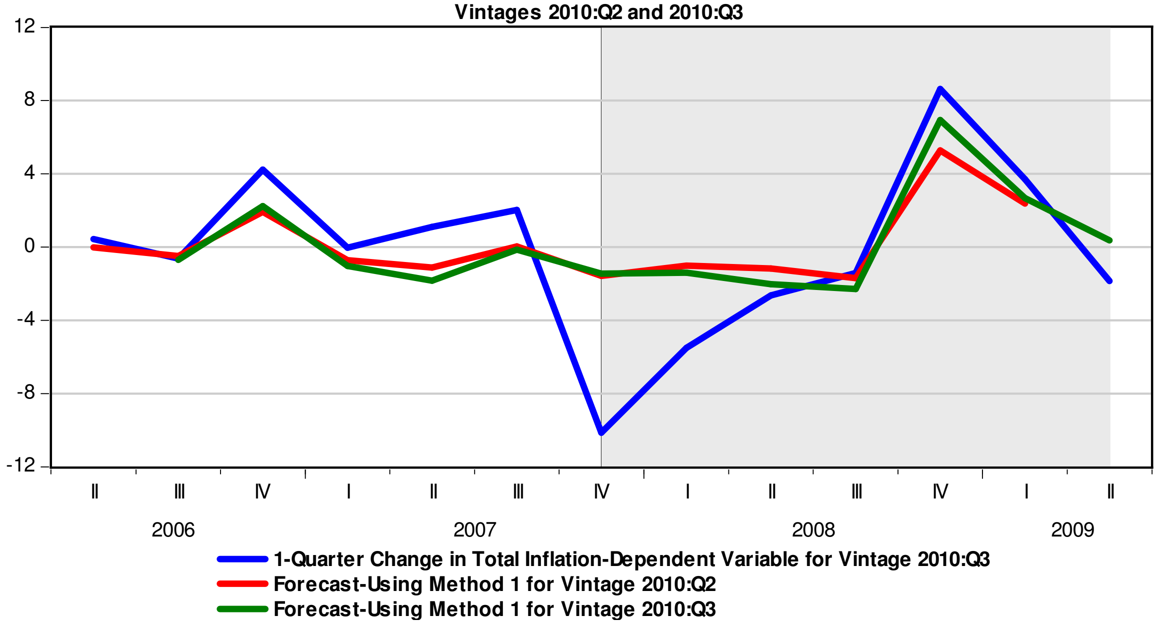


Graph 10

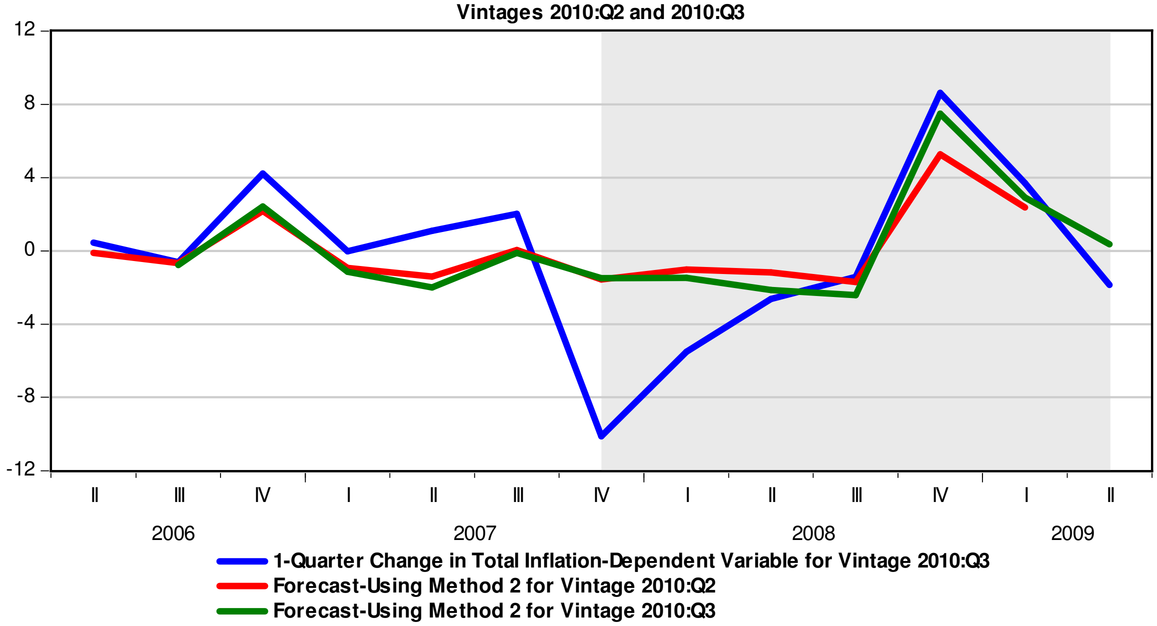
Out-of-Sample Forecast-Method 3 for h1-Regression Vintages 2008:Q2 and 2008:Q3



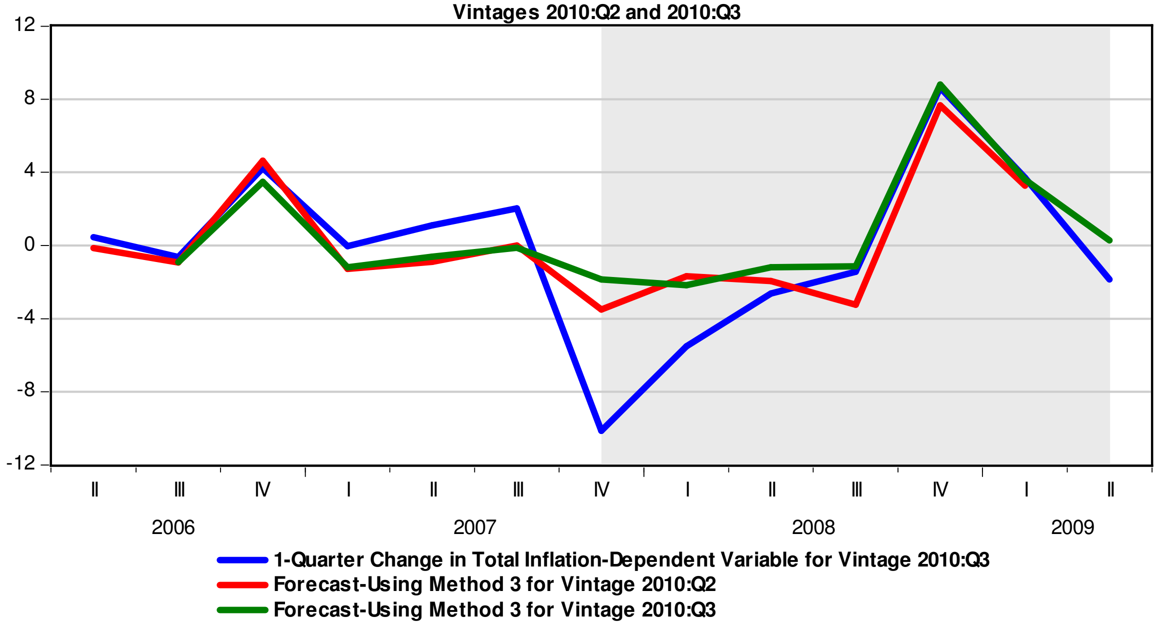
Graph 11
Out-of-Sample Forecast-Method 1
for h3-Regression
Vintages 2010:Q2 and 2010:Q3



Graph 12
Out-of-Sample Forecast-Method 2
for h3-Regression
Vintages 2010:Q2 and 2010:Q3



Graph 13
Out-of-Sample Forecast-Method 3
for h3-Regression
Vintages 2010:Q2 and 2010:Q3



Graph 14
Out-of-Sample Forecasts
Method 1 to Method 3
for h2-Regression
Vintage 2010:Q3

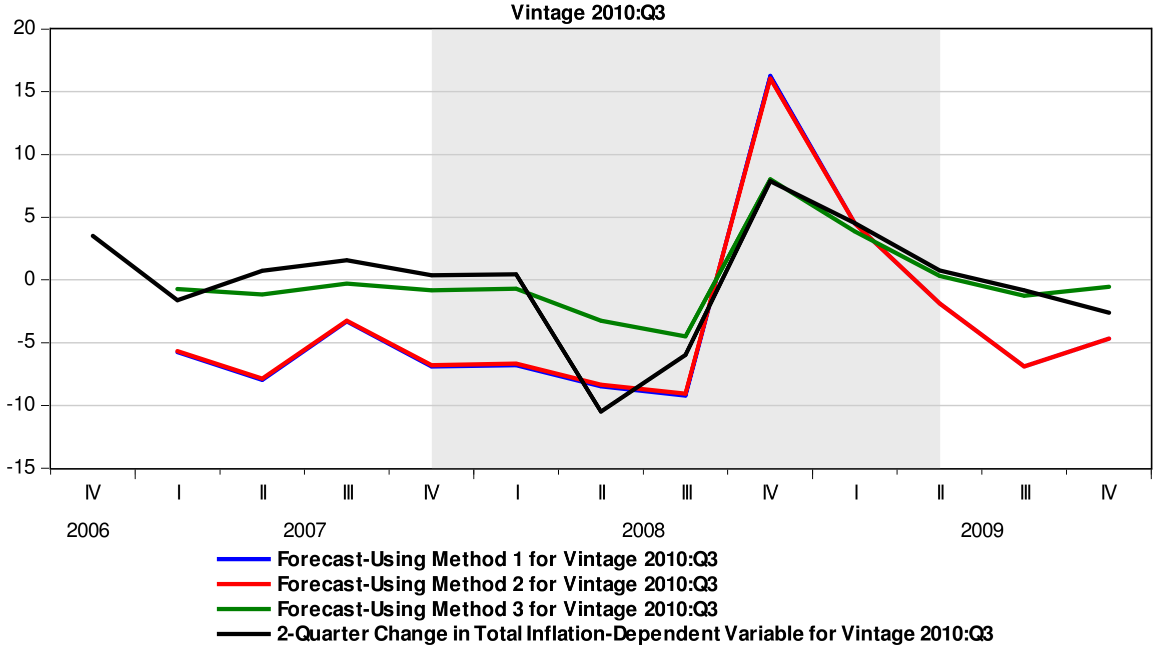


Table 1: Sample Size for each *h* In-Sample Regression			
Horizon	**# of Obs.**	**Sample Period**	**Vintages**
Full Sample	49 to 110	1983:Q4-2011:Q1	1996:Q1- 2011:Q2
***h1* (*1-quarter*)**	47 to 108	1984:Q1-2010:Q4	1996:Q1- 2011:Q2
***h2* (*2-quarters*)**	46 to 107	1984:Q1-2010:Q3	1996:Q1- 2011:Q2
***h3* (*4-quarters*)**	44 to 105	1984:Q1-2010:Q1	1996:Q1- 2011:Q2
***h4* (*8-quarters*)**	40 to 101	1984:Q1-2009:Q1	1996:Q1- 2011:Q2
***h5* (12-quarters)**	36 to 97	1984:Q1-2008:Q1	1996:Q1- 2011:Q2

Table 2: Difference in Real-Time Data Regressors for the *h1* In-Sample Forecast Horizons									
1998:Q2-1998:Q3		**2000:Q2-2000:Q3**		**2001:Q2-2001:Q3**		**2002:Q2-2002:Q3**		**2004:Q2-2004:Q3**	
Obs.	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**
1995:Q1	0.124	**1997:Q1**	0.019	**1998:Q1**	-0.158	**1999:Q1**	0.023	**2001:Q1**	0.065
1995:Q2	-0.094	**1997:Q2**	0.030	**1998:Q2**	-0.091	**1999:Q2**	-0.012	**2001:Q2**	-0.126
1995:Q3	0.085	**1997:Q3**	-0.025	**1998:Q3**	0.098	**1999:Q3**	0.008	**2001:Q3**	0.000
1995:Q4	-0.098	**1997:Q4**	-0.038	**1998:Q4**	0.173	**1999:Q4**	0.042	**2001:Q4**	0.118
1996:Q1	0.019	**1998:Q1**	-0.057	**1999:Q1**	-0.022	**2000:Q1**	0.018	**2002:Q1**	-0.047
1996:Q2	0.073	**1998:Q2**	-0.061	**1999:Q2**	-0.151	**2000:Q2**	0.080	**2002:Q2**	-0.130
1996:Q3	0.218	**1998:Q3**	-0.082	**1999:Q3**	0.049	**2000:Q3**	0.065	**2002:Q3**	0.010
1996:Q4	0.115	**1998:Q4**	-0.038	**1999:Q4**	0.173	**2000:Q4**	-0.098	**2002:Q4**	0.205
1997:Q1	-0.140	**1999:Q1**	-0.076	**2000:Q1**	-0.159	**2001:Q1**	-0.136	**2003:Q1**	-0.173
1997:Q2	-0.103	**1999:Q2**	0.002	**2000:Q2**	-0.267	**2001:Q2**	-0.058	**2003:Q2**	-0.134
1997:Q3	0.010	**1999:Q3**	-0.007	**2000:Q3**	0.060	**2001:Q3**	-0.100	**2003:Q3**	0.001
1997:Q4	-0.033	**1999:Q4**	0.033	**2000:Q4**	0.074	**2001:Q4**	-0.073	**2003:Q4**	0.012

Table 2 (Con't): Difference in Real-Time Data Regressors for the *h1* In-Sample Forecast Horizons									
2005:Q2-2005:Q3		**2006:Q2-2006:Q3**		**2007:Q2-2007:Q3**		**2008:Q2-2008:Q3**		**2010:Q2-2010:Q3**	
Obs.	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**
2002:Q1	0.018	**2003:Q1**	0.038	**2004:Q1**	-0.109	**2005:Q1**	0.319	**2007:Q1**	0.062
2002:Q2	0.040	**2003:Q2**	-0.226	**2004:Q2**	0.070	**2005:Q2**	-0.815	**2007:Q2**	0.363
2002:Q3	-0.110	**2003:Q3**	0.148	**2004:Q3**	0.019	**2005:Q3**	0.510	**2007:Q3**	0.085
2002:Q4	-0.007	**2003:Q4**	-0.045	**2004:Q4**	0.118	**2005:Q4**	0.435	**2007:Q4**	-0.523
2003:Q1	0.164	**2004:Q1**	0.029	**2005:Q1**	-0.259	**2006:Q1**	-0.084	**2008:Q1**	0.060
2003:Q2	0.015	**2004:Q2**	-0.228	**2005:Q2**	0.054	**2006:Q2**	-1.021	**2008:Q2**	0.474
2003:Q3	-0.277	**2004:Q3**	0.206	**2005:Q3**	0.067	**2006:Q3**	0.536	**2008:Q3**	0.125
2003:Q4	0.065	**2004:Q4**	-0.009	**2005:Q4**	0.079	**2006:Q4**	0.561	**2008:Q4**	-0.602
2004:Q1	0.020	**2005:Q1**	0.021	**2006:Q1**	-0.247	**2007:Q1**	-0.025	**2009:Q1**	0.094
2004:Q2	-0.096	**2005:Q2**	-0.337	**2006:Q2**	0.088	**2007:Q2**	-1.057	**2009:Q2**	0.303
2004:Q3	-0.394	**2005:Q3**	0.160	**2006:Q3**	0.059	**2007:Q3**	0.561	**2009:Q3**	-0.008
2004:Q4	-0.121	**2005:Q4**	-0.090	**2006:Q4**	-0.065	**2007:Q4**	0.377	**2009:Q4**	-0.112

Table 3: Difference in Real-Time Data Regressands for the *h1* In-Sample Forecast Horizons

1998:Q2-1998:Q3		2000:Q2-2000:Q3		2001:Q2-2001:Q3		2002:Q2-2002:Q3		2004:Q2-2004:Q3	
Obs.	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**
1995:Q1	-1.055	**1997:Q1**	-0.210	**1998:Q1**	0.479	**1999:Q1**	-0.310	**2001:Q1**	0.092
1995:Q2	0.043	**1997:Q2**	0.055	**1998:Q2**	-0.191	**1999:Q2**	0.286	**2001:Q2**	-0.109
1995:Q3	-0.037	**1997:Q3**	-0.143	**1998:Q3**	0.001	**1999:Q3**	-0.034	**2001:Q3**	-0.042
1995:Q4	0.394	**1997:Q4**	0.020	**1998:Q4**	0.346	**1999:Q4**	0.512	**2001:Q4**	-0.026
1996:Q1	-0.059	**1998:Q1**	-0.033	**1999:Q1**	-0.178	**2000:Q1**	-0.704	**2002:Q1**	0.236
1996:Q2	0.537	**1998:Q2**	-0.171	**1999:Q2**	-0.543	**2000:Q2**	0.464	**2002:Q2**	-0.016
1996:Q3	-0.522	**1998:Q3**	-0.003	**1999:Q3**	0.067	**2000:Q3**	-0.584	**2002:Q3**	0.302
1996:Q4	-0.716	**1998:Q4**	0.042	**1999:Q4**	-0.232	**2000:Q4**	0.151	**2002:Q4**	-0.743
1997:Q1	0.218	**1999:Q1**	0.228	**2000:Q1**	0.451	**2001:Q1**	-0.332	**2003:Q1**	0.216
1997:Q2	0.216	**1999:Q2**	-0.028	**2000:Q2**	-0.549	**2001:Q2**	0.302	**2003:Q2**	0.331
1997:Q3	0.007	**1999:Q3**	0.341	**2000:Q3**	0.548	**2001:Q3**	0.197	**2003:Q3**	-0.326
1997:Q4	0.147	**1999:Q4**	-0.546	**2000:Q4**	0.084	**2001:Q4**	-0.532	**2003:Q4**	0.107

Table 3 (Con't): Difference in Real-Time Data Regressands for the *h1* In-Sample Forecast Horizons

2005:Q2-2005:Q3		2006:Q2-2006:Q3		2007:Q2-2007:Q3		2008:Q2-2008:Q3		2010:Q2-2010:Q3	
Obs.	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**
2002:Q1	0.125	**2003:Q1**	0.008	**2004:Q1**	-0.381	**2005:Q1**	1.049	**2007:Q1**	-0.069
2002:Q2	0.130	**2003:Q2**	-0.361	**2004:Q2**	0.160	**2005:Q2**	-1.230	**2007:Q2**	0.323
2002:Q3	-0.471	**2003:Q3**	0.198	**2004:Q3**	0.086	**2005:Q3**	-0.064	**2007:Q3**	0.792
2002:Q4	0.465	**2003:Q4**	0.362	**2004:Q4**	0.056	**2005:Q4**	0.491	**2007:Q4**	-1.065
2003:Q1	-0.113	**2004:Q1**	0.023	**2005:Q1**	-0.311	**2006:Q1**	0.956	**2008:Q1**	-0.431
2003:Q2	-0.426	**2004:Q2**	-0.595	**2005:Q2**	0.101	**2006:Q2**	-1.479	**2008:Q2**	0.943
2003:Q3	0.256	**2004:Q3**	0.481	**2005:Q3**	0.228	**2006:Q3**	0.109	**2008:Q3**	0.513
2003:Q4	-0.470	**2004:Q4**	-0.101	**2005:Q4**	0.191	**2006:Q4**	0.500	**2008:Q4**	-0.619
2004:Q1	-0.103	**2005:Q1**	0.189	**2006:Q1**	-0.496	**2007:Q1**	0.503	**2009:Q1**	-0.728
2004:Q2	0.462	**2005:Q2**	-0.577	**2006:Q2**	-0.009	**2007:Q2**	-1.254	**2009:Q2**	0.237
2004:Q3	-0.249	**2005:Q3**	0.349	**2006:Q3**	0.185	**2007:Q3**	0.310	**2009:Q3**	0.132
2004:Q4	0.335	**2005:Q4**	0.014	**2006:Q4**	-0.071	**2007:Q4**	0.267	**2009:Q4**	-0.347

Table 4: Difference in Real-Time Data Regressands for the h5 In-Sample Forecast Horizons

1998:Q2-1998:Q3		2000:Q2-2000:Q3		2001:Q2-2001:Q3		2002:Q2-2002:Q3		2004:Q2-2004:Q3	
Obs.	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**
1992.02	0.055	**1994.02**	0.888	**1995.02**	-0.185	**1996.02**	-0.797	**1998.02**	0.333
1992.03	0.089	**1994.03**	-0.499	**1995.03**	0.083	**1996.03**	0.482	**1998.03**	-0.092
1992.04	0.061	**1994.04**	-0.103	**1995.04**	0.737	**1996.04**	-0.398	**1998.04**	0.000
1993.01	0.446	**1995.01**	0.148	**1996.01**	0.263	**1997.01**	-1.265	**1999.01**	1.125
1993.02	0.391	**1995.02**	-0.185	**1996.02**	-0.797	**1997.02**	1.361	**1999.02**	-0.107
1993.03	0.928	**1995.03**	0.083	**1996.03**	0.482	**1997.03**	-0.133	**1999.03**	-0.257
1993.04	0.406	**1995.04**	0.737	**1996.04**	-0.398	**1997.04**	-1.090	**1999.04**	0.530
1994.01	-0.310	**1996.01**	0.263	**1997.01**	-1.265	**1998.01**	0.344	**2000.01**	-0.380
1994.02	-0.092	**1996.02**	-0.797	**1997.02**	1.361	**1998.02**	0.445	**2000.02**	0.254
1994.03	0.123	**1996.03**	0.482	**1997.03**	-0.133	**1998.03**	0.182	**2000.03**	-0.651
1994.04	0.130	**1996.04**	-0.398	**1997.04**	-1.090	**1998.04**	-0.052	**2000.04**	0.159
1995.01	-0.828	**1997.01**	-1.246	**1998.01**	0.186	**1999.01**	0.890	**2001.01**	0.109

Table 4 (Con't): Difference in Real-Time Data Regressands for the h5 In-Sample Forecast Horizons									
2005:Q2-2005:Q3		2006:Q2-2006:Q3		2007:Q2-2007:Q3		2008:Q2-2008:Q3		2010:Q2-2010:Q3	
Obs.	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**	**Obs.**	**Diff**
1999.02	-0.107	**2000.02**	0.254	**2001.02**	-1.348	**2002.02**	-1.011	**2004.02**	0.134
1999.03	-0.257	**2000.03**	-0.651	**2001.03**	-1.138	**2002.03**	0.515	**2004.03**	0.935
1999.04	0.530	**2000.04**	0.159	**2001.04**	1.653	**2002.04**	1.482	**2004.04**	-1.865
2000.01	-0.380	**2001.01**	0.044	**2002.01**	1.263	**2003.01**	-2.519	**2005.01**	0.804
2000.02	0.254	**2001.02**	-1.348	**2002.02**	-1.011	**2003.02**	1.180	**2005.02**	2.522
2000.03	-0.651	**2001.03**	-1.138	**2002.03**	0.515	**2003.03**	-0.697	**2005.03**	-1.990
2000.04	0.159	**2001.04**	1.653	**2002.04**	1.482	**2003.04**	1.187	**2005.04**	-1.147
2001.01	0.044	**2002.01**	1.263	**2003.01**	-2.519	**2004.01**	0.084	**2006.01**	0.386
2001.02	-1.348	**2002.02**	-1.011	**2003.02**	1.180	**2004.02**	-0.920	**2006.02**	0.554
2001.03	-1.138	**2002.03**	0.515	**2003.03**	-0.697	**2004.03**	0.661	**2006.03**	-2.775
2001.04	1.653	**2002.04**	1.482	**2003.04**	1.187	**2004.04**	-0.928	**2006.04**	3.098
2002.01	1.282	**2003.01**	-2.481	**2004.01**	-0.026	**2005.01**	0.798	**2007.01**	0.825

Table 5: Mean and Maximum of Absolute Difference in Real-Time Data Regressors										
	h1		h2		h3		h4		h5	
Vintages	**Mean**	**Max**	**Mean**	**Max**	**Mean**	**Max**	**Mean**	**Max**	**Mean**	**Max**
1998:Q2-1998:Q3	0.093	0.218	0.090	0.218	0.080	0.218	0.035	0.124	0.012	0.124
2000:Q2-2000:Q3	0.039	0.082	0.036	0.082	0.035	0.082	0.014	0.057	0.002	0.019
2001:Q2-2001:Q3	0.123	0.267	0.117	0.267	0.090	0.173	0.045	0.173	0.013	0.158
2002:Q2-2002:Q3	0.059	0.136	0.053	0.136	0.040	0.136	0.008	0.042	0.002	0.023
2004:Q2-2004:Q3	0.085	0.205	0.084	0.205	0.073	0.205	0.030	0.126	0.005	0.065
2005:Q2-2005:Q3	0.111	0.394	0.101	0.394	0.060	0.277	0.028	0.164	0.002	0.018
2006:Q2-2006:Q3	0.128	0.337	0.121	0.337	0.079	0.228	0.040	0.226	0.003	0.038
2007:Q2-2007:Q3	0.103	0.259	0.097	0.259	0.085	0.259	0.048	0.259	0.009	0.109
2008:Q2-2008:Q3	0.525	1.057	0.494	1.057	0.359	1.021	0.180	0.815	0.027	0.319
2010:Q2-2010:Q3	0.234	0.602	0.225	0.602	0.199	0.602	0.091	0.523	0.005	0.062

Table 6: Mean and Maximum of Absolute Difference in Real-Time Data Regressands										
	h1		h2		h3		h4		h5	
Vintages	**Mean**	**Max**	**Mean**	**Max**	**Mean**	**Max**	**Mean**	**Max**	**Mean**	**Max**
1998:Q2-1998:Q3	0.329	1.055	0.400	1.238	0.441	0.835	0.350	1.415	0.322	0.928
2000:Q2-2000:Q3	0.152	0.546	0.151	0.313	0.180	0.583	0.176	0.443	0.175	0.448
2001:Q2-2001:Q3	0.306	0.549	0.296	0.721	0.322	0.886	0.264	0.638	0.247	0.581
2002:Q2-2002:Q3	0.367	0.704	0.250	0.499	0.292	0.673	0.278	1.038	0.248	0.584
2004:Q2-2004:Q3	0.212	0.743	0.225	0.547	0.209	0.522	0.148	0.334	0.154	0.409
2005:Q2-2005:Q3	0.300	0.471	0.264	0.573	0.331	0.753	0.281	0.733	0.266	0.668
2006:Q2-2006:Q3	0.272	0.595	0.301	0.572	0.141	0.382	0.169	0.394	0.175	0.402
2007:Q2-2007:Q3	0.190	0.496	0.263	0.505	0.116	0.391	0.117	0.246	0.158	0.274
2008:Q2-2008:Q3	0.684	1.479	0.827	1.447	0.260	0.804	0.385	0.957	0.456	0.957
2010:Q2-2010:Q3	0.517	1.065	0.661	1.496	0.385	0.978	0.454	1.018	0.391	0.818

Table 7: Differences in Real-Time PCE Data (Raw Data)

Vint\OBS	1995:Q1	1995:Q2	1995:Q3	1995:Q4	1996:Q1	1996:Q2	1996:Q3	1996:Q4	1997:Q1	1997:Q2	1997:Q3	1997:Q4	1998:Q1
1998.02	107.040	107.665	108.188	108.640	109.347	110.120	110.792	111.598	112.196	112.479	112.892	113.228	113.310
1998.03	106.744	107.355	107.851	108.287	108.869	109.532	109.945	110.633	111.312	111.618	111.993	112.291	112.293
DIFF	**0.295**	0.310	0.337	0.353	0.478	0.588	0.847	0.966	0.884	0.861	0.899	0.938	**1.016**
Vint\OBS	1997:Q1	1997:Q2	1997:Q3	1997:Q4	1998:Q1	1998:Q2	1998:Q3	1998:Q4	1999:Q1	1999:Q2	1999:Q3	1999:Q4	2000:Q1
2000.02	101.525	101.807	102.127	102.438	102.504	102.782	103.070	103.364	103.739	104.312	104.787	105.427	106.265
2000.03	101.480	101.769	102.083	102.424	102.516	102.828	103.194	103.568	104.012	104.596	105.090	105.658	106.570
DIFF	0.045	0.037	0.044	0.013	**-0.012**	-0.046	-0.124	-0.204	-0.273	-0.284	-0.302	-0.231	**-0.305**
Vint\OBS	1998:Q1	1998:Q2	1998:Q3	1998:Q4	1999:Q1	1999:Q2	1999:Q3	1999:Q4	2000:Q1	2000:Q2	2000:Q3	2000:Q4	2001:Q1
2001.02	102.516	102.828	103.194	103.568	104.012	104.596	105.090	105.658	106.570	107.119	107.599	108.110	108.981
2001.03	102.575	102.823	103.175	103.533	103.873	104.397	104.973	105.607	106.646	107.205	107.842	108.363	109.221
DIFF	-0.059	**0.004**	0.019	0.034	0.139	0.199	0.117	0.051	-0.077	-0.086	-0.243	**-0.253**	-0.240
Vint\OBS	1999:Q1	1999:Q2	1999:Q3	1999:Q4	2000:Q1	2000:Q2	2000:Q3	2000:Q4	2001:Q1	2001:Q2	2001:Q3	2001:Q4	2002:Q1
2002.02	103.873	104.397	104.973	105.607	106.646	107.205	107.842	108.363	109.221	109.586	109.524	109.753	109.919
2002.03	103.849	104.430	104.988	105.613	106.507	107.107	107.660	108.256	109.148	109.638	109.619	109.838	110.138
DIFF	0.024	-0.033	-0.015	**-0.006**	0.140	0.098	**0.181**	0.107	0.073	-0.052	-0.095	-0.084	-0.220
Vint\OBS	2001:Q1	2001:Q2	2001:Q3	2001:Q4	2002:Q1	2002:Q2	2002:Q3	2002:Q4	2003:Q1	2003:Q2	2003:Q3	2003:Q4	2004:Q1
2004.02	101.472	102.113	102.229	102.332	102.505	103.242	103.757	104.199	104.923	105.060	105.517	105.783	106.615
2004.03	101.499	102.143	102.290	102.434	102.655	103.382	103.890	104.245	105.076	105.264	105.685	106.001	106.857
DIFF	**-0.026**	-0.030	-0.061	-0.102	-0.151	-0.140	-0.132	-0.046	-0.153	-0.204	-0.169	-0.219	**-0.242**
Vint\OBS	2002:Q1	2002:Q2	2002:Q3	2002:Q4	2003:Q1	2003:Q2	2003:Q3	2003:Q4	2004:Q1	2004:Q2	2004:Q3	2004:Q4	2005:Q1
2005.02	102.655	103.382	103.890	104.245	105.076	105.264	105.685	106.001	106.857	107.678	108.017	108.730	109.305
2005.03	102.671	103.381	103.838	104.265	105.047	105.216	105.729	106.070	107.077	108.081	108.477	109.317	109.928
DIFF	-0.016	**0.001**	0.051	-0.021	0.029	0.049	-0.044	-0.069	-0.221	-0.403	-0.460	-0.587	**-0.623**
Vint\OBS	2003:Q1	2003:Q2	2003:Q3	2003:Q4	2004:Q1	2004:Q2	2004:Q3	2004:Q4	2005:Q1	2005:Q2	2005:Q3	2005:Q4	2006:Q1
2006.02	105.047	105.216	105.729	106.070	107.077	108.081	108.477	109.317	109.928	110.824	111.838	112.628	113.187
2006.03	105.055	105.229	105.844	106.235	107.195	108.145	108.648	109.467	110.082	110.931	112.058	112.864	113.436
DIFF	**-0.008**	-0.014	-0.115	-0.164	-0.118	-0.065	-0.172	-0.149	-0.154	-0.107	-0.220	-0.237	**-0.249**

Table 7 (Continued): Differences in Real-Time PCE Data (Raw Data)

Vint\OBS	2004:Q1	2004:Q2	2004:Q3	2004:Q4	2005:Q1	2005:Q2	2005:Q3	2005:Q4	2006:Q1	2006:Q2	2006:Q3	2006:Q4	2007:Q1
2007.02	107.195	108.145	108.648	109.467	110.082	110.931	112.058	112.864	113.436	114.564	115.232	114.957	115.908
2007.03	107.157	108.171	108.696	109.512	110.110	111.027	112.196	112.980	113.474	114.665	115.401	115.139	116.125
DIFF	0.038	**-0.026**	-0.047	-0.045	-0.028	-0.096	-0.138	-0.115	-0.038	-0.102	-0.169	-0.182	**-0.217**
Vint\OBS	2005:Q1	2005:Q2	2005:Q3	2005:Q4	2006:Q1	2006:Q2	2006:Q3	2006:Q4	2007:Q1	2007:Q2	2007:Q3	2007:Q4	2008:Q1
2008.02	110.110	111.027	112.196	112.980	113.474	114.665	115.401	115.139	116.125	117.342	117.869	119.014	120.048
2008.03	110.177	110.872	112.159	113.081	113.576	114.494	115.378	115.235	116.197	117.241	117.963	119.215	120.276
DIFF	-0.068	0.155	0.037	-0.101	-0.101	0.172	**0.022**	-0.096	-0.072	0.101	-0.095	-0.201	**-0.229**
Vint\OBS	2007:Q1	2007:Q2	2007:Q3	2007:Q4	2008:Q1	2008:Q2	2008:Q3	2008:Q4	2009:Q1	2009:Q2	2009:Q3	2009:Q4	2010:Q1
2010.02	104.246	105.069	105.677	107.002	107.974	109.023	110.277	108.858	108.454	108.818	109.514	110.193	110.610
2010.03	104.305	105.207	105.809	106.916	107.954	109.187	110.369	108.737	108.290	108.809	109.595	110.330	110.898
DIFF	-0.059	-0.138	-0.132	0.086	0.020	-0.164	-0.093	0.120	0.163	**0.009**	-0.081	-0.137	**-0.289**

Table 8: Differences in Real-Time Core PCE Data (Raw Data)

Vint\OBS	1995:Q1	1995:Q2	1995:Q3	1995:Q4	1996:Q1	1996:Q2	1996:Q3	1996:Q4	1997:Q1	1997:Q2	1997:Q3	1997:Q4	1998:Q1
1998.02	107.630	108.300	108.880	109.350	109.920	110.520	111.210	111.870	112.410	112.970	113.280	113.580	113.970
1998.03	107.300	107.980	108.510	108.990	109.430	109.900	110.270	110.780	111.440	112.050	112.320	112.590	112.890
DIFF	0.330	**0.320**	0.370	0.360	0.490	0.620	0.940	1.090	0.970	0.920	0.960	0.990	**1.080**
Vint\OBS	1997:Q1	1997:Q2	1997:Q3	1997:Q4	1998:Q1	1998:Q2	1998:Q3	1998:Q4	1999:Q1	1999:Q2	1999:Q3	1999:Q4	2000:Q1
2000.02	101.350	101.930	102.190	102.470	102.740	103.150	103.500	103.840	104.220	104.550	104.860	105.380	105.860
2000.03	101.300	101.880	102.140	102.460	102.770	103.230	103.680	104.110	104.580	104.920	105.250	105.690	106.260
DIFF	0.050	0.050	0.050	0.010	**-0.030**	-0.080	-0.180	-0.270	-0.360	-0.370	-0.390	-0.310	**-0.400**
Vint\OBS	1998:Q1	1998:Q2	1998:Q3	1998:Q4	1999:Q1	1999:Q2	1999:Q3	1999:Q4	2000:Q1	2000:Q2	2000:Q3	2000:Q4	2001:Q1
2001.02	102.770	103.230	103.680	104.110	104.580	104.920	105.250	105.690	106.260	106.640	106.930	107.340	108.060
2001.03	102.870	103.290	103.700	104.070	104.440	104.760	105.160	105.620	106.360	106.820	107.250	107.650	108.330
DIFF	-0.100	**-0.060**	-0.020	0.040	0.140	0.160	0.090	0.070	-0.100	-0.180	-0.320	**-0.310**	-0.270

Table 8 (Continued): Differences in Real-Time Core PCE Data (Raw Data)

Vint\OBS	1999:Q1	1999:Q2	1999:Q3	1999:Q4	2000:Q1	2000:Q2	2000:Q3	2000:Q4	2001:Q1	2001:Q2	2001:Q3	2001:Q4	2002:Q1
2002.02	104.440	104.760	105.160	105.620	106.360	106.820	107.250	107.650	108.330	108.510	108.640	109.370	109.600
2002.03	104.410	104.790	105.170	105.610	106.200	106.680	107.010	107.510	108.260	108.580	108.780	109.520	109.910
DIFF	0.030	-0.030	-0.010	**0.010**	0.160	0.140	**0.240**	0.140	0.070	-0.070	-0.140	-0.150	-0.310
Vint\OBS	2001:Q1	2001:Q2	2001:Q3	2001:Q4	2002:Q1	2002:Q2	2002:Q3	2002:Q4	2003:Q1	2003:Q2	2003:Q3	2003:Q4	2004:Q1
2004.02	101.162	101.643	101.976	102.618	102.871	103.349	103.861	104.243	104.474	104.680	104.951	105.257	105.782
2004.03	101.172	101.688	102.052	102.706	103.020	103.520	104.022	104.264	104.647	104.939	105.174	105.527	106.081
DIFF	**-0.010**	-0.045	-0.076	-0.088	-0.149	-0.171	-0.161	-0.021	-0.173	-0.259	-0.223	-0.270	**-0.299**
Vint\OBS	2002:Q1	2002:Q2	2002:Q3	2002:Q4	2003:Q1	2003:Q2	2003:Q3	2003:Q4	2004:Q1	2004:Q2	2004:Q3	2004:Q4	2005:Q1
2005.02	103.020	103.520	104.022	104.264	104.647	104.939	105.174	105.527	106.081	106.523	106.753	107.217	107.814
2005.03	103.031	103.504	103.984	104.300	104.591	104.859	105.259	105.620	106.319	106.966	107.358	107.980	108.617
DIFF	-0.011	**0.016**	0.038	-0.036	0.056	0.080	-0.085	-0.093	-0.238	-0.443	-0.605	-0.763	**-0.803**
Vint\OBS	2003:Q1	2003:Q2	2003:Q3	2003:Q4	2004:Q1	2004:Q2	2004:Q3	2004:Q4	2005:Q1	2005:Q2	2005:Q3	2005:Q4	2006:Q1
2006.02	104.591	104.859	105.259	105.620	106.319	106.966	107.358	107.980	108.617	109.083	109.450	110.095	110.654
2006.03	104.589	104.922	105.384	105.806	106.451	107.106	107.549	108.151	108.787	109.298	109.732	110.418	110.983
DIFF	**0.002**	-0.063	-0.125	-0.186	-0.132	-0.140	-0.191	-0.171	-0.170	-0.215	-0.282	-0.323	**-0.329**
Vint\OBS	2004:Q1	2004:Q2	2004:Q3	2004:Q4	2005:Q1	2005:Q2	2005:Q3	2005:Q4	2006:Q1	2006:Q2	2006:Q3	2006:Q4	2007:Q1
2007.02	106.451	107.106	107.549	108.151	108.787	109.298	109.732	110.418	110.983	111.738	112.34	112.84	113.47
2007.03	106.442	107.142	107.601	108.169	108.858	109.422	109.878	110.520	111.078	111.871	112.52	113.05	113.73
DIFF	**0.009**	-0.036	-0.052	-0.018	-0.071	-0.124	-0.146	-0.102	-0.095	**-0.133**	-0.18	-0.21	-0.26
Vint\OBS	2005:Q1	2005:Q2	2005:Q3	2005:Q4	2006:Q1	2006:Q2	2006:Q3	2006:Q4	2007:Q1	2007:Q2	2007:Q3	2007:Q4	2008:Q1
2008.02	108.858	109.422	109.878	110.520	111.078	111.871	112.519	113.052	113.730	114.116	114.682	115.403	116.019
2008.03	108.838	109.405	109.838	110.495	111.076	111.887	112.531	113.022	113.682	114.201	114.797	115.512	116.158
DIFF	0.020	0.017	0.040	0.025	**0.002**	-0.016	-0.012	0.030	0.048	-0.085	-0.115	-0.109	**-0.139**
Vint\OBS	2007:Q1	2007:Q2	2007:Q3	2007:Q4	2008:Q1	2008:Q2	2008:Q3	2008:Q4	2009:Q1	2009:Q2	2009:Q3	2009:Q4	2010:Q1
2010.02	103.862	104.318	104.904	105.714	106.333	106.976	107.652	107.866	108.173	108.712	109.027	109.503	109.671
2010.03	103.905	104.344	104.901	105.633	106.301	106.998	107.569	107.735	107.973	108.583	108.990	109.551	109.887
DIFF	-0.043	**-0.026**	0.003	0.081	0.032	-0.022	0.083	0.131	0.200	0.129	0.037	**-0.048**	-0.216

Table 9: Mean Values of RMSE and MAE					
RMSE+					
	h1	h2	h3	h4	h5
Local NP Method 1	2.458	3.318	1.854	2.311	2.842
Local NP Method 2	1.955	3.311	2.049	2.355	2.905
Local NP Method 3	0.168	0.179	0.183	0.141	0.116
Parametric	3.256	4.513	4.362	3.979	3.496
Global Nonparametric	4.066	5.871	3.503	2.140	2.473
MAE					
	h1	h2	h3	h4	h5
Local NP Method 1	1.340	1.748	1.125	1.126	1.273
Local NP Method 2	1.087	1.879	1.242	1.133	1.304
Local NP Method 3	0.086	0.094	0.094	0.084	0.071
Parametric	8.677	11.552	11.800	11.365	9.681
Global Nonparametric	11.084	23.359	16.435	11.597	6.991

Table 10: Ave Values of RMSE and MAE--Removing Outliers					
RMSE					
	h1	h2	h3	h4	h5
Method 1	1.549	2.260	1.369	1.389	1.670
Method 2	1.312	2.255	1.526	1.408	1.567
Method 3	0.168	0.179	0.183	0.141	0.116
MAE					
	h1	h2	h3	h4	h5
Method 1	1.340	1.748	1.125	1.126	1.273
Method 2	1.087	1.879	1.242	1.133	1.304
Method 3	0.086	0.094	0.094	0.084	0.071

Table 11: Vintages Corresponding to RMSE Outliers for Method 1 and Method 2									
h1		h2		h3		h4		h5	
Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2
2007.03	2000.01	2000.01	2000.01	2007.02	2007.02	1996.01	1996.01	1996.02	1996.01
2009.01	2007.03	2005.03	2005.03	2008.01	2008.01	2000.01	2000.01	1997.01	1996.02
	2010.02	2006.04	2006.04			2008.02	2008.02	2008.01	1997.01
		2008.02	2008.02					2009.02	2008.01
		2009.02							2009.02

+In forming the averages of the RMSE of the parametric and global nonparametric forecasts, V_2000:Q1 is eliminated due to the nonparametric model's ability to detect the fact that the data for this vintage came from two different data sources as is evidenced by the unusually small window width and the unusually large estimated parameters of the nonparametric model as is demonstrated in Table 2A.

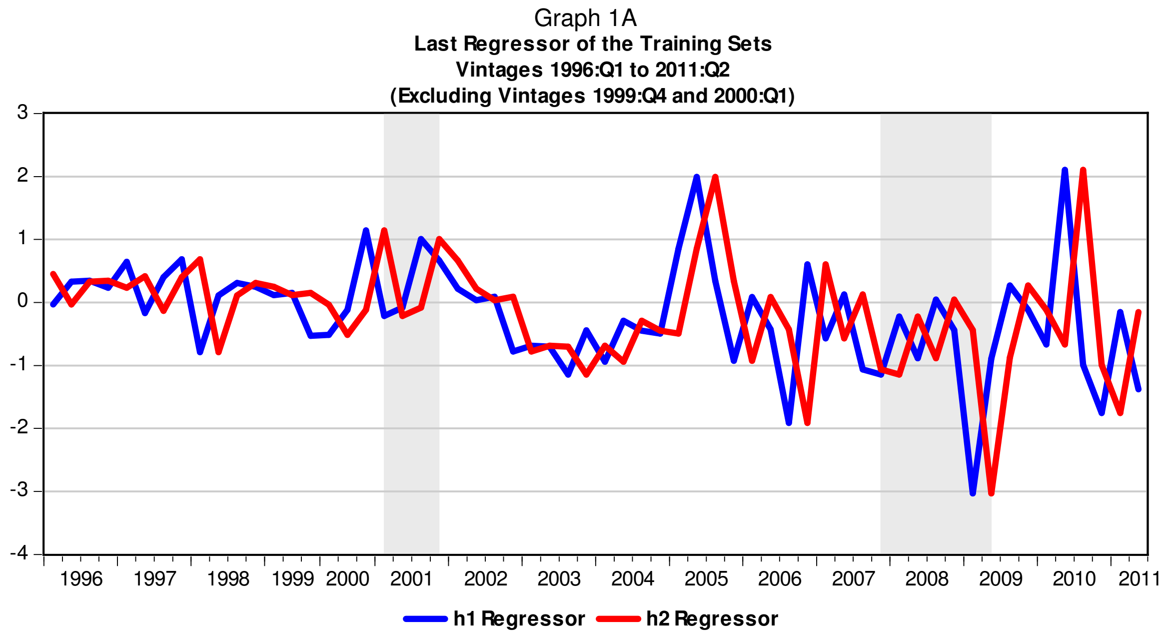
Table 12: Vintages Corresponding to MAE Outliers for Method 1 and Method 2									
h1		h2		h3		h4		h5	
Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2
2009.01	2000.01	2000.01	2000.01	2007.02	2007.02	1996.01	1996.01	1996.02	1996.02
	2010.02	2005.03	2005.03			2008.02	2008.02	1997.01	1997.01
		2006.04	2006.04					2008.01	2008.01
		2008.02						2009.02	2009.02
		2009.02							

Table 13: Number of Times the HLN Test Stat is > 1.796					
	h1	h2	h3	h4	h5
Method 1 v. Method 2	30	34	34	41	30
Method 1 v. Method 3	27	31	39	42	31
Method 2 v. Method 3	27	33	37	39	31

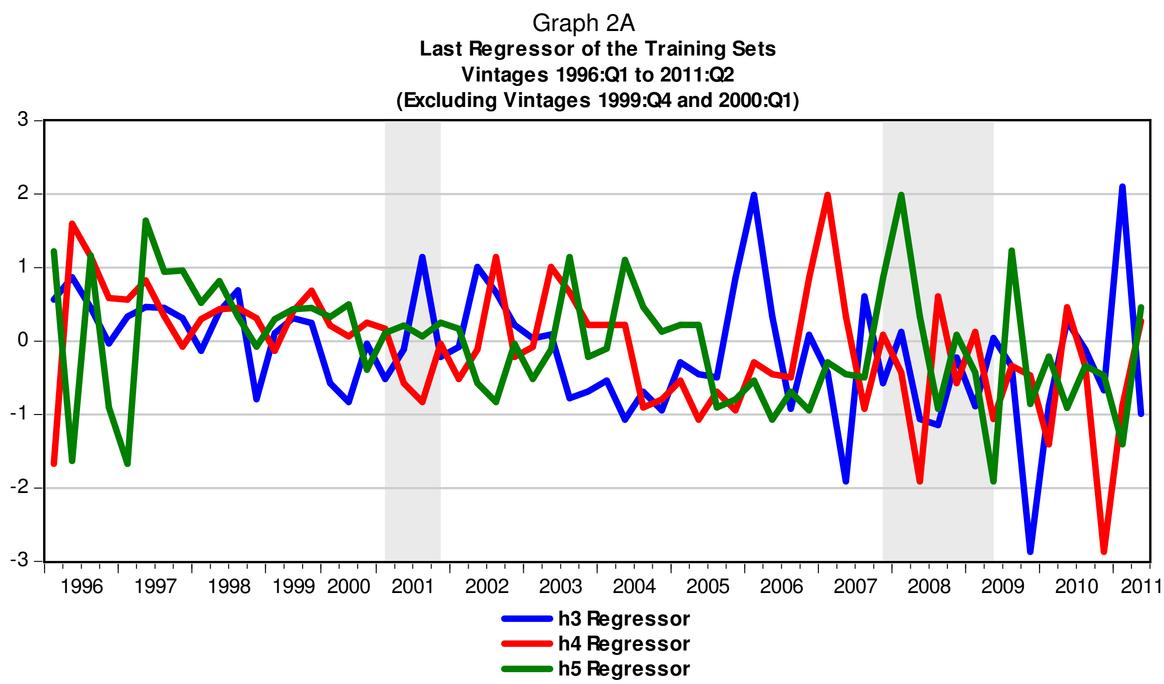
Table 14: Number of Times the HLN Test Stat is > 1.363					
	h1	h2	h3	h4	h5
Method 1 v. Method 2	37	40	39	45	36
Method 1 v. Method 3	37	37	39	48	37
Method 2 v. Method 3	35	41	39	42	35

Table 15: Comparing Efficiency Ratios					
No. of Times Method 1 is more Efficient than Method 2					
	h1	h2	h3	h4	h5
RMSE	36	33	37	29	37
MAE	38	34	37	36	36
No. of Times Method 3 is more Efficient than Method 1					
	h1	h2	h3	h4	h5
RMSE	61	62	62	62	60
MAE	61	61	62	62	60
No. of Times Method 3 is more Efficient than Method 2					
	h1	h2	h3	h4	h5
RMSE	61	62	62	62	62
MAE	61	61	62	62	62

Appendix



Graph 1A
Last Regressor of the Training Sets
Vintages 1996:Q1 to 2011:Q2
(Excluding Vintages 1999:Q4 and 2000:Q1)
3
2
1
0
-1
-2
-3
-4
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
h1 Regressor
h2 Regressor



Graph 2A
Last Regressor of the Training Sets
Vintages 1996:Q1 to 2011:Q2
(Excluding Vintages 1999:Q4 and 2000:Q1)
3
2
1
0
-1
-2
-3
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
h3 Regressor
h4 Regressor
h5 Regressor

Table 1A: Nonparametric Window Widths											
Vintage	**h1**	**h2**	**h3**	**h4**	**h5**	**Vintage**	**h1**	**h2**	**h3**	**h4**	**h5**
1996.01	0.22	0.22	0.22	0.22	0.22	**2003.04**	0.16	0.16	0.16	0.22	0.22
1996.02	0.22	0.22	0.22	0.22	0.22	**2004.01**	0.14	0.14	0.14	0.14	0.20
1996.03	0.22	0.22	0.22	0.22	0.22	**2004.02**	0.14	0.14	0.14	0.14	0.20
1996.04	0.22	0.22	0.22	0.22	0.22	**2004.03**	0.15	0.15	0.15	0.15	0.20
1997.01	0.22	0.22	0.22	0.22	0.22	**2004.04**	0.15	0.15	0.15	0.15	0.20
1997.02	0.20	0.20	0.20	0.20	0.21	**2005.01**	0.15	0.15	0.15	0.15	0.15
1997.03	0.21	0.05	0.21	0.21	0.21	**2005.02**	0.15	0.15	0.15	0.15	0.15
1997.04	0.21	0.05	0.21	0.21	0.21	**2005.03**	0.15	0.15	0.15	0.15	0.15
1998.01	0.21	0.05	0.21	0.21	0.21	**2005.04**	0.15	0.15	0.15	0.15	0.15
1998.02	0.21	0.05	0.21	0.21	0.21	**2006.01**	0.15	0.15	0.15	0.15	0.15
1998.03	0.20	0.20	0.20	0.20	0.21	**2006.02**	0.15	0.15	0.15	0.15	0.15
1998.04	0.21	0.05	0.21	0.21	0.21	**2006.03**	0.15	0.15	0.15	0.15	0.15
1999.01	0.21	0.05	0.21	0.21	0.21	**2006.04**	0.15	0.15	0.15	0.15	0.15
1999.02	0.21	0.05	0.21	0.21	0.21	**2007.01**	0.15	0.15	0.15	0.15	0.15
1999.03	0.21	0.05	0.21	0.21	0.21	**2007.02**	0.07	0.15	0.15	0.15	0.15
1999.04	0.23	0.23	0.23	0.23	0.24	**2007.03**	0.06	0.06	0.15	0.15	0.15
2000.01	0.04	0.04	0.04	0.04	0.04	**2007.04**	0.06	0.06	0.15	0.15	0.15
2000.02	0.22	0.22	0.22	0.22	0.22	**2008.01**	0.06	0.06	0.06	0.15	0.15
2000.03	0.22	0.22	0.22	0.22	0.22	**2008.02**	0.06	0.06	0.06	0.15	0.15
2000.04	0.22	0.22	0.22	0.22	0.22	**2008.03**	0.13	0.13	0.13	0.15	0.15
2001.01	0.22	0.22	0.22	0.22	0.22	**2008.04**	0.12	0.13	0.13	0.15	0.15
2001.02	0.22	0.22	0.22	0.22	0.22	**2009.01**	0.12	0.12	0.13	0.13	0.15
2001.03	0.22	0.22	0.22	0.22	0.22	**2009.02**	0.33	0.12	0.13	0.13	0.15
2001.04	0.22	0.22	0.22	0.22	0.22	**2009.03**	0.31	0.31	0.15	0.15	0.19
2002.01	0.22	0.22	0.22	0.22	0.22	**2009.04**	0.31	0.31	0.15	0.15	0.19
2002.02	0.16	0.22	0.22	0.22	0.22	**2010.01**	0.31	0.31	0.31	0.15	0.15
2002.03	0.16	0.16	0.22	0.22	0.22	**2010.02**	0.31	0.31	0.31	0.15	0.15
2002.04	0.16	0.16	0.22	0.22	0.22	**2010.03**	0.41	0.42	0.42	0.15	0.15
2003.01	0.16	0.16	0.16	0.22	0.22	**2010.04**	0.41	0.42	0.42	0.15	0.15
2003.02	0.16	0.16	0.16	0.22	0.22	**2011.01**	0.41	0.42	0.42	0.42	0.15
2003.03	0.16	0.16	0.16	0.22	0.22	**2011.02**	0.41	0.42	0.42	0.42	0.15

Table 2A: Parametric (P), Global Nonparametric (GNP), and the nth Local Nonparametric (LNP) Estimated Slopes															
	h1			h2			h3			h4			h5		
Vintage	**Slope-P**	**Slope-GNP**	**Slope-LNP**	**Slope-P**	**Slope-GNP**	**Slope-LNP**	**Slope-P**	**Slope-GNP**	**Slope-LNP**	**Slope-P**	**Slope-GNP**	**Slope-LNP**	**Slope-P**	**Slope-GNP**	**Slope-LNP**
1996.01	0.677	0.584	0.247	0.821	0.830	-0.035	0.989	0.783	0.890	0.978	0.355	6.477	1.131	0.663	-4.497
1996.02	0.690	0.596	0.277	0.826	0.827	1.767	0.998	0.809	0.751	0.979	0.379	-0.863	1.135	0.643	9.547
1996.03	0.663	0.597	0.717	0.813	0.603	-1.011	0.995	0.787	0.938	0.979	0.371	-1.543	1.133	0.482	-3.656
1996.04	0.681	0.638	0.623	0.808	0.586	-1.025	0.995	0.791	-0.130	0.996	0.468	0.019	1.134	0.612	-1.391
1997.01	0.681	0.578	-0.379	0.792	0.557	-0.496	0.994	0.704	0.685	0.981	0.526	-0.069	1.111	0.758	9.750
1997.02	0.688	0.501	0.723	0.820	0.925	-0.310	0.988	0.583	0.749	1.023	0.032	-1.404	1.172	0.691	-5.801
1997.03	0.667	0.595	0.072	0.813	3.031	14.650	0.980	0.410	0.009	1.003	-0.011	-0.016	1.114	0.465	-0.805
1997.04	0.666	0.572	0.444	0.816	2.802	-1.418	0.983	0.481	0.047	1.003	0.056	1.341	1.139	0.415	-0.740
1998.01	0.662	0.573	0.338	0.810	2.689	10.997	0.999	0.460	2.266	1.002	0.103	0.426	1.142	0.476	0.437
1998.02	0.670	0.615	0.508	0.818	2.771	9.186	1.017	0.561	0.128	1.032	0.129	-0.119	1.135	0.582	-0.336
1998.03	0.669	0.580	0.686	0.832	0.967	1.671	0.963	0.723	0.044	1.052	0.078	-0.236	1.138	0.658	0.959
1998.04	0.665	0.592	0.784	0.842	3.003	10.361	0.954	0.681	3.719	1.051	0.176	0.300	1.140	0.682	1.064
1999.01	0.664	0.594	0.839	0.845	3.086	-0.117	0.947	0.683	1.006	1.051	0.219	1.563	1.139	0.655	0.888
1999.02	0.664	0.608	0.847	0.843	3.359	10.740	0.957	0.747	0.424	1.060	0.296	0.051	1.133	0.625	1.272
1999.03	0.658	0.565	0.463	0.842	2.832	2.891	0.968	0.731	0.701	1.078	0.410	-0.462	1.081	0.687	1.265
1999.04	0.760	0.379	0.574	0.917	0.949	1.453	1.108	1.367	2.391	1.221	0.923	1.477	1.225	0.823	1.523
2000.01	0.737	-0.546	15.936	0.879	-65.188	15.800	1.150	-53.189	-9.015	1.163	50.252	21.580	1.151	2.852	14.202
2000.02	0.705	0.518	-0.075	0.817	0.660	1.742	1.105	0.809	2.100	1.121	0.662	0.902	1.162	0.683	0.326
2000.03	0.709	0.560	0.532	0.818	0.662	-0.428	1.068	0.776	1.703	1.122	0.663	0.991	1.163	0.679	0.546
2000.04	0.703	0.550	-2.271	0.824	0.706	1.662	1.047	0.789	1.019	1.122	0.643	0.746	1.134	0.653	1.759
2001.01	0.690	0.543	0.428	0.821	0.678	-0.370	1.041	0.787	1.238	1.120	0.636	0.851	1.126	0.623	-0.648
2001.02	0.673	0.534	0.242	0.779	0.629	1.025	0.993	0.796	1.284	1.112	0.604	2.278	1.170	0.769	-0.334
2001.03	0.677	0.502	-0.831	0.767	0.597	1.563	0.985	0.744	2.789	1.090	0.626	0.921	1.173	0.801	-0.846
2001.04	0.706	0.529	0.198	0.827	0.605	0.331	1.030	0.811	1.879	1.136	0.660	1.486	1.170	0.805	-0.171
2002.01	0.712	0.535	0.641	0.819	0.579	0.723	1.032	0.813	1.500	1.142	0.672	2.441	1.171	0.764	-0.552
2002.02	0.660	0.612	0.214	0.825	0.591	0.657	1.062	0.841	1.100	1.195	0.723	1.960	1.172	0.736	1.846
2002.03	0.665	0.577	0.098	0.829	0.433	1.505	0.991	0.793	-0.362	1.125	0.690	1.157	1.138	0.746	2.382
2002.04	0.669	0.614	0.069	0.839	0.421	0.871	1.009	0.806	0.442	1.096	0.648	2.097	1.110	0.742	-0.681
2003.01	0.672	0.603	-0.683	0.836	0.470	-0.312	0.985	0.881	0.723	1.093	0.684	1.549	1.095	0.748	0.906
2003.02	0.660	0.620	-0.473	0.836	0.459	-1.988	0.986	0.863	0.155	1.088	0.709	1.330	1.061	0.771	-0.141
2003.03	0.677	0.471	1.592	0.842	0.485	-1.757	1.002	0.943	4.525	1.088	0.724	-0.800	1.072	0.791	0.988

Table 2A (Continued): Parametric (P), Global Nonparametric (GNP), and the nth Local Nonparametric (LNP) Estimated Slopes															
	h1			h2			h3			h4			h5		
Vintage	Slope-P	Slope-GNP	Slope-LNP	Slope-P	Slope-GNP	Slope-LNP	Slope-P	Slope-GNP	Slope-LNP	Slope-P	Slope-GNP	Slope-LNP	Slope-P	Slope-GNP	Slope-LNP
2003.04	0.685	0.458	1.200	0.783	0.318	-0.456	1.003	0.917	2.346	1.119	0.777	0.296	1.035	0.761	0.979
2004.01	0.643	0.986	1.491	0.833	1.122	-3.898	0.894	1.420	-2.626	1.000	0.718	0.118	0.974	0.884	0.045
2004.02	0.640	0.992	1.642	0.804	1.011	4.468	0.809	0.582	2.940	1.024	0.722	0.689	0.961	0.889	3.541
2004.03	0.617	0.925	0.217	0.820	1.273	1.832	0.819	1.171	0.683	0.984	0.855	1.504	0.936	0.846	0.549
2004.04	0.646	0.990	0.008	0.843	1.401	0.373	0.815	1.160	2.084	0.989	0.889	-0.524	0.939	0.876	-0.391
2005.01	0.630	0.974	1.461	0.823	1.270	-0.916	0.814	1.176	2.878	0.968	0.876	1.298	0.953	1.151	0.005
2005.02	0.627	0.973	3.108	0.808	1.265	0.003	0.815	1.139	0.049	0.937	1.439	4.998	0.966	1.159	0.392
2005.03	0.661	0.777	0.868	0.804	1.175	5.096	0.786	0.471	-0.511	0.927	0.095	-0.653	0.932	1.169	1.432
2005.04	0.624	1.146	1.258	0.806	1.170	0.948	0.784	0.409	-1.317	0.905	0.098	2.114	0.931	1.087	-0.531
2006.01	0.608	1.034	1.237	0.789	1.194	3.711	0.781	0.440	1.577	0.904	0.087	1.080	0.913	1.082	1.538
2006.02	0.605	1.022	0.729	0.777	1.149	2.053	0.778	0.469	1.596	0.918	0.176	2.587	0.879	0.407	6.029
2006.03	0.603	0.530	-3.481	0.763	0.583	1.020	0.738	-0.105	1.240	0.892	0.010	0.894	0.904	0.183	-0.128
2006.04	0.616	0.611	-1.774	0.764	0.597	-11.538	0.730	-0.027	1.630	0.890	0.043	-0.584	0.893	0.172	2.451
2007.01	0.627	0.645	-0.185	0.833	1.013	-0.507	0.754	0.014	0.860	0.934	-0.018	3.416	0.894	0.196	1.017
2007.02	0.720	1.002	0.168	0.833	1.031	-1.688	0.755	-0.018	-14.277	0.937	-0.022	0.215	0.874	0.151	1.639
2007.03	0.721	1.760	11.163	0.958	1.144	2.792	0.733	0.004	-1.479	0.895	-0.354	0.160	0.844	0.217	1.409
2007.04	0.737	1.816	3.648	0.966	1.221	-2.084	0.737	0.058	-1.391	0.904	-0.311	1.059	0.845	0.225	0.444
2008.01	0.737	1.884	2.570	0.885	1.044	-3.494	0.835	0.664	8.681	0.887	-0.318	1.224	0.817	0.251	7.164
2008.02	0.728	1.815	-2.126	0.888	1.134	-7.811	0.824	0.616	-0.841	0.893	-0.303	-23.839	0.822	0.280	0.917
2008.03	0.663	1.621	1.735	0.788	1.823	3.803	0.808	1.179	3.090	0.861	-0.012	-0.383	0.801	0.220	1.892
2008.04	0.609	1.173	1.634	0.746	1.525	2.717	0.792	1.215	1.782	0.829	0.069	0.311	0.662	0.195	-1.146
2009.01	0.852	1.196	-17.584	0.941	2.538	0.336	0.973	-0.637	1.549	0.623	-0.492	0.690	0.787	-0.086	1.281
2009.02	0.791	0.581	0.916	1.017	2.322	-5.775	1.008	-0.190	1.284	0.692	-0.331	3.358	0.763	-0.083	-15.411
2009.03	0.847	0.970	0.767	1.052	1.052	0.687	1.172	1.504	0.904	0.823	0.765	0.510	0.833	1.203	2.431
2009.04	0.852	0.976	0.712	1.085	1.017	1.730	1.156	1.151	-0.332	0.821	0.768	0.771	0.828	1.226	4.360
2010.01	0.837	0.965	1.006	1.084	1.024	1.169	1.208	1.114	1.853	0.837	0.751	-3.029	0.861	1.165	0.017
2010.02	0.841	0.970	4.249	1.078	1.033	-0.069	1.199	1.073	0.867	0.854	0.719	0.036	0.872	1.225	5.663
2010.03	0.865	0.857	0.855	1.165	1.122	2.911	1.157	0.927	1.052	0.883	0.990	0.852	0.936	1.226	0.228
2010.04	0.867	0.857	3.293	1.165	1.114	0.470	1.158	0.919	1.915	0.914	0.986	-1.606	0.940	1.198	1.935
2011.01	0.863	0.845	0.789	1.172	1.129	3.624	1.161	0.936	2.400	1.013	0.891	1.953	0.956	1.063	-3.818
2011.02	0.835	0.818	1.290	1.165	1.099	0.961	1.145	0.920	2.182	1.062	0.952	0.680	0.936	0.953	2.194

Table 3A: RMSE of Parametric (P) and Global Nonparametric (GNP) Forecasts										
	h1		h2		h3		h4		h5	
Vintage	RMSE-P	RMSE-GNP	RMSE-P	RMSE-GNP	RMSE-P	RMSE-GNP	RMSE-P	RMSE-GNP	RMSE-P	RMSE-GNP
1996.01	1.452	1.228	1.566	1.567	1.993	1.559	5.066	1.753	4.911	2.773
1996.02	1.395	1.185	1.389	1.376	1.909	1.529	4.689	1.736	5.406	2.950
1996.03	1.659	1.468	1.906	1.395	2.093	1.635	3.839	1.391	5.385	2.182
1996.04	1.703	1.570	2.062	1.475	2.297	1.805	3.962	1.798	5.617	2.923
1997.01	1.812	1.512	2.159	1.497	2.307	1.613	3.866	2.014	4.788	3.172
1997.02	1.373	0.967	1.797	2.002	1.747	1.007	2.906	0.023	4.794	2.778
1997.03	1.424	1.258	1.876	6.997	2.069	0.855	2.850	0.055	4.525	1.832
1997.04	1.616	1.374	1.893	6.506	2.046	0.990	2.730	0.129	4.831	1.701
1998.01	1.557	1.335	2.145	7.120	2.116	0.965	1.884	0.179	4.866	1.971
1998.02	1.466	1.334	1.938	6.570	2.176	1.192	1.759	0.207	4.719	2.366
1998.03	1.677	1.416	2.216	2.546	2.738	2.024	2.284	0.125	4.172	2.370
1998.04	1.725	1.522	2.374	8.468	2.511	1.780	2.274	0.365	4.124	2.423
1999.01	1.731	1.536	2.412	8.819	2.537	1.818	2.307	0.464	4.067	2.296
1999.02	1.734	1.574	2.534	10.094	2.778	2.156	2.319	0.633	3.637	1.966
1999.03	1.663	1.415	2.533	8.519	2.860	2.148	2.498	0.933	3.638	2.273
1999.04	1.963	0.965	2.615	2.693	3.181	3.906	2.937	2.211	4.008	2.430
2000.01	1.820	1.318	2.522	186.978	3.321	153.552	2.665	115.181	3.050	7.634
2000.02	1.709	1.249	2.347	1.891	3.120	2.272	2.933	1.722	2.721	1.590
2000.03	1.782	1.403	2.366	1.907	3.274	2.364	3.328	1.953	2.784	1.614
2000.04	1.596	1.243	2.442	2.085	3.346	2.507	3.343	1.903	2.304	1.318
2001.01	1.253	0.982	2.017	1.660	3.329	2.504	3.416	1.926	2.248	1.236
2001.02	1.241	0.980	1.967	1.581	3.429	2.733	3.248	1.752	2.322	1.518
2001.03	1.022	0.755	1.686	1.306	2.760	2.072	3.611	2.060	2.474	1.680
2001.04	1.038	0.775	1.513	1.104	2.882	2.256	3.780	2.182	2.422	1.658
2002.01	1.397	1.045	1.382	0.973	2.861	2.244	3.789	2.216	2.421	1.572
2002.02	1.492	1.307	1.655	1.182	2.740	2.160	4.698	2.827	2.319	1.450
2002.03	1.835	1.492	2.613	1.336	2.567	2.046	4.442	2.708	1.796	1.172
2002.04	1.925	1.664	2.672	1.326	3.057	2.433	4.446	2.614	1.817	1.209
2003.01	2.031	1.717	3.464	1.929	3.719	3.184	4.448	2.769	1.761	1.198
2003.02	2.009	1.784	3.411	1.853	3.704	3.090	4.130	2.679	1.967	1.423
2003.03	2.321	1.497	3.464	1.975	3.485	3.143	3.798	2.516	2.525	1.854

Table 3A (Continued): RMSE of Parametric (P) and Global Nonparametric (GNP) Forecasts										
	h1		h2		h3		h4		h5	
Vintage	RMSE-P	RMSE-GNP	RMSE-P	RMSE-GNP	RMSE-P	RMSE-GNP	RMSE-P	RMSE-GNP	RMSE-P	RMSE-GNP
2003.04	2.749	1.703	3.566	1.426	3.444	3.018	4.241	2.933	2.511	1.839
2004.01	2.770	4.250	4.090	5.507	3.808	6.046	4.706	3.384	2.503	2.329
2004.02	2.778	4.311	4.056	5.103	3.730	2.686	4.995	3.527	2.700	2.559
2004.03	2.604	3.935	3.815	5.927	3.870	5.564	4.375	3.848	2.779	2.575
2004.04	2.734	4.217	3.919	6.510	3.888	5.565	4.456	4.053	2.866	2.738
2005.01	2.606	4.053	4.028	6.212	3.906	5.673	4.345	3.975	3.362	4.094
2005.02	2.513	3.924	3.855	6.036	3.911	5.495	3.865	5.974	3.318	4.011
2005.03	2.610	3.090	3.578	5.229	4.024	2.439	3.827	0.430	3.203	4.039
2005.04	2.552	4.714	3.564	5.172	3.773	1.995	3.790	0.450	3.210	3.771
2006.01	2.456	4.201	2.689	4.070	3.376	1.922	4.136	0.439	3.151	3.756
2006.02	2.663	4.526	3.241	4.795	3.449	2.100	4.372	0.884	3.036	1.427
2006.03	2.662	2.364	3.185	2.434	3.344	0.453	4.317	0.091	2.957	0.620
2006.04	2.367	2.370	3.379	2.642	3.650	0.110	4.058	0.232	2.875	0.573
2007.01	2.385	2.474	3.654	4.448	3.314	0.083	3.553	0.038	2.896	0.656
2007.02	3.420	4.762	3.482	4.316	2.852	0.051	3.811	0.058	2.563	0.460
2007.03	4.526	11.070	5.900	7.068	2.664	0.032	4.092	1.581	2.381	0.631
2007.04	4.816	11.862	5.978	7.577	3.122	0.267	4.394	1.475	2.478	0.677
2008.01	5.252	13.432	7.310	8.620	4.437	3.542	4.343	1.517	3.030	0.952
2008.02	5.287	13.186	7.369	9.417	4.451	3.339	4.337	1.436	3.047	1.061
2008.03	4.083	9.971	5.340	12.324	4.395	6.407	4.088	0.018	3.004	0.846
2008.04	3.760	7.095	5.097	10.402	4.315	6.608	3.781	0.350	3.176	0.961
2009.01	4.795	6.731	6.421	17.755	6.487	4.259	3.244	2.577	3.792	0.388
2009.02	7.827	5.707	6.315	14.427	6.635	1.266	3.544	1.710	4.011	0.407
2009.03	8.434	9.715	9.817	9.909	7.364	9.447	4.548	4.228	4.387	6.331
2009.04	8.645	9.960	10.803	10.229	7.095	7.067	5.071	4.744	4.359	6.453
2010.01	8.651	10.030	12.217	11.645	12.047	11.237	5.179	4.651	4.952	6.701
2010.02	8.386	9.733	12.854	12.437	12.838	11.622	5.061	4.260	4.995	7.019
2010.03	8.925	8.833	15.095	14.524	12.576	10.058	5.293	5.931	5.525	7.232
2010.04	9.071	8.959	15.111	14.426	12.367	9.794	5.342	5.762	5.420	6.903
2011.01	8.996	8.799	14.638	14.083	14.539	11.700	7.423	6.522	4.580	5.090
2011.02	8.691	8.493	14.541	13.703	14.781	11.856	8.547	7.651	4.790	4.875

Table 4A: Comparing the Average Estimated Forecasted Slopes Produced by Method 1, Method 2, and Method 3															
	h1			h2			h3			h4			h5		
Vintage	**Meth 1**	**Meth 2**	**Meth 3**	**Meth 1**	**Meth 2**	**Meth 3**	**Meth 1**	**Meth 2**	**Meth 3**	**Meth 1**	**Meth 2**	**Meth 3**	**Meth 1**	**Meth 2**	**Meth 3**
1996.01	0.247	-0.067	0.169	-0.035	-0.610	0.462	0.890	0.613	1.005	6.477	6.477	-0.540	-4.497	-5.966	0.311
1996.02	0.277	0.215	0.223	1.767	2.025	0.226	0.751	0.866	1.009	-0.863	-0.872	-0.434	9.547	9.602	-0.685
1996.03	0.717	0.708	0.345	-1.011	-1.073	0.271	0.938	0.666	1.057	-1.543	-1.949	-0.175	-3.656	-4.702	-0.336
1996.04	0.623	0.507	0.393	-1.025	-1.013	0.475	-0.130	-0.208	1.158	0.019	0.003	0.092	-1.391	-1.398	-0.097
1997.01	-0.379	-0.258	0.448	-0.496	-0.614	0.616	0.685	0.987	1.182	-0.069	-0.111	0.239	9.750	9.750	-0.452
1997.02	0.723	0.835	0.379	-0.310	-0.343	0.859	0.749	0.949	1.142	-1.404	-1.526	0.319	-5.801	-5.838	0.372
1997.03	0.072	0.057	0.380	14.650	14.726	3.264	0.009	0.184	0.945	-0.016	-0.688	0.048	-0.805	-1.205	0.579
1997.04	0.444	0.420	0.294	-1.418	-0.857	2.801	0.047	-0.043	1.023	1.341	1.661	-0.053	-0.740	-1.071	0.853
1998.01	0.338	0.403	0.325	10.997	10.997	1.909	2.266	2.472	0.876	0.426	-0.290	0.097	0.437	0.803	0.809
1998.02	0.508	0.212	0.406	9.186	9.346	1.673	0.128	0.087	1.104	-0.119	-0.684	0.309	-0.336	-0.730	0.945
1998.03	0.686	0.559	0.072	1.671	1.866	1.431	0.044	0.084	1.480	-0.236	-0.620	0.415	0.959	0.182	0.990
1998.04	0.784	0.621	0.094	10.361	10.416	1.395	3.719	4.233	1.069	0.300	-0.165	0.603	1.064	1.970	0.763
1999.01	0.839	0.642	0.110	-0.117	0.095	1.297	1.006	0.682	1.161	1.563	1.640	0.568	0.888	0.213	0.788
1999.02	0.847	0.682	0.127	10.740	10.116	2.050	0.424	0.260	1.183	0.051	-0.333	0.770	1.272	0.911	0.713
1999.03	0.463	0.568	0.154	2.891	-0.424	1.725	0.701	0.366	1.204	-0.462	-0.683	0.779	1.265	0.948	0.751
1999.04	0.574	0.784	0.444	1.453	1.455	0.841	2.391	2.462	1.051	1.477	1.168	0.785	1.523	1.416	0.358
2000.01	15.936	25.820	-3.921	15.800	27.125	4.070	-9.015	-6.464	0.644	21.580	27.818	6.386	14.202	7.754	5.511
2000.02	-0.075	0.233	0.304	1.742	1.689	0.756	2.100	2.053	1.342	0.902	0.987	1.310	0.326	0.146	0.711
2000.03	0.532	0.711	0.443	-0.428	0.472	0.668	1.703	3.114	1.142	0.991	1.268	1.172	0.546	0.504	0.777
2000.04	-2.271	-2.269	0.659	1.662	1.834	0.632	1.019	0.871	1.237	0.746	0.776	1.160	1.759	1.508	0.664
2001.01	0.428	0.790	0.617	-0.370	-0.357	0.652	1.238	1.744	1.169	0.851	0.998	1.133	-0.648	-0.105	0.664
2001.02	0.242	0.575	0.569	1.025	1.605	0.508	1.284	1.178	1.080	2.278	2.061	1.018	-0.334	0.028	0.804
2001.03	-0.831	-0.831	0.410	1.563	1.761	0.330	2.789	2.834	1.129	0.921	1.066	1.178	-0.846	-0.336	0.960
2001.04	0.198	0.199	0.445	0.331	0.331	0.257	1.879	1.718	1.211	1.486	1.405	1.183	-0.171	-0.051	0.896
2002.01	0.641	0.638	0.390	0.723	0.727	0.148	1.500	1.270	1.248	2.441	2.408	1.143	-0.552	-0.333	0.791
2002.02	0.214	0.234	0.290	0.657	0.651	0.128	1.100	1.101	1.276	1.960	1.723	1.110	1.846	1.664	0.580
2002.03	0.098	-0.106	0.453	1.505	1.508	0.158	-0.362	-0.355	1.309	1.157	1.190	1.134	2.382	2.503	0.579
2002.04	0.069	0.587	0.509	0.871	0.789	0.159	0.442	0.418	1.173	2.097	2.229	1.075	-0.681	-0.471	0.660
2003.01	-0.683	-0.626	0.537	-0.312	0.604	0.254	0.723	0.664	1.230	1.549	1.590	1.156	0.906	1.497	0.664
2003.02	-0.473	-0.499	0.644	-1.988	-1.595	0.377	0.155	-0.116	1.320	1.330	1.331	1.197	-0.141	-0.027	0.877
2003.03	1.592	1.759	0.141	-1.757	-1.465	0.521	4.525	4.439	1.361	-0.800	-0.795	1.411	0.988	0.997	0.901

Table 4A (Continued): Comparing the Average Estimated Forecasted Slopes Produced by Method 1, Method 2, and Method 3

	h1			h2			h3			h4			h5		
Vintage	**Meth 1**	**Meth 2**	**Meth 3**	**Meth 1**	**Meth 2**	**Meth 3**	**Meth 1**	**Meth 2**	**Meth 3**	**Meth 1**	**Meth 2**	**Meth 3**	**Meth 1**	**Meth 2**	**Meth 3**
2003.04	1.200	0.658	0.276	-0.456	-0.532	-0.172	2.346	2.129	1.198	0.296	0.280	1.341	0.979	0.905	0.920
2004.01	1.491	1.978	0.498	-3.898	-3.937	1.559	-2.626	-2.147	1.665	0.118	0.117	1.046	0.045	-0.203	1.206
2004.02	1.642	1.461	0.604	4.468	4.088	0.847	2.940	3.046	0.861	0.689	0.166	1.117	3.541	3.541	1.061
2004.03	0.217	0.257	1.144	1.832	1.773	1.663	0.683	0.218	1.819	1.504	0.926	1.371	0.549	0.545	1.065
2004.04	0.008	-0.167	1.426	0.373	1.097	1.960	2.084	2.155	1.690	-0.524	-0.185	1.617	-0.391	-0.421	1.233
2005.01	1.461	1.481	1.318	-0.916	-0.154	1.909	2.878	3.245	1.623	1.298	1.020	1.589	0.005	0.004	2.089
2005.02	3.108	3.108	1.158	0.003	0.005	2.006	0.049	0.190	1.746	4.998	4.358	2.251	0.392	0.039	2.152
2005.03	0.868	1.187	0.866	5.096	5.096	1.889	-0.511	-0.623	0.577	-0.653	-0.751	-0.662	1.432	1.920	2.098
2005.04	1.258	1.702	0.760	0.948	1.386	1.882	-1.317	-1.291	0.778	2.114	1.988	-0.628	-0.531	-0.292	2.015
2006.01	1.237	1.551	0.356	3.711	3.430	1.750	1.577	1.577	0.799	1.080	2.152	-0.752	1.538	1.103	2.106
2006.02	0.729	0.569	0.303	2.053	2.262	1.472	1.596	1.599	0.820	2.587	2.583	-0.404	6.029	5.484	0.732
2006.03	-3.481	-3.641	0.484	1.020	0.836	0.090	1.240	2.027	-0.490	0.894	1.644	-0.467	-0.128	-0.587	0.332
2006.04	-1.774	-1.774	0.597	-11.538	-12.803	1.405	1.630	1.848	-0.441	-0.584	-0.209	-0.348	2.451	2.435	0.233
2007.01	-0.185	-0.049	0.762	-0.507	-0.504	2.208	0.860	0.928	-0.262	3.416	3.416	-0.620	1.017	1.483	-0.035
2007.02	0.168	1.192	-0.644	-1.688	-2.247	2.555	-14.277	-15.971	1.183	0.215	0.334	-0.565	1.639	1.849	0.233
2007.03	11.163	9.030	0.801	2.792	2.729	2.388	-1.479	-1.567	0.487	0.160	1.422	-1.160	1.409	1.551	0.738
2007.04	3.648	4.287	0.296	-2.084	-1.034	2.925	-1.391	-1.020	0.902	1.059	1.014	-1.084	0.444	1.056	0.638
2008.01	2.570	1.328	0.545	-3.494	-3.714	2.670	8.681	8.638	0.794	1.224	1.525	-1.212	7.164	7.164	0.087
2008.02	-2.126	-1.410	1.107	-7.811	-7.398	3.661	-0.841	-3.592	0.761	-23.839	-24.555	0.913	0.917	0.452	0.143
2008.03	1.735	1.747	2.817	3.803	3.681	4.527	3.090	2.901	3.550	-0.383	-0.215	1.687	1.892	1.849	-0.093
2008.04	1.634	1.242	1.350	2.717	2.682	3.499	1.782	2.848	3.525	0.311	0.833	1.769	-1.146	-0.909	-0.190
2009.01	-17.584	-0.801	2.919	0.336	0.338	7.274	1.549	2.078	0.373	0.690	0.575	-0.380	1.281	1.319	-0.284
2009.02	0.916	1.064	1.625	-5.775	1.214	6.279	1.284	1.302	1.600	3.358	3.307	-0.304	-15.411	-15.414	1.036
2009.03	0.767	0.843	2.115	0.687	0.426	1.324	0.904	0.607	2.583	0.510	0.517	-1.085	2.431	2.432	0.921
2009.04	0.712	0.702	2.082	1.730	1.780	1.203	-0.332	0.454	1.866	0.771	1.102	-1.095	4.360	3.115	0.897
2010.01	1.006	1.063	2.129	1.169	1.160	1.157	1.853	1.675	1.842	-3.029	-3.140	-1.112	0.017	0.586	0.927
2010.02	4.249	6.232	1.612	-0.069	-0.157	1.354	0.867	0.933	1.645	0.036	0.108	-1.173	5.663	5.348	0.911
2010.03	0.855	0.987	1.369	2.911	2.885	1.415	1.052	1.126	0.642	0.852	0.698	-0.628	0.228	0.442	1.403
2010.04	3.293	2.812	1.222	0.470	0.488	1.390	1.915	1.756	0.581	-1.606	0.854	-0.514	1.935	2.064	1.280
2011.01	0.789	0.758	1.226	3.624	2.905	1.400	2.400	2.775	0.487	1.953	1.879	0.517	-3.818	-4.346	1.273
2011.02	1.290	1.402	1.185	0.961	0.951	1.393	2.182	1.992	0.571	0.680	0.689	0.929	2.194	2.041	0.699

Table 5A: Comparing Forecasting Method 1 v. Method 2 at the 10% Significance Level

Vintage	HLN: h1	Vintage	HLN: h2	Vintage	HLN: h3	Vintage	HLN: h4	Vintage	HLN: h5
1996.01	7.386	**1996.01**	3.594	**1996.01**	-4.182	**1996.01**	5.634	**1996.01**	2.290
1996.02	1.804	**1996.02**	3.424	**1997.03**	2.458	**1996.02**	1.826	**1996.02**	8.072
1996.03	-2.934	**1996.03**	3.308	**1997.04**	3.618	**1996.03**	14.313	**1996.03**	3.507
1996.04	-1.924	**1996.04**	2.450	**1998.02**	3.512	**1996.04**	1.592	**1996.04**	-6.621
1997.01	2.871	**1997.01**	6.178	**1998.03**	5.140	**1997.02**	3.158	**1997.01**	4.403
1997.02	5.611	**1997.02**	5.829	**1998.04**	8.100	**1997.03**	2.108	**1997.02**	6.835
1997.03	2.757	**1997.04**	3.975	**1999.01**	2.745	**1997.04**	4.221	**1997.03**	2.845
1998.01	-1.478	**1998.01**	-8.778	**1999.02**	6.172	**1998.01**	1.952	**1997.04**	3.868
1998.02	3.087	**1998.02**	5.756	**1999.03**	10.238	**1998.02**	6.093	**1998.02**	8.075
1998.03	1.653	**1998.04**	-2.775	**2000.02**	4.086	**1998.03**	2.788	**1998.03**	1.510
1999.03	2.079	**1999.03**	3.206	**2000.03**	4.660	**1998.04**	4.637	**1998.04**	2.243
1999.04	1.959	**1999.04**	2.286	**2000.04**	2.469	**1999.01**	2.087	**1999.04**	-5.773
2000.02	-1.726	**2000.01**	17.621	**2001.01**	4.605	**1999.02**	7.919	**2000.04**	2.297
2000.04	3.565	**2000.03**	-3.042	**2001.03**	-4.061	**1999.03**	12.479	**2002.02**	2.571
2001.03	5.093	**2001.01**	3.363	**2002.01**	3.088	**1999.04**	1.874	**2002.03**	2.986
2001.04	5.856	**2001.04**	3.866	**2002.02**	-7.565	**2000.02**	7.482	**2003.01**	1.456
2002.01	-2.290	**2002.01**	1.387	**2002.03**	5.432	**2000.03**	2.728	**2003.03**	-1.460
2002.02	4.278	**2002.02**	2.377	**2002.04**	9.848	**2000.04**	2.524	**2003.04**	2.077
2002.03	1.897	**2003.04**	-2.265	**2003.01**	14.126	**2001.01**	1.976	**2004.01**	3.153
2003.03	1.897	**2004.01**	-1.569	**2003.02**	1.983	**2001.02**	1.416	**2004.02**	-7.976
2004.01	2.502	**2004.02**	3.965	**2003.04**	1.905	**2001.03**	-12.932	**2004.03**	-5.311
2005.01	-3.910	**2004.04**	-8.889	**2004.01**	-1.497	**2001.04**	13.996	**2005.03**	6.250
2005.02	-158.07	**2005.01**	-1.481	**2004.02**	2.155	**2002.01**	6.712	**2005.04**	-2.098
2005.03	1.513	**2005.02**	1.546	**2004.03**	-1.672	**2002.02**	2.366	**2006.02**	1.413
2005.04	3.874	**2005.03**	-65.224	**2005.02**	-2.541	**2002.03**	-3.697	**2006.03**	-3.375
2006.01	-2.729	**2005.04**	-1.811	**2005.03**	-1.766	**2003.01**	3.378	**2006.04**	7.158
2006.03	-6.658	**2006.01**	43.787	**2005.04**	3.953	**2003.02**	-276.8	**2007.01**	2.066
2006.04	6.600	**2006.02**	-4.854	**2006.01**	-17.544	**2003.03**	14.759	**2007.02**	1.503
2007.02	-1.852	**2006.03**	-10.179	**2006.02**	-1.742	**2003.04**	3.475	**2008.01**	-7.836
2007.03	1.622	**2006.04**	-7.316	**2006.03**	-6.185	**2004.01**	3.780	**2008.03**	4.247
2008.03	-3.177	**2007.01**	8.572	**2006.04**	-4.148	**2004.02**	5.010	**2008.04**	2.296
2008.04	-1.974	**2007.03**	-1.625	**2007.01**	-6.311	**2004.03**	1.955	**2009.02**	-3.308
2009.01	-5.085	**2007.04**	-3.748	**2007.02**	-19.617	**2004.04**	-1.445	**2009.03**	-6.830
2010.01	1.477	**2008.01**	-1.458	**2007.03**	8.230	**2005.03**	-2.220	**2010.02**	1.446
2010.02	-1.999	**2008.03**	1.951	**2008.01**	-2.026	**2005.04**	4.630	**2011.01**	-10.388
2010.04	1.758	**2008.04**	-4.149	**2008.02**	-1.938	**2007.01**	-15.478	**2011.02**	-2.331
2011.02	1.903	**2009.02**	-3.355	**2008.04**	-6.024	**2007.02**	6.044		
		2010.01	-1.866	**2010.03**	-1.363	**2007.03**	-157.6		
		2010.03	-2.127	**2011.01**	-3.819	**2008.02**	-9.897		
		2011.01	2.000			**2008.03**	3.277		
						2009.02	5.449		
						2010.01	-3.312		
						2010.02	7.553		
						2010.03	2.365		
						2010.04	-1.656		

Table 6A: Comparing Forecasting Method 1 v. Method 3 at the 10% Significance Level

Vintage	HLN: h1	Vintage	HLN: h2	Vintage	HLN: h3	Vintage	HLN: h4	Vintage	HLN: h5
1996.01	3.392	**1996.01**	3.652	**1996.02**	5.109	**1996.01**	5.558	**1996.01**	2.782
1996.02	1.607	**1996.02**	4.320	**1997.01**	2.123	**1996.02**	2.717	**1996.02**	7.933
1996.03	-2.409	**1996.03**	4.119	**1997.03**	2.139	**1996.03**	13.043	**1996.03**	6.881
1997.01	2.672	**1996.04**	2.545	**1997.04**	3.164	**1996.04**	2.387	**1996.04**	-6.367
1997.02	4.377	**1997.01**	20.721	**1998.02**	4.350	**1997.02**	3.946	**1997.01**	4.400
1997.03	2.257	**1997.02**	8.424	**1998.03**	4.593	**1997.03**	2.410	**1997.02**	7.155
1998.02	3.110	**1997.04**	4.378	**1998.04**	7.543	**1997.04**	5.724	**1997.03**	3.670
1998.03	1.672	**1998.01**	-9.844	**1999.01**	3.045	**1998.01**	2.432	**1997.04**	3.740
1999.03	2.033	**1998.02**	6.443	**1999.02**	5.215	**1998.02**	7.082	**1998.01**	1.439
2000.02	-1.732	**1998.04**	-3.149	**1999.03**	6.584	**1998.03**	3.191	**1998.02**	6.212
2000.04	3.550	**1999.04**	2.070	**2000.02**	3.240	**1998.04**	30.311	**1998.03**	1.577
2001.03	4.910	**2000.01**	16.612	**2000.03**	2.324	**1999.01**	2.047	**1998.04**	2.577
2001.04	5.069	**2000.03**	-2.660	**2000.04**	3.630	**1999.02**	6.769	**1999.04**	-9.478
2002.02	4.097	**2001.01**	3.339	**2001.01**	2.643	**1999.03**	21.561	**2000.03**	-2.896
2002.03	2.234	**2001.02**	-2.206	**2001.03**	-4.169	**1999.04**	2.583	**2000.04**	2.313
2003.03	1.978	**2001.04**	3.018	**2002.01**	2.221	**2000.02**	3.525	**2002.02**	2.555
2004.01	2.312	**2002.02**	1.645	**2002.02**	-3.659	**2000.03**	2.490	**2002.03**	3.013
2005.01	-4.038	**2003.04**	-1.852	**2002.03**	4.552	**2000.04**	2.299	**2003.03**	-1.960
2005.02	-402.2	**2004.01**	-1.592	**2002.04**	6.217	**2001.01**	1.786	**2003.04**	3.790
2005.03	2.282	**2004.02**	3.746	**2003.01**	10.380	**2001.03**	-7.846	**2004.01**	5.761
2005.04	1.967	**2004.04**	-3.625	**2003.02**	2.192	**2001.04**	4.897	**2004.02**	-8.107
2006.01	-1.399	**2005.02**	1.463	**2003.04**	1.988	**2002.01**	6.622	**2004.03**	-4.538
2006.02	-2.018	**2005.03**	-78.051	**2004.02**	2.014	**2002.02**	2.814	**2005.03**	2.696
2006.03	-6.840	**2006.01**	32.764	**2005.02**	-2.649	**2002.03**	-3.931	**2005.04**	-2.811
2006.04	6.317	**2006.02**	-3.987	**2005.03**	-2.143	**2003.01**	3.287	**2006.02**	1.397
2007.02	3.885	**2006.03**	-9.424	**2005.04**	3.872	**2003.02**	-13.874	**2006.03**	-3.725
2007.03	1.687	**2006.04**	-8.197	**2006.01**	-26.522	**2003.03**	6.793	**2006.04**	7.552
2008.01	-1.746	**2007.01**	9.604	**2006.02**	-2.713	**2003.04**	3.996	**2007.02**	1.512
2008.03	-3.313	**2007.02**	1.587	**2006.03**	-2.575	**2004.01**	3.338	**2008.01**	-7.861
2008.04	-1.706	**2007.03**	-1.702	**2006.04**	-4.042	**2004.02**	5.052	**2008.02**	-1.650
2009.01	-4.948	**2007.04**	-8.604	**2007.01**	-4.883	**2004.03**	1.713	**2008.03**	3.780
2009.03	1.670	**2008.01**	-1.502	**2007.02**	-14.847	**2004.04**	-1.543	**2008.04**	2.038
2009.04	1.535	**2008.03**	2.280	**2007.03**	11.118	**2005.02**	1.363	**2009.02**	-3.297
2010.01	1.708	**2008.04**	-4.309	**2008.01**	-2.049	**2005.03**	-2.447	**2009.03**	-5.812
2010.02	-2.040	**2009.02**	-3.917	**2008.02**	-1.930	**2005.04**	4.591	**2010.03**	1.478
2010.04	1.902	**2010.03**	-2.145	**2008.04**	-2.121	**2006.04**	1.570	**2011.01**	-5.961
2011.02	2.055	**2011.01**	2.264	**2009.04**	-1.965	**2007.01**	-16.515	**2011.02**	-2.182
				2010.02	2.759	**2007.02**	7.161		
				2011.01	-5.574	**2007.03**	-9.134		
						2008.01	-1.441		
						2008.02	-11.299		
						2008.03	3.198		
						2009.02	3.426		
						2009.04	1.881		
						2010.01	-3.155		
						2010.02	8.631		
						2010.03	2.273		
						2010.04	-2.541		

Table 7A: Comparing Forecasting Method 2 v. Method 3 at the 10% Significance Level									
Vintage	**HLN: h1**	**Vintage**	**HLN: h2**	**Vintage**	**HLN: h3**	**Vintage**	**HLN: h4**	**Vintage**	**HLN: h5**
1996.01	-3.375	**1996.01**	-3.994	**1996.01**	2.930	**1996.01**	-5.714	**1996.01**	-2.055
1996.03	3.787	**1996.02**	-2.666	**1997.03**	-3.015	**1996.03**	-25.130	**1996.02**	-8.214
1996.04	3.121	**1996.03**	-2.900	**1997.04**	-4.295	**1997.02**	-2.694	**1996.03**	-2.657
1997.01	-3.122	**1996.04**	-2.389	**1998.02**	-2.918	**1997.03**	-1.894	**1996.04**	6.903
1997.02	-5.652	**1997.01**	-4.846	**1998.03**	-7.157	**1997.04**	-3.307	**1997.01**	-4.406
1997.03	-2.966	**1997.02**	-5.129	**1998.04**	-9.068	**1998.01**	-1.686	**1997.02**	-6.550
1998.01	1.534	**1997.04**	-3.390	**1999.01**	-2.628	**1998.02**	-5.131	**1997.03**	-2.481
1998.02	-3.024	**1998.01**	7.960	**1999.02**	-11.031	**1998.03**	-2.506	**1997.04**	-4.990
1998.03	-1.806	**1998.02**	-5.205	**1999.03**	-5.170	**1998.04**	-3.535	**1998.02**	-4.330
1999.01	-1.467	**1998.04**	2.506	**2000.02**	-5.151	**1999.01**	-2.164	**1998.04**	-1.972
1999.02	-1.364	**1999.03**	-2.269	**2000.03**	-5.744	**1999.02**	-4.318	**1999.03**	1.530
1999.03	-1.835	**1999.04**	-2.487	**2000.04**	-3.877	**1999.03**	-8.259	**1999.04**	4.459
1999.04	-2.447	**2000.01**	-18.217	**2001.01**	-3.238	**2000.02**	-6.808	**2000.02**	-2.813
2000.02	1.618	**2000.03**	3.683	**2001.02**	-3.161	**2000.03**	-2.823	**2000.04**	-2.223
2000.04	-3.580	**2001.01**	-3.386	**2001.03**	3.953	**2000.04**	-2.718	**2002.02**	-2.590
2001.03	-5.274	**2001.04**	-6.147	**2002.01**	-3.670	**2001.01**	-2.241	**2002.03**	-2.984
2001.04	-6.035	**2002.01**	-2.120	**2002.02**	20.193	**2001.02**	-1.668	**2003.01**	-1.967
2002.01	2.882	**2002.02**	-2.460	**2002.03**	-6.773	**2001.03**	7.782	**2003.04**	-1.950
2002.02	-2.951	**2003.04**	2.735	**2002.04**	-17.785	**2001.04**	-4.770	**2004.01**	-2.933
2002.03	-1.583	**2004.01**	1.548	**2003.01**	-29.858	**2002.01**	-5.869	**2004.02**	7.853
2003.03	-1.834	**2004.02**	-4.229	**2003.02**	-1.837	**2002.02**	-2.132	**2005.03**	-3.067
2004.01	-2.639	**2004.04**	4.615	**2003.04**	-1.817	**2002.03**	3.501	**2006.02**	-1.430
2005.01	3.775	**2005.01**	1.705	**2004.01**	2.011	**2003.01**	-3.636	**2006.03**	3.283
2005.02	103.028	**2005.02**	-1.628	**2004.02**	-2.296	**2003.02**	18.099	**2006.04**	-6.793
2005.04	-4.022	**2005.03**	56.869	**2004.03**	4.585	**2003.03**	-10.191	**2007.01**	-2.251
2006.01	3.548	**2005.04**	10.114	**2005.02**	2.458	**2003.04**	-3.210	**2007.02**	-1.487
2006.03	6.467	**2006.01**	-17.393	**2005.03**	1.528	**2004.01**	-4.523	**2007.04**	1.574
2006.04	-6.839	**2006.02**	5.569	**2005.04**	-4.060	**2004.02**	-2.313	**2008.01**	7.810
2007.02	2.434	**2006.03**	3.555	**2006.01**	13.294	**2004.03**	-2.849	**2008.03**	-5.064
2007.03	-1.540	**2006.04**	6.691	**2006.04**	4.112	**2005.03**	2.053	**2008.04**	-2.759
2008.03	3.033	**2007.01**	-7.942	**2007.01**	4.732	**2005.04**	-4.801	**2009.02**	3.319
2008.04	2.183	**2007.03**	1.549	**2007.02**	37.037	**2007.01**	14.652	**2009.03**	9.791
2010.02	1.942	**2007.04**	2.781	**2007.03**	-7.351	**2007.02**	-5.332	**2010.02**	-2.363
2010.04	-1.621	**2008.01**	1.446	**2008.01**	2.005	**2008.02**	8.909	**2011.01**	8.229
2011.02	-1.640	**2008.03**	-1.692	**2008.02**	1.944	**2008.03**	-3.380	**2011.02**	2.637
		2008.04	3.979	**2008.04**	3.067	**2009.01**	-1.578		
		2009.02	-5.742	**2010.01**	-1.386	**2009.02**	-13.371		
		2010.01	3.172	**2010.03**	1.931	**2010.01**	3.473		
		2010.03	2.107	**2011.01**	2.562	**2010.02**	-4.006		
		2011.01	-1.768			**2010.03**	-2.431		
		2011.02	1.498			**2010.04**	-2.839		
						2011.02	-1.874		

Table 8A: Comparing Forecasting Method 1 v. Method 2 at the 5% Level									
Vintage	**HLN: h1**	**Vintage**	**HLN: h2**	**Vintage**	**HLN: h3**	**Vintage**	**HLN: h4**	**Vintage**	**HLN: h5**
1996:Q1	7.39	**1996:Q1**	3.59	**1996:Q1**	-4.18	**1996:Q1**	5.63	**1996:Q1**	2.29
1996:Q2	1.80	**1996:Q2**	3.42	**1997:Q3**	2.46	**1996:Q2**	1.83	**1996:Q2**	8.07
1996:Q3	-2.93	**1996:Q3**	3.31	**1997:Q4**	3.62	**1996:Q3**	14.31	**1996:Q3**	3.51
1996:Q4	-1.92	**1996:Q4**	2.45	**1998:Q2**	3.51	**1997:Q2**	3.16	**1996:Q4**	-6.62
1997:Q1	2.87	**1997:Q1**	6.18	**1998:Q3**	5.14	**1997:Q3**	2.11	**1997:Q1**	4.40
1997:Q2	5.61	**1997:Q2**	5.83	**1998:Q4**	8.10	**1997:Q4**	4.22	**1997:Q2**	6.83
1997:Q3	2.76	**1997:Q4**	3.98	**1999:Q1**	2.75	**1998:Q1**	1.95	**1997:Q3**	2.84
1998:Q2	3.09	**1998:Q1**	-8.78	**1999:Q2**	6.17	**1998:Q2**	6.09	**1997:Q4**	3.87
1999:Q3	2.08	**1998:Q2**	5.76	**1999:Q3**	10.24	**1998:Q3**	2.79	**1998:Q2**	8.08
1999:Q4	1.96	**1998:Q4**	-2.78	**2000:Q2**	4.09	**1998:Q4**	4.64	**1998:Q4**	2.24
2000:Q4	3.57	**1999:Q3**	3.21	**2000:Q3**	4.66	**1999:Q1**	2.09	**1999:Q4**	-5.77
2001:Q3	5.09	**1999:Q4**	2.29	**2000:Q4**	2.47	**1999:Q2**	7.92	**2000:Q4**	2.30
2001:Q4	5.86	**2000:Q1**	17.62	**2001:Q1**	4.60	**1999:Q3**	12.48	**2002:Q2**	2.57
2002:Q1	-2.29	**2000:Q3**	-3.04	**2001:Q3**	-4.06	**1999:Q4**	1.87	**2002:Q3**	2.99
2002:Q2	4.28	**2001:Q1**	3.36	**2002:Q1**	3.09	**2000:Q2**	7.48	**2003:Q4**	2.08
2002:Q3	1.90	**2001:Q4**	3.87	**2002:Q2**	-7.56	**2000:Q3**	2.73	**2004:Q1**	3.15
2003:Q3	1.90	**2002:Q2**	2.38	**2002:Q3**	5.43	**2000:Q4**	2.52	**2004:Q2**	-7.98
2004:Q1	2.50	**2003:Q4**	-2.27	**2002:Q4**	9.85	**2001:Q1**	1.98	**2004:Q3**	-5.31
2005:Q1	-3.91	**2004:Q2**	3.96	**2003:Q1**	14.13	**2001:Q3**	-12.93	**2005:Q3**	6.25
2005:Q2	-158.07	**2004:Q4**	-8.89	**2003:Q2**	1.98	**2001:Q4**	14.00	**2005:Q4**	-2.10
2005:Q4	3.87	**2005:Q3**	-65.22	**2003:Q4**	1.90	**2002:Q1**	6.71	**2006:Q3**	-3.37
2006:Q1	-2.73	**2005:Q4**	-1.81	**2004:Q2**	2.16	**2002:Q2**	2.37	**2006:Q4**	7.16
2006:Q3	-6.66	**2006:Q1**	43.79	**2005:Q2**	-2.54	**2002:Q3**	-3.70	**2007:Q1**	2.07
2006:Q4	6.600	**2006:Q2**	-4.85	**2005:Q4**	3.95	**2003:Q1**	3.38	**2008:Q1**	-7.84
2007:Q2	-1.852	**2006:Q3**	-10.18	**2006:Q1**	-17.54	**2003:Q2**	-276.86	**2008:Q3**	4.25
2008:Q3	-3.177	**2006:Q4**	-7.32	**2006:Q3**	-6.19	**2003:Q3**	14.76	**2008:Q4**	2.30
2008:Q4	-1.974	**2007:Q1**	8.57	**2006:Q4**	-4.15	**2003:Q4**	3.48	**2009:Q2**	-3.31
2009:Q1	-5.085	**2007:Q4**	-3.75	**2007:Q1**	-6.31	**2004:Q1**	3.78	**2009:Q3**	-6.83
2010:Q2	-1.999	**2008:Q3**	1.95	**2007:Q2**	-19.62	**2004:Q2**	5.01	**2011:Q1**	-10.39
2011:Q2	1.903	**2008:Q4**	-4.15	**2007:Q3**	8.23	**2004:Q3**	1.95	**2011:Q2**	-2.33
		2009:Q2	-3.36	**2008:Q1**	-2.03	**2005:Q3**	-2.22		
		2010:Q1	-1.87	**2008:Q2**	-1.94	**2005:Q4**	4.63		
		2010:Q3	-2.13	**2008:Q4**	-6.02	**2007:Q1**	-15.48		
		2011:Q1	2.00	**2011:Q1**	-3.82	**2007:Q2**	6.04		
						2007:Q3	-157.69		
						2008:Q2	-9.90		
						2008:Q3	3.28		
						2009:Q2	3.45		
						2010:Q1	-3.31		
						2010:Q2	7.55		
						2010:Q3	2.37		

Table 9A: Comparing Forecasting Method 1 v. Method 3 at the 5% Level									
Vintage	**HLN: h1**	**Vintage**	**HLN: h2**	**Vintage**	**HLN: h3**	**Vintage**	**HLN: h4**	**Vintage**	**HLN: h5**
1996:Q1	3.39	**1996:Q1**	3.65	**1996:Q2**	5.11	**1996:Q1**	5.56	**1996:Q1**	2.78
1996:Q3	-2.41	**1996:Q2**	4.32	**1997:Q1**	2.12	**1996:Q2**	2.72	**1996:Q2**	7.93
1997:Q1	2.67	**1996:Q3**	4.12	**1997:Q3**	2.14	**1996:Q3**	13.04	**1996:Q3**	6.88
1997:Q2	4.38	**1996:Q4**	2.54	**1997:Q4**	3.16	**1996:Q4**	2.39	**1996:Q4**	-6.37
1997:Q3	2.26	**1997:Q1**	20.72	**1998:Q2**	4.35	**1997:Q2**	3.95	**1997:Q1**	4.40
1998:Q2	3.11	**1997:Q2**	8.42	**1998:Q3**	4.59	**1997:Q3**	2.41	**1997:Q2**	7.16
1999:Q3	2.03	**1997:Q4**	4.38	**1998:Q4**	7.54	**1997:Q4**	5.72	**1997:Q3**	3.67
2000:Q4	3.55	**1998:Q1**	-9.84	**1999:Q1**	3.05	**1998:Q1**	2.43	**1997:Q4**	3.74
2001:Q3	4.91	**1998:Q2**	6.44	**1999:Q2**	5.21	**1998:Q2**	7.08	**1998:Q2**	6.21
2001:Q4	5.07	**1998:Q4**	-3.15	**1999:Q3**	6.58	**1998:Q3**	3.19	**1998:Q4**	2.58
2002:Q2	4.10	**1999:Q4**	2.07	**2000:Q2**	3.24	**1998:Q4**	30.31	**1999:Q4**	-9.48
2002:Q3	2.23	**2000:Q1**	16.61	**2000:Q3**	2.32	**1999:Q1**	2.05	**2000:Q3**	-2.90
2003:Q3	1.98	**2000:Q3**	-2.66	**2000:Q4**	3.63	**1999:Q2**	6.77	**2000:Q4**	2.31
2004:Q1	2.31	**2001:Q1**	3.34	**2001:Q1**	2.64	**1999:Q3**	21.56	**2002:Q2**	2.56
2005:Q1	-4.04	**2001:Q2**	-2.21	**2001:Q3**	-4.17	**1999:Q4**	2.58	**2002:Q3**	3.01
2005:Q2	-401.23	**2001:Q4**	3.02	**2002:Q1**	2.22	**2000:Q2**	3.53	**2003:Q3**	-1.96
2005:Q3	2.28	**2003:Q4**	-1.85	**2002:Q2**	-3.66	**2000:Q3**	2.49	**2003:Q4**	3.79
2005:Q4	1.97	**2004:Q2**	3.75	**2002:Q3**	4.55	**2000:Q4**	2.30	**2004:Q1**	5.76
2006:Q2	-2.02	**2004:Q4**	-3.63	**2002:Q4**	6.22	**2001:Q3**	-7.85	**2004:Q2**	-8.11
2006:Q3	-6.84	**2005:Q3**	-78.05	**2003:Q1**	10.38	**2001:Q4**	4.90	**2004:Q3**	-4.54
2006:Q4	6.32	**2006:Q1**	32.76	**2003:Q2**	2.19	**2002:Q1**	6.62	**2005:Q3**	2.70
2007:Q2	4.00	**2006:Q2**	-3.99	**2003:Q4**	1.99	**2002:Q2**	2.81	**2005:Q4**	-2.81
2008:Q3	-3.45	**2006:Q3**	-9.42	**2004:Q2**	2.01	**2002:Q3**	-3.93	**2006:Q3**	-3.72
2009:Q1	-4.95	**2006:Q4**	-8.20	**2005:Q2**	-2.65	**2003:Q1**	3.29	**2006:Q4**	7.55
2010:Q4	1.89	**2007:Q1**	9.60	**2005:Q3**	-2.14	**2003:Q2**	-13.87	**2008:Q1**	-7.86
2011:Q2	2.01	**2007:Q4**	-8.60	**2005:Q4**	3.87	**2003:Q3**	6.79	**2008:Q3**	3.78
		2008:Q3	2.28	**2006:Q1**	-26.52	**2003:Q4**	4.00	**2008:Q4**	2.04
		2008:Q4	-4.31	**2006:Q2**	-2.71	**2004:Q1**	3.34	**2009:Q2**	-3.30
		2009:Q2	-3.92	**2006:Q3**	-2.58	**2004:Q2**	5.05	**2009:Q3**	-5.81
		2010:Q3	-2.14	**2006:Q4**	-4.04	**2005:Q3**	-2.45	**2011:Q1**	-5.96
		2011:Q1	2.26	**2007:Q1**	-4.88	**2005:Q4**	4.59	**2011:Q2**	-2.18
				2007:Q2	-14.85	**2007:Q1**	-16.52		
				2007:Q3	11.12	**2007:Q2**	7.16		
				2008:Q1	-2.05	**2007:Q3**	-9.13		
				2008:Q2	-1.93	**2008:Q2**	-11.30		
				2008:Q4	-2.12	**2008:Q3**	3.20		
				2009:Q4	-1.96	**2009:Q2**	2.51		
				2010:Q2	2.76	**2009:Q4**	1.88		
				2011:Q1	-5.57	**2010:Q1**	-3.15		
						2010:Q2	8.63		
						2010:Q3	2.27		
						2010:Q4	-2.54		

Table 10A: Comparing Forecasting Method 2 v. Method 3 at the 5% Level									
Vintage	HLN: h1	Vintage	HLN: h2	Vintage	HLN: h3	Vintage	HLN: h4	Vintage	HLN: h5
1996:Q1	-3.38	**1996:Q1**	-3.99	**1996:Q1**	2.93	**1996:Q1**	-5.71	**1996:Q1**	-2.06
1996:Q3	3.79	**1996:Q2**	-2.67	**1997:Q3**	-3.02	**1996:Q3**	-25.13	**1996:Q2**	-8.21
1996:Q4	3.12	**1996:Q3**	-2.90	**1997:Q4**	-4.29	**1997:Q2**	-2.69	**1996:Q3**	-2.66
1997:Q1	-3.12	**1996:Q4**	-2.39	**1998:Q2**	-2.92	**1997:Q3**	-1.89	**1996:Q4**	6.90
1997:Q2	-5.65	**1997:Q1**	-4.85	**1998:Q3**	-7.16	**1997:Q4**	-3.31	**1997:Q1**	-4.41
1997:Q3	-2.97	**1997:Q2**	-5.13	**1998:Q4**	-9.07	**1998:Q2**	-5.13	**1997:Q2**	-6.55
1998:Q2	-3.02	**1997:Q4**	-3.39	**1999:Q1**	-2.63	**1998:Q3**	-2.51	**1997:Q3**	-2.48
1998:Q3	-1.81	**1998:Q1**	7.96	**1999:Q2**	-11.03	**1998:Q4**	-3.53	**1997:Q4**	-4.99
1999:Q3	-1.84	**1998:Q2**	-5.20	**1999:Q3**	-5.17	**1999:Q1**	-2.16	**1998:Q2**	-4.33
1999:Q4	-2.45	**1998:Q4**	2.51	**2000:Q2**	-5.15	**1999:Q2**	-4.32	**1998:Q4**	-1.97
2000:Q4	-3.58	**1999:Q3**	-2.27	**2000:Q3**	-5.74	**1999:Q3**	-8.26	**1999:Q4**	4.46
2001:Q3	-5.27	**1999:Q4**	-2.49	**2000:Q4**	-3.88	**2000:Q2**	-6.81	**2000:Q2**	-2.81
2001:Q4	-6.03	**2000:Q1**	-18.22	**2001:Q1**	-3.24	**2000:Q3**	-2.82	**2000:Q4**	-2.22
2002:Q1	2.88	**2000:Q3**	3.68	**2001:Q2**	-3.16	**2000:Q4**	-2.72	**2002:Q2**	-2.59
2002:Q2	-2.95	**2001:Q1**	-3.39	**2001:Q3**	3.95	**2001:Q1**	-2.24	**2002:Q3**	-2.98
2003:Q3	-1.83	**2001:Q4**	-6.15	**2002:Q1**	-3.67	**2001:Q3**	7.78	**2003:Q1**	-1.97
2004:Q1	-2.64	**2002:Q1**	-2.12	**2002:Q2**	20.19	**2001:Q4**	-4.77	**2003:Q4**	-1.95
2005:Q1	3.77	**2002:Q2**	-2.46	**2002:Q3**	-6.77	**2002:Q1**	-5.87	**2004:Q1**	-2.93
2005:Q2	103.03	**2003:Q4**	2.74	**2002:Q4**	-17.79	**2002:Q2**	-2.13	**2004:Q2**	7.85
2005:Q4	-4.02	**2004:Q2**	-4.23	**2003:Q1**	-29.86	**2002:Q3**	3.50	**2005:Q3**	-3.07
2006:Q1	3.55	**2004:Q4**	4.62	**2003:Q2**	-1.84	**2003:Q1**	-3.64	**2006:Q3**	3.28
2006:Q3	6.47	**2005:Q3**	56.87	**2003:Q4**	-1.82	**2003:Q2**	18.10	**2006:Q4**	-6.79
2006:Q4	-6.84	**2005:Q4**	10.11	**2004:Q1**	2.01	**2003:Q3**	-10.19	**2007:Q1**	-2.25
2007:Q2	2.43	**2006:Q1**	-17.39	**2004:Q2**	-2.30	**2003:Q4**	-3.21	**2008:Q1**	7.81
2008:Q3	3.03	**2006:Q2**	5.57	**2004:Q3**	4.58	**2004:Q1**	-4.52	**2008:Q3**	-5.06
2008:Q4	2.18	**2006:Q3**	3.56	**2005:Q2**	2.46	**2004:Q2**	-2.31	**2008:Q4**	-2.76
2010:Q2	1.94	**2006:Q4**	6.69	**2005:Q4**	-4.06	**2004:Q3**	-2.85	**2009:Q2**	3.32
		2007:Q1	-7.94	**2006:Q1**	13.29	**2005:Q3**	2.05	**2009:Q3**	9.79
		2007:Q4	2.78	**2006:Q4**	4.11	**2005:Q4**	-4.80	**2010:Q2**	-2.36
		2008:Q4	3.98	**2007:Q1**	4.73	**2007:Q1**	14.65	**2011:Q1**	8.23
		2009:Q2	-5.74	**2007:Q2**	37.04	**2007:Q2**	-5.33	**2011:Q2**	2.64
		2010:Q1	3.17	**2007:Q3**	-7.35	**2008:Q2**	8.91		
		2010:Q3	2.11	**2008:Q1**	2.00	**2008:Q3**	-3.38		
				2008:Q2	1.94	**2009:Q2**	-13.37		
				2008:Q4	3.07	**2010:Q1**	3.47		
				2010:Q3	1.93	**2010:Q2**	-4.01		
				2011:Q1	2.56	**2010:Q3**	-2.43		
						2010:Q4	-2.84		
						2011:Q2	-1.87		

Table 11A: Out-of-Sample Performance Efficiency Ratios of Method 1 v. Method 2										
Vintage	**RMSE: h1**	**MAE: h1**	**RMSE: h2**	**MAE: h2**	**RMSE: h3**	**MAE: h3**	**RMSE: h4**	**MAE: h4**	**RMSE: h5**	**MAE: h5**
1996.01	0.732	0.715	0.635	0.617	0.715	0.694	1.000	1.000	0.685	0.733
1996.02	0.714	0.700	0.741	0.696	0.642	0.569	0.996	0.989	0.988	0.990
1996.03	0.895	0.919	1.008	0.997	1.000	0.936	0.824	0.782	0.673	0.743
1996.04	1.616	1.595	1.018	1.013	0.984	0.919	1.007	0.891	0.998	0.998
1997.01	1.185	1.239	0.952	0.951	1.417	0.862	1.016	0.917	1.000	1.000
1997.02	0.573	0.614	0.930	0.955	1.032	0.815	0.943	0.912	0.998	0.996
1997.03	0.896	0.882	0.994	0.994	1.034	0.991	0.590	0.529	0.654	0.580
1997.04	0.937	0.906	1.128	1.143	0.818	0.805	0.457	0.354	0.834	0.685
1998.01	0.640	0.584	1.000	1.000	0.753	0.791	0.461	0.440	0.785	0.728
1998.02	0.492	0.471	0.980	0.979	0.895	0.904	0.688	0.667	0.653	0.588
1998.03	1.135	1.263	0.826	0.717	1.047	1.053	0.834	0.795	0.209	0.222
1998.04	1.211	1.387	1.000	0.998	0.846	0.809	0.715	0.704	0.225	0.240
1999.01	1.241	1.364	0.835	0.828	0.532	0.438	0.698	0.714	0.157	0.191
1999.02	1.245	1.442	1.075	1.080	0.694	0.728	0.781	0.789	0.871	0.917
1999.03	0.701	0.657	1.005	0.790	0.576	0.670	0.876	0.862	1.162	1.178
1999.04	0.637	0.558	1.013	1.012	0.940	0.914	1.669	1.713	1.151	1.204
2000.01	0.582	0.610	0.561	0.564	1.368	1.370	0.962	0.946	1.785	1.932
2000.02	1.154	1.012	1.093	1.103	1.149	1.118	1.002	1.021	0.618	0.659
2000.03	0.749	0.661	2.232	1.919	0.283	0.216	1.124	1.206	1.000	0.984
2000.04	1.002	1.003	0.902	0.874	1.164	1.046	1.104	1.136	1.457	1.447
2001.01	0.763	0.596	1.015	1.017	0.526	0.515	1.248	1.289	1.717	1.493
2001.02	1.302	0.961	0.629	0.622	1.800	1.941	1.212	1.066	1.457	1.302
2001.03	1.000	1.000	0.841	0.857	0.984	0.983	0.840	0.827	1.441	1.398
2001.04	1.001	1.002	1.000	1.000	1.745	1.517	1.263	1.205	1.219	1.314
2002.01	1.024	1.013	1.004	1.000	2.556	1.578	1.089	1.029	1.363	1.391
2002.02	1.045	1.057	0.948	0.935	0.999	0.999	1.472	1.353	1.064	1.045
2002.03	0.724	0.671	0.994	0.993	1.001	1.002	0.833	0.868	1.047	1.115
2002.04	0.467	0.429	0.980	1.038	0.919	0.910	1.069	0.877	1.216	1.249
2003.01	0.753	0.739	0.778	0.707	0.910	0.917	1.465	1.485	0.328	0.339
2003.02	0.651	0.688	0.899	0.915	0.810	0.802	1.000	1.000	1.105	1.168
2003.03	0.807	0.813	0.882	0.894	1.045	1.051	1.000	1.002	0.770	0.827

Table 11A (Continued): Out-of-Sample Performance Efficiency Ratios of Method 1 v. Method 2										
Vintage	**RMSE: h1**	**MAE: h1**	**RMSE: h2**	**MAE: h2**	**RMSE: h3**	**MAE: h3**	**RMSE: h4**	**MAE: h4**	**RMSE: h5**	**MAE: h5**
2003.04	1.876	1.772	0.994	0.945	1.226	1.204	0.965	0.970	0.722	0.716
2004.01	0.708	0.659	0.951	0.974	0.991	1.066	1.000	1.000	0.771	0.759
2004.02	1.268	1.231	1.170	1.134	0.923	0.899	0.731	0.783	1.000	1.000
2004.03	0.947	0.854	1.038	1.039	0.661	0.637	1.433	1.483	1.010	1.014
2004.04	0.786	0.741	1.435	1.420	0.854	0.860	1.437	1.346	0.962	0.965
2005.01	0.981	0.981	1.680	1.542	0.869	0.851	1.047	0.798	0.999	0.998
2005.02	1.000	1.000	1.003	1.002	1.058	1.054	1.220	1.215	0.624	0.481
2005.03	1.631	1.796	1.000	1.000	0.866	0.887	0.928	0.913	0.946	1.027
2005.04	0.550	0.620	0.527	0.713	1.015	1.014	1.280	1.289	1.357	1.285
2006.01	0.747	0.540	1.124	1.122	1.000	1.000	0.291	0.286	1.280	1.078
2006.02	0.870	0.872	0.850	0.802	1.013	1.075	1.061	1.046	1.155	1.148
2006.03	0.967	0.968	0.653	0.787	0.535	0.393	0.298	0.346	0.812	0.734
2006.04	1.000	1.000	0.904	0.907	0.832	0.804	1.298	1.452	1.047	1.049
2007.01	1.241	1.237	1.001	1.001	1.007	1.157	1.000	1.000	0.597	0.563
2007.02	0.853	0.882	0.817	0.832	0.891	0.894	1.152	1.165	0.829	0.821
2007.03	1.331	1.315	1.046	1.045	0.970	0.964	1.128	1.062	0.867	0.864
2007.04	0.791	0.944	1.460	1.442	1.262	1.249	1.029	1.031	0.460	0.411
2008.01	1.356	1.504	1.011	0.976	1.005	1.006	0.427	0.448	1.000	1.000
2008.02	1.338	1.345	1.031	1.044	0.420	0.414	0.971	0.972	0.773	0.983
2008.03	1.002	0.992	1.050	1.043	1.007	1.200	1.203	1.209	1.063	1.110
2008.04	1.076	1.234	1.021	1.018	0.529	0.423	0.804	0.946	1.158	1.184
2009.01	39.712	39.416	0.998	1.084	0.729	0.668	0.992	0.916	1.049	1.006
2009.02	1.012	0.968	5.984	6.852	1.015	1.012	0.906	0.972	1.000	1.000
2009.03	1.004	1.013	0.907	0.868	0.832	0.847	1.003	0.986	1.000	1.000
2009.04	1.001	1.005	0.994	0.957	1.141	0.827	1.007	0.941	1.636	1.424
2010.01	0.987	0.990	1.004	0.985	1.000	1.012	0.947	0.946	0.924	0.781
2010.02	0.580	0.599	0.934	0.934	1.021	1.073	1.044	1.078	1.079	1.028
2010.03	0.962	0.983	1.019	1.018	1.149	1.121	1.044	0.935	0.954	0.866
2010.04	0.989	1.013	1.078	1.037	0.976	1.076	1.375	1.853	0.948	0.971
2011.01	0.984	0.998	0.968	1.014	0.715	0.731	1.057	1.042	0.904	0.934
2011.02	0.811	0.858	0.922	0.896	0.956	1.019	1.004	1.009	1.208	1.161

Table 12A: Out-of-Sample Performance Efficiency Ratios of Method 1 v. Method 3										
Vintage	**RMSE: h1**	**MAE: h1**	**RMSE: h2**	**MAE: h2**	**RMSE: h3**	**MAE: h3**	**RMSE: h4**	**MAE: h4**	**RMSE: h5**	**MAE: h5**
1996.01	1.792	2.097	4.521	4.525	1.072	1.126	128.706	220.159	85.414	103.528
1996.02	0.907	1.005	3.450	3.542	1.334	1.684	5.860	6.101	180.642	272.022
1996.03	2.336	3.262	20.165	16.572	9.568	6.746	13.681	18.277	61.626	78.525
1996.04	1.525	1.846	17.827	15.820	22.419	19.073	10.414	7.678	64.819	110.750
1997.01	7.003	6.608	8.019	8.550	6.265	3.419	24.949	16.315	259.300	423.637
1997.02	2.577	2.822	10.906	10.979	2.479	1.804	12.450	14.412	83.412	129.414
1997.03	4.110	3.933	27.599	44.896	6.621	5.061	3.836	2.829	5.719	5.030
1997.04	1.517	1.885	8.167	13.499	7.962	7.289	1.903	1.534	10.139	8.622
1998.01	2.455	2.543	43.593	77.544	4.160	4.379	2.869	2.112	2.780	1.938
1998.02	1.739	1.810	29.407	51.423	5.499	5.650	5.831	4.510	5.061	4.906
1998.03	2.651	2.538	4.651	3.428	6.373	6.481	9.632	8.162	0.690	0.599
1998.04	3.325	3.306	26.527	47.882	23.483	24.067	7.883	7.050	1.243	1.489
1999.01	3.774	3.947	3.128	6.898	2.937	2.197	3.278	2.873	0.632	0.634
1999.02	3.837	4.314	26.214	51.322	4.293	4.281	8.579	8.848	1.980	2.048
1999.03	2.214	1.682	5.644	9.750	3.455	4.040	12.935	13.907	2.871	2.685
1999.04	6.858	6.585	17.017	12.444	14.561	13.979	9.056	9.190	9.740	11.352
2000.01	101.246	254.201	155.827	277.617	64.439	116.190	38.998	47.389	28.549	46.475
2000.02	6.481	6.331	5.653	6.092	7.284	6.638	5.133	5.518	2.059	1.727
2000.03	5.304	4.729	14.792	16.119	6.124	4.837	5.051	5.150	2.455	2.740
2000.04	58.136	83.790	14.081	16.684	2.502	2.337	5.613	5.835	5.883	5.287
2001.01	3.443	3.803	21.852	30.415	3.128	2.675	5.398	5.885	5.980	4.639
2001.02	3.940	3.484	3.635	4.463	3.303	3.275	7.763	6.655	5.432	4.609
2001.03	28.645	32.342	5.106	7.328	19.891	26.883	2.806	3.155	6.832	6.416
2001.04	4.325	5.341	4.513	5.327	5.360	4.210	3.821	3.903	5.062	5.382
2002.01	1.571	2.025	1.087	0.865	4.282	3.301	6.280	5.485	7.073	7.513
2002.02	2.768	3.077	1.350	1.312	3.411	4.241	5.851	5.530	8.574	9.456
2002.03	4.188	5.105	4.144	6.603	13.877	17.633	5.980	7.026	13.806	17.812
2002.04	3.062	3.313	1.952	3.354	5.651	7.514	6.265	4.648	7.896	9.267
2003.01	9.891	10.222	11.477	10.690	6.680	9.363	5.113	4.876	2.539	3.200
2003.02	16.022	25.108	29.042	26.474	11.517	15.869	7.407	9.952	9.551	13.003
2003.03	24.934	35.952	26.857	27.249	60.856	55.081	17.761	21.348	6.375	9.439

Table 12A (Continued): Out-of-Sample Performance Efficiency Ratios of Method 1 v. Method 3										
Vintage	**RMSE: h1**	**MAE: h1**	**RMSE: h2**	**MAE: h2**	**RMSE: h3**	**MAE: h3**	**RMSE: h4**	**MAE: h4**	**RMSE: h5**	**MAE: h5**
2003.04	12.270	13.212	15.994	19.041	25.627	25.444	9.670	12.485	3.873	4.511
2004.01	36.108	42.914	76.494	114.395	42.012	44.777	6.952	10.407	11.097	12.732
2004.02	24.904	24.200	54.619	100.378	45.145	53.330	5.085	8.159	73.380	99.441
2004.03	10.805	14.351	14.331	15.287	6.879	8.898	5.094	6.016	1.910	2.380
2004.04	25.128	33.233	16.697	21.516	21.261	29.071	9.335	10.498	8.475	9.979
2005.01	26.024	41.261	33.151	37.844	27.113	33.294	5.199	4.569	7.771	7.915
2005.02	127.459	207.762	13.072	17.164	21.892	29.257	46.110	52.520	5.168	3.935
2005.03	5.390	6.273	80.848	128.629	13.843	21.619	12.908	15.805	5.377	5.748
2005.04	1.591	2.917	2.183	2.862	21.179	29.363	9.633	11.979	9.280	7.832
2006.01	2.204	2.872	17.172	24.812	20.192	31.513	2.872	2.993	4.104	4.139
2006.02	1.935	3.650	11.809	14.854	6.237	5.936	13.436	16.908	37.866	45.540
2006.03	48.385	85.105	3.966	5.900	2.536	2.996	3.939	5.331	8.243	8.894
2006.04	27.872	38.949	144.774	239.033	4.680	6.898	17.676	25.279	14.994	21.905
2007.01	4.069	4.798	8.273	15.087	3.300	6.053	62.295	97.783	3.467	5.126
2007.02	4.924	6.946	6.751	11.089	87.063	174.704	7.790	9.709	13.298	19.597
2007.03	37.092	54.161	5.393	12.303	16.750	27.998	4.052	6.205	7.891	11.723
2007.04	9.855	16.345	13.953	28.854	8.338	13.386	1.877	2.604	6.258	7.125
2008.01	7.128	13.014	17.320	29.960	47.570	80.769	2.631	3.695	143.181	242.949
2008.02	11.655	17.126	32.160	61.508	13.482	17.986	195.816	364.483	4.922	7.028
2008.03	16.392	19.962	50.701	93.655	37.759	50.857	19.991	23.771	11.598	14.978
2008.04	2.824	4.784	42.690	66.189	11.545	9.818	3.615	4.758	18.034	22.186
2009.01	509.423	708.044	13.989	20.279	1.032	1.843	13.448	10.416	4.492	6.819
2009.02	2.506	2.683	284.789	400.503	1.214	2.483	53.373	50.503	109.964	264.972
2009.03	3.699	4.129	3.204	3.904	3.371	5.134	12.908	12.823	10.938	18.369
2009.04	3.669	4.382	6.387	5.546	7.005	9.328	14.167	12.882	15.536	26.493
2010.01	4.068	3.944	4.253	3.632	10.455	7.951	41.220	88.872	3.668	6.489
2010.02	22.093	46.860	4.659	6.816	4.258	5.260	18.533	33.006	190.206	189.294
2010.03	2.683	4.506	10.665	20.075	2.140	3.171	17.671	15.633	19.989	24.798
2010.04	16.688	27.848	4.353	5.918	5.003	6.388	32.646	46.530	30.097	36.692
2011.01	2.746	5.285	32.146	36.213	10.366	18.848	18.026	15.222	153.371	175.178
2011.02	4.339	7.046	4.743	5.813	7.554	10.924	1.412	3.084	33.864	43.365

Table 13A: Out-of-Sample Performance Efficiency Ratios of Method 2 v. Method 3										
Vintage	**RMSE: h1**	**MAE: h1**	**RMSE: h2**	**MAE: h2**	**RMSE: h3**	**MAE: h3**	**RMSE: h4**	**MAE: h4**	**RMSE: h5**	**MAE: h5**
1996.01	2.448	2.933	7.115	7.332	1.499	1.624	128.706	220.159	124.617	141.161
1996.02	1.270	1.437	4.658	5.088	2.079	2.960	5.882	6.172	182.865	274.721
1996.03	2.611	3.551	19.998	16.614	9.571	7.208	16.611	23.358	91.633	105.749
1996.04	0.944	1.157	17.506	15.622	22.774	20.763	10.340	8.616	64.974	111.009
1997.01	5.912	5.334	8.427	8.989	4.421	3.968	24.555	17.799	259.301	423.638
1997.02	4.496	4.599	11.726	11.501	2.401	2.213	13.200	15.806	83.617	129.992
1997.03	4.588	4.458	27.775	45.177	6.404	5.107	6.502	5.347	8.745	8.674
1997.04	1.618	2.081	7.241	11.808	9.738	9.055	4.164	4.328	12.161	12.583
1998.01	3.838	4.356	43.593	77.544	5.522	5.534	6.223	4.803	3.541	2.664
1998.02	3.536	3.846	29.999	52.537	6.147	6.247	8.472	6.758	7.753	8.342
1998.03	2.336	2.009	5.632	4.783	6.088	6.155	11.546	10.270	3.309	2.702
1998.04	2.746	2.384	26.538	47.956	27.743	29.762	11.023	10.009	5.515	6.219
1999.01	3.041	2.893	3.747	8.329	5.520	5.016	4.695	4.025	4.032	3.315
1999.02	3.083	2.992	24.382	47.536	6.187	5.878	10.987	11.221	2.273	2.234
1999.03	3.158	2.560	5.614	12.338	6.000	6.029	14.757	16.132	2.470	2.280
1999.04	10.762	11.799	16.796	12.299	15.491	15.290	5.426	5.365	8.462	9.431
2000.01	173.917	416.660	277.846	491.839	47.108	84.831	40.556	50.110	15.993	24.061
2000.02	5.618	6.256	5.173	5.523	6.341	5.938	5.121	5.404	3.331	2.623
2000.03	7.085	7.151	6.627	8.399	21.676	22.345	4.494	4.271	2.454	2.785
2000.04	58.001	83.546	15.609	19.094	2.150	2.235	5.085	5.134	4.039	3.653
2001.01	4.512	6.376	21.528	29.893	5.944	5.194	4.326	4.565	3.482	3.108
2001.02	3.027	3.624	5.779	7.171	1.835	1.687	6.407	6.243	3.729	3.541
2001.03	28.646	32.344	6.072	8.550	20.218	27.344	3.340	3.814	4.740	4.589
2001.04	4.321	5.329	4.513	5.327	3.072	2.775	3.024	3.238	4.151	4.096
2002.01	1.534	1.998	1.083	0.864	1.675	2.091	5.767	5.333	5.190	5.402
2002.02	2.648	2.910	1.424	1.404	3.414	4.244	3.975	4.087	8.054	9.048
2002.03	5.782	7.608	4.171	6.648	13.869	17.591	7.177	8.098	13.192	15.971
2002.04	6.553	7.726	1.991	3.230	6.146	8.254	5.860	5.302	6.493	7.422
2003.01	13.133	13.840	14.748	15.127	7.337	10.210	3.490	3.283	7.751	9.429
2003.02	24.628	36.511	32.310	28.940	14.226	19.795	7.410	9.955	8.642	11.137
2003.03	30.900	44.244	30.446	30.496	58.235	52.393	17.757	21.312	8.281	11.413

Table 13A (Continued): Out-of-Sample Performance Efficiency Ratios of Method 2 v. Method 3										
Vintage	**RMSE: h1**	**MAE: h1**	**RMSE: h2**	**MAE: h2**	**RMSE: h3**	**MAE: h3**	**RMSE: h4**	**MAE: h4**	**RMSE: h5**	**MAE: h5**
2003.04	6.540	7.458	16.098	20.154	20.907	21.138	10.017	12.875	5.364	6.302
2004.01	51.019	65.084	80.401	117.423	42.386	42.007	6.955	10.411	14.392	16.782
2004.02	19.637	19.658	46.666	88.544	48.899	59.308	6.952	10.423	73.381	99.443
2004.03	11.412	16.811	13.807	14.708	10.405	13.958	3.554	4.056	1.890	2.347
2004.04	31.968	44.859	11.634	15.154	24.904	33.790	6.497	7.801	8.809	10.346
2005.01	26.526	42.057	19.731	24.546	31.201	39.117	4.965	5.728	7.778	7.930
2005.02	127.459	207.762	13.035	17.122	20.687	27.766	37.784	43.218	8.285	8.173
2005.03	3.305	3.492	80.848	128.629	15.980	24.382	13.904	17.314	5.684	5.598
2005.04	2.893	4.704	4.138	4.013	20.872	28.956	7.525	9.296	6.837	6.095
2006.01	2.951	5.314	15.277	22.107	20.192	31.513	9.884	10.454	3.205	3.838
2006.02	2.223	4.184	13.892	18.531	6.155	5.521	12.662	16.168	32.797	39.664
2006.03	50.052	87.939	6.076	7.501	4.741	7.622	13.241	15.401	10.158	12.119
2006.04	27.876	38.955	160.175	263.551	5.626	8.579	13.615	17.408	14.326	20.884
2007.01	3.278	3.879	8.265	15.065	3.276	5.233	62.295	97.783	5.807	9.111
2007.02	5.776	7.879	8.259	13.331	97.664	195.339	6.760	8.336	16.042	23.877
2007.03	27.864	41.175	5.157	11.777	17.264	29.035	3.591	5.845	9.105	13.573
2007.04	12.461	17.312	9.559	20.016	6.606	10.713	1.824	2.525	13.605	17.348
2008.01	5.256	8.656	17.131	30.698	47.322	80.325	6.164	8.250	143.181	242.949
2008.02	8.709	12.733	31.199	58.920	32.063	43.490	201.648	375.095	6.363	7.146
2008.03	16.354	20.113	48.282	89.791	37.512	42.385	16.623	19.660	10.906	13.493
2008.04	9.879	10.231	41.793	65.022	21.822	23.210	4.497	5.029	15.570	18.738
2009.01	12.828	17.964	15.023	20.447	1.415	2.760	13.556	11.375	4.280	6.781
2009.02	2.476	2.770	47.593	58.450	1.195	2.455	58.936	51.943	109.983	265.013
2009.03	3.683	4.074	3.531	4.499	4.050	6.060	12.874	13.007	10.942	18.378
2009.04	3.666	4.360	6.427	5.793	6.138	11.274	14.065	13.694	9.496	18.607
2010.01	4.123	3.984	4.234	3.687	10.456	7.860	43.538	93.953	3.969	8.313
2010.02	38.091	78.256	4.990	7.300	4.172	4.901	17.758	30.624	176.250	184.097
2010.03	2.788	4.584	10.465	19.716	1.862	2.828	16.923	16.711	20.944	28.636
2010.04	16.872	27.496	4.038	5.706	5.127	5.938	23.750	25.104	31.763	37.780
2011.01	2.792	5.298	33.210	35.711	14.506	25.798	17.049	14.603	169.601	187.580
2011.02	5.351	8.208	5.144	6.488	7.902	10.716	1.406	3.058	28.032	37.336