Generalized Shrinkage Methods for Forecasting using Many Predictors

Supplement

June 2012

James H. Stock

Department of Economics, Harvard University
and the National Bureau of Economic Research

and

Mark W. Watson

Woodrow Wilson School and Department of Economics, Princeton University
and the National Bureau of Economic Research

Outline of supplement

A. Proofs of theorems

B. Variable definitions and transformations

C. Additional empirical results: cross-validated MSEs

A. Proofs of Results in Section 2

Proof of (8). First use (7) to write

$$\psi^{NB}(u) = 1 + \frac{1}{u}\frac{d}{dx}\ln\left\{\int \phi(x-\tau)dG_\tau(\tau)\right\}\Big|_{x=u}$$

$$= 1 - \frac{\int (u-\tau)\phi(u-\tau)g_\tau(\tau)d\tau}{u\int \phi(u-\tau)g_\tau(\tau)d\tau} = \frac{\int \tau\phi(u-\tau)g_\tau(\tau)d\tau}{u\int \phi(u-\tau)g_\tau(\tau)d\tau} \qquad (S.1)$$

The symmetry of $\psi^{NB}(u)$ follows from the final expression, the symmetry of the normal

distribution, and the assumed symmetry of the prior density g_τ.

To show that $0 \leq \psi^{NB}(u) \leq 1$ is bounded, first note that, because of the symmetry of

$\psi^{NB}(u)$, it suffices to consider $u \geq 0$. Also note that, for functions h and f where $h(x) > h(-x)$ for

all $x \geq 0$, $f(x)$ is odd, and $f(x) \geq 0$ for $x \geq 0$, then $\int_{-\infty}^{\infty} f(x)h(x)dx \geq 0$. The result $\psi^{NB}(u) \geq 0$

follows from the final expression in (S.1) and this inequality by setting $f(x) = xg_\tau(x)$ and $h(x) = $

$\phi(u-x)$ (note that, for $u \geq 0$, $\phi(u-x) \geq \phi(u+x)$). The result $\psi^{NB}(u) \leq 1$ follows by using the

inequality with $f(x) = x\phi(x)$ and $h(x) = g(u-x)$ (noting that $\phi(u-x) \geq \phi(u+x)$ for $u \geq 0$ because g

is symmetric and unimodal) to show that $\int (u-\tau)\phi(u-\tau)g_\tau(\tau)d\tau \geq 0$.

Proof of Theorem 1: Let $\psi = \psi^{NB}$, and recall the notation $\tau_i = \sqrt{T}\delta_i/\sigma$, $\hat{\tau}_i = \sqrt{T}\hat{\delta}_i/\sigma$,

$t_i = \sqrt{T}\hat{\delta}_i/s_e$, $\kappa = s_e/\hat{\sigma}$, and $\zeta = \hat{\sigma}^2/\sigma^2$. Let $\hat{t}_i = \kappa t_i$, so that $\hat{\tau}_i = \hat{t}_i\zeta^{1/2}$.

Note that $\tilde{Y}_{T+1/T}^{NB} - \sum_{i=1}^{n}\psi(\kappa t_i)\hat{\delta}_i P_{iT} = \sum_{i=1}^{n}\left[E^M\psi(\hat{\tau}_i) - \psi(\kappa t_i)\right]\hat{\delta}_i P_{iT} = \sum_{i=1}^{n}\rho_i P_{iT}$, where

$$\rho_i = \left[E^M \psi(\hat{\tau}_i) - \psi(\kappa t_i) \right] \hat{\delta}_i$$

$$= \left[E^M \psi^{NB}(\hat{t}_i \zeta^{1/2}) - \psi^{NB}(\hat{t}_i) \right] \hat{\delta}_i \qquad \text{(S.2)}$$

$$= \frac{1}{8} \hat{\delta}_i E^M \left[\left(\tilde{t}_i^2 \psi^{NB\prime\prime}(\tilde{t}_i) - \tilde{t}_i \, \psi^{NB\prime}(\tilde{t}_i) \right) \tilde{\zeta}^{-2} (\zeta - 1)^2 \right]$$

where the third equality follows from a second order mean value expansion of $\psi^{NB}(t\zeta^{1/2})$ around $\zeta = 1$, where $\psi^{NB\prime}$ and $\psi^{NB\prime\prime}$ are the first and second derivatives of ψ^{NB} (which exists by (A7)), $\tilde{\zeta} \in [1, \zeta]$, $\tilde{t}_i = \hat{t}_i \, \tilde{\zeta}^{1/2}$, and the first term in the mean value expansion vanishes because $E^M(\zeta - 1) = 0$. The theorem follows by showing that $\sum_i \rho_i P_{iT}$ converges to zero in mean square.

To show this, note that

$$\left(\sum_{i=1}^{n} \rho_i P_{iT} \right)^2 = \left(\frac{1}{8} \sum_{i=1}^{n} P_{iT} \hat{\delta}_i E^M \left[\left(\tilde{t}_i^2 \psi^{NB\prime\prime}(\tilde{t}_i) - \tilde{t}_i \, \psi^{NB\prime}(\tilde{t}_i) \right) \tilde{\zeta}^{-2} (\zeta - 1)^2 \right] \right)^2$$

$$\leq \frac{1}{64} \left(\sum_{i=1}^{n} P_{iT}^2 \hat{\delta}_i^2 \right) \sum_{i=1}^{n} \left\{ E^M \left[\left(\tilde{t}_i^2 \psi^{NB\prime\prime}(\tilde{t}_i) - \tilde{t}_i \, \psi^{NB\prime}(\tilde{t}_i) \right) \tilde{\zeta}^{-2} (\zeta - 1)^2 \right] \right\}^2 .$$

Now, $\sum_{i=1}^{n} P_{iT}^2 \hat{\delta}_i^2 \leq P_{\max}^2 \sum_{i=1}^{n} \hat{\delta}_i^2 \leq P_{\max}^2 \, T^{-1} \sum_{t=1}^{T} Y_t^2$, where the final inequality follows because $T \sum_{i=1}^{n} \hat{\delta}_i^2$ is the regression sum of squares from the regression of Y onto P. Also

$$\left\{ E^M \left[\left(\tilde{t}_i^2 \psi^{NB\prime\prime}(\tilde{t}_i) - \tilde{t}_i \, \psi^{NB\prime}(\tilde{t}_i) \right) \tilde{\zeta}^{-2} (\zeta - 1)^2 \right] \right\}^2 \leq 4M^2 \left\{ E^M \left[\tilde{\zeta}^{-2} (\zeta - 1)^2 \right] \right\}^2 \text{ (by A6). Thus, repeated}$$

application of the Cauchy-Schwarz inequality yields

$$E\left(\sum_{i=1}^{n}\rho_i P_{iT}\right)^2 \le \frac{1}{16}P_{\max}^2 M^2 n E\left((T^{-1}\sum_{t=1}^{T}Y_t^2)\left\{E^M\left[\tilde{\zeta}^{-2}(\zeta-1)^2\right]\right\}^2\right)$$

$$\le \frac{1}{16}P_{\max}^2 M^2 n \sqrt{E\left(T^{-1}\sum_{t=1}^{T}Y_t^2\right)^2}\sqrt{E\left\{E^M\left[\tilde{\zeta}^{-2}(\zeta-1)^2\right]\right\}^4}$$

$$\le \frac{1}{16}P_{\max}^2 M^2 n \sqrt{E\left(T^{-1}\sum_{t=1}^{T}Y_t^2\right)^2}\sqrt{E\left\{\sqrt{E^M\tilde{\zeta}^{-4}}\sqrt{E^M(\zeta-1)^4}\right\}^4}$$

$$= \frac{1}{16}P_{\max}^2 M^2 n \sqrt{E\left(T^{-1}\sum_{t=1}^{T}Y_t^2\right)^2}\sqrt{E\left\{\left(E^M\tilde{\zeta}^{-4}\right)^2\left(E^M(\zeta-1)^4\right)^2\right\}}$$

$$\le \frac{1}{16}P_{\max}^2 M^2 n \sqrt{E\left(T^{-1}\sum_{t=1}^{T}Y_t^2\right)^2}\sqrt{\sqrt{E\left(E^M\tilde{\zeta}^{-4}\right)^4}\sqrt{E\left(E^M(\zeta-1)^4\right)^4}}$$

$$\le \frac{1}{16}P_{\max}^2 M^2 n \sqrt{E\left(T^{-1}\sum_{t=1}^{T}Y_t^2\right)^2}\sqrt{\sqrt{E\left(1+E^M\zeta^{-4}\right)^4}\sqrt{E\left(E^M(\zeta-1)^4\right)^4}} \sim o(1) \qquad \text{(S.3)}$$

Where the final inequality follows from $E^M(\tilde{\zeta}^{-4}) \le E^M\left[\max(1,\zeta^{-4})\right] \le 1 + E^M(\zeta^{-4})$, and the rate follows from (A2), (A4) and (A5) .

Proof of Theorem 2: The proof of Theorem 2 is facilitated by the following lemma:

Lemma: Let $y \sim N(\mu,1)$ and let D be a random variable distributed independently of y. Then

$$\mathrm{var}\left[y \times 1(|y| > D)\right] \le 1 + \mu^2.$$

Proof: $\mathrm{var}\left[y \times 1(|y| > D)\right] \leq E\left[y \times 1(|y| > D)\right]^2 = E\left[y^2 \times 1(|y| > D)\right] =$

$E\left\{E\left[y^2 \times 1(|y| > D)|D\right]\right\} \leq E\left\{E\left[y^2|D\right]\right\} = Ey^2 = 1 + \mu^2.$

As discussed in Section 2.5, bagging is implemented using the parametric bootstrap based on the exogeneity-normality assumption (M1). Let the superscript * denote bootstrap realizations and let E^* denote expectations taken with respect to the bootstrap distribution conditional on the observed data (Y, P). Each parametric bootstrap realization draws T observations such that $P^{*\prime}P^*/T = I$ and $Y^*|P^* \sim N(P^*\hat{\delta},\ s_e^2 I)$. Let $\hat{\delta}_{ij}^*$ denote the jth bootstrap draw of the OLS estimator of δ_i and let $s_{e,j}^{2*}$ denote the jth bootstrap draw of the OLS estimator of σ^2, let $\xi^* = s_{e,j}^{2*}/s_e^2$, and let $t_{ij}^* = \sqrt{T}\ \hat{\delta}_{ij}^*/s_{e,j}^*$. The jth bootstrap realization of the pretest estimator is $1(|t_{ij}^*| > c)\hat{\delta}_{ij}^*$. The bagging estimator is

$$\tilde{\delta}_i^{BG} = \frac{1}{B}\sum_{j=1}^{B} 1(|t_{ij}^*| > c)\hat{\delta}_{ij}^* , \tag{S.4}$$

where B is the number of bootstrap draws.

By construction, under the * distribution, $\hat{\delta}_{ij}^* \sim$ i.i.d. $N(\hat{\delta}_i,\ s_e^2/T)$ so $\sqrt{T}\hat{\delta}_{ij}^*/s_e \sim$ i.i.d. $N(t_i, 1)$, $\xi^* \sim$ i.i.d. $\chi^2_{T-n}/T - n$, and $\hat{\delta}_{ij}^*$ and ξ^* are independently distributed. It is useful to define $z_{ij}^* = \sqrt{T}\hat{\delta}_{ij}^*/s_e - t_i$, where $z_{ij}^* \sim$ i.i.d. $N(0,1)$.

With this notation, $\tilde{Y}_{T+1/T}^{BG} - \hat{Y}_{T+1/T}^{BG} = \sum_{i=1}^{n} \rho_i P_{it}$, where $\rho_i = \tilde{\delta}_i^{BG} - \psi^{BG}(t_t)\hat{\delta}_i$. Thus

$$E(\tilde{Y}_{T+1/T}^{BG} - \hat{Y}_{T+1/T}^{BG})^2 = E(\sum_{i=1}^{n} \rho_i P_{iT})^2 \le P_{max}^2 n[\sum_{i=1}^{n} E(\rho_i^2)] \le P_{max}^2 n^2 \max_i E(\rho_i^2).$$ The rest of the proof

entails showing that $\max_i E(\rho_i^2) \sim o(n^{-2})$. Write $\rho_i = \rho_{1i} + \rho_{2i}$, where $\rho_{1i} = \tilde{\delta}_i^{BG} - E^*\tilde{\delta}_i^{BG}$ and ρ_{2i}

$= E^*\tilde{\delta}_i^{BG} - \psi^{BG}(t_t)\hat{\delta}_i$, and note from Minkowski's theorem that $E(\rho_i^2) \le \left(\sqrt{E(\rho_{1i}^2)} + \sqrt{E(\rho_{2i}^2)}\right)^2$.

The proof follows from showing $\max_i E(\rho_{1i}^2) \sim o(n^{-2})$ and $\max_i E(\rho_{2i}^2) \sim o(n^{-2})$.

$\underline{E(\rho_{1i}^2)}$:

$\quad E(\rho_{1i}^2) = E[E^* \rho_{1i}^2] = E[\text{var}^*(\rho_{1i})]$ since the * distribution is conditional on (Y,P) and

$E^*(\rho_{1i}) = 0$. Now

$$\text{var}^*(\rho_{1i}) = \text{var}^*(\tilde{\delta}_i^{BG} - E^*\tilde{\delta}_i^{BG})$$

$$= \text{var}^* \left\{ \frac{1}{B} \sum_{j=1}^{B} \left[1(|t_{ij}^*| > c)\hat{\delta}_{ij}^* - E^* 1(|t_{ij}^*| > c)\hat{\delta}_{ij}^* \right] \right\}$$

$$= \frac{1}{B} \text{var}^* \left[1(|t_{ij}^*| > c)\hat{\delta}_{ij}^* \right]$$

$$= \frac{s_e^2}{T} \frac{1}{B} \text{var}^* \left[1(|t_{ij}^*| > c) \frac{\sqrt{T}\hat{\delta}_{ij}^*}{s_e} \right]$$

$$= \frac{s_e^2}{T} \frac{1}{B} \text{var}^* \left[1\left(|t_i + z_{ij}^*| > c\sqrt{\xi_j^*}\right)(t_i + z_{ij}^*) \right]$$

$$\le \frac{1}{T-n} \frac{1}{B} \left(T^{-1} \sum Y_t^2 \right) \left(1 + t_i^2 \right),$$

where the second equality follows by substituting (S.4), the third equality follows because the

bootstrap draws are i.i.d., the fourth equality follows from multiplying and dividing by s_e^2/T, the

fifth equality uses the notation introduces above, and the inequality follows from

$(T-n)s_e^2 \le \sum_{t=1}^{T} Y_t^2$ and the lemma. Thus

$$\max_i E(\rho_{1i}^2) \le \frac{1}{(T-n)B}\left[E\left(T^{-1}\sum Y_t^2\right)^2\right]^{1/2} \max_i\left[E\left(1+t_i^2\right)^2\right]^{1/2} \sim o(n^{-2}),$$

where the rate follows from (A2), (A3), (A7), (A8), and the lemma.

$\underline{E(\rho_{2i}^2)}$:

$$\rho_{2i} = E^* \tilde{\delta}_i^{BG} - \psi^{BG}(t_t)\hat{\delta}_i$$

$$= E^*[1(|t_{ij}^*|>c)\hat{\delta}_{ij}^*] - \psi^{BG}(t_t)\hat{\delta}_i$$

$$= \frac{s_e}{\sqrt{T}}\left[E^*\left\{1(|t_{ij}^*|>c)\frac{\sqrt{T}\hat{\delta}_{ij}^*}{s_e}\right\} - \psi^{BG}(t_i)\frac{\sqrt{T}\hat{\delta}_i}{s_e}\right]$$

$$= \frac{s_e}{\sqrt{T}}\left[E^*\left\{1\left(|t_i+z_{ij}^*|>c\sqrt{\xi_j^*}\right)\left(t_i+z_{ij}^*\right)\right\} - \psi^{BG}(t_i)t_i\right].$$

Now $E^*\left[1\left(|t+z_{ij}^*|>d\right)\left(t+z_{ij}^*\right)\right] = \int_{|t+z^*|>d}(t+z^*)\phi(z^*)dz^* = \psi^{BG}(t,d)t$, where $\psi^{BG}(t,d) \equiv 1 - \Phi(t +$

$d) + \Phi(t-d) + t^{-1}[\phi(t-d) - \phi(t+d)]$ (cf. Bühlmann and Yu 2002). Thus

$$\rho_{2i} = \frac{s_e}{\sqrt{T}}t_i E^*\left[\psi^{BG}\left(t_i, c\sqrt{\xi_j^*}\right) - \psi^{BG}(t_i, c)\right].$$

Let $\psi^{BG\prime}$ and $\psi^{BG\prime\prime}$ denote the first two derivatives of ψ^{BG} with respect to its second argument (direct calculation show that $t\psi^{BG\prime}(t,c)$ and $t\psi^{BG\prime\prime}(t,c)$ exist). By the extended mean value theorem, the second order expansion of $\psi^{BG}(t_i,c\sqrt{\xi_j^*})$ around $\xi_j^* = 1$ yields,

$$\rho_{2i} = \frac{s_e}{\sqrt{T}} E^* \left\{ \frac{1}{8} \left[t_i \psi^{BG\prime\prime}(t_i,\tilde{c})\tilde{c}^2 - t_i \psi^{BG\prime}(t_i,\tilde{c})\tilde{c} \right] \tilde{\xi}^{-2}(\xi_j^*-1)^2 \right\} \quad (S.5)$$

where $\tilde{c} = c\sqrt{\tilde{\xi}}$, $\tilde{\xi} \in [1, \xi_j^*]$, and the first term in the mean value expansion vanishes because $E^*(\xi_j^*) = 1$. Thus

$$|\rho_{2i}| = \frac{s_e}{\sqrt{T}} E^* \left\{ \frac{1}{8} \left[t_i \psi^{BG\prime\prime}(t_i,\tilde{c})\tilde{c}^2 - t_i \psi^{BG\prime}(t_i,\tilde{c})\tilde{c} \right] \tilde{\xi}^{-2}(\xi_j^*-1)^2 \right\}$$

$$\leq \frac{s_e}{\sqrt{T}} \frac{1}{8} \sup_u \left| t_i \psi^{BG\prime\prime}(t_i,u)u^2 - t_i \psi^{BG\prime}(t_i,u)u \right| E^* \left[\tilde{\xi}^{-2}(\xi_j^*-1)^2 \right]$$

$$\leq \frac{s_e}{\sqrt{T}} \frac{1}{8} \sup_u \left| t_i \psi^{BG\prime\prime}(t_i,u)u^2 - t_i \psi^{BG\prime}(t_i,u)u \right| \sqrt{E^*(\xi_j^*-1)^4} \sqrt{E^*\tilde{\xi}^{-4}} . \quad (S.6)$$

Note, $E^*(\xi_j^*-1)^4$ is the fourth central moment of a $\chi^2_{T-n}/T-n$ random variable, so

$$E^*(\xi_j^*-1)^4 = 12(T-n)(T-n+4)/(T-n)^4 = a_{T-n} \quad (S.7)$$

where the final equality defines a_{T-n}. Next, because $\tilde{\xi} \in [1, \xi_j^*]$ and because the fourth moment of the reciprocal of a χ^2_r random variable exists for $r > 8$ and is $[(r-2)(r-4)(r-6)(r-8)]^{-1}$, for $T-n \geq 8$ we have that

$$E^* \tilde{\xi}_j^{*-4} \le 1 + E^* \xi_j^{*-4} = 1 + \frac{(T-n)^4}{(T-n-2)(T-n-4)(T-n-6)(T-n-8)} = b_{T-n} \qquad (S.8)$$

where the final equality defines b_{T-n}

Now turn to the sup term in (S.6). Direct evaluation of the derivatives using the definition of ψ^{BG} show that $t\psi^{BG\prime}(t,u)u = u^2[\phi(t+u) - \phi(t-u)]$ and $t\psi^{BG\prime\prime}(t,u)u^2 = u^2[\phi(t+u) - \phi(t-u)] - u^3[(t+u)\phi(t+u) + (t-u)\phi(t-u)]$. Thus

$$|t\psi^{BG\prime}(t,u)u| \le 2\sup_u u^2 \phi(t+u)$$

$$\le 2\sup_v (v-t)^2 \phi(v)$$

$$\le 2[(\sup_v v^2 \phi(v)) + 2t \sup_v |v\phi(v)| + t^2 \sup_v \phi(v)]$$

$$= 2(h_2 + 2h_1 t + h_2 t^2) \qquad (S.9)$$

where $h_m = m^{m/2} e^{-m/2} / \sqrt{2\pi}$. Similar calculations provide a bound on $|t\psi^{BG\prime\prime}(t,u)u^2|$ which, combined with the bound in (S.9), yields

$$\sup_u \left| t_i \psi^{BG\prime\prime}(t_i,u)u^2 - t_i \psi^{BG\prime}(t_i,u)u \right|$$

$$\le 2[(2h_2 + h_4) + (4h_1 + 3h_3)|t_i| + (2h_0 + 3h_2)t_i^2 + h_1|t_i|^3]$$

$$\le 14h_4 \sum_{m=0}^{3} |t_i|^m,$$

where the final equality uses $h_i < h_m$ for $i < m$ and $m > 1$. Substituting this bound, (S.7), and

(S.8) into (S.6), squaring, taking expectations, and collecting terms yields

$$
\begin{aligned}
E(\rho_{2i}^2) &\leq \frac{14^2}{64} a_{T-n} b_{T-n} h_4^2 E\left[\frac{s_e^2}{T} \left(\sum_{m=0}^{3} |t_i|^m \right)^2 \right] \\
&\leq \frac{14^2}{64} a_{T-n} b_{T-n} h_4^2 \frac{1}{T-n} E\left[\left(T^{-1}\sum_{t=1}^{T} Y_t^2 \right)\left(\sum_{m=0}^{3} |t_i|^m \right)^2 \right] \\
&\leq \frac{14^2}{64} a_{T-n} b_{T-n} h_4^2 \frac{1}{T-n} \sqrt{E\left(T^{-1}\sum_{t=1}^{T} Y_t^2 \right)^2} \sqrt{E\left(\sum_{m=0}^{3} |t_i|^m \right)^4} \\
&\sim o(n^{-3}),
\end{aligned}
$$

where the second inequality uses $(T-n)\, s_e^2 \leq \sum Y_t^2$, the third uses Cauchy-Schwarz, and the rate

uses $a_{T-n} \sim o[(T-n)^{-2}]$, $b_{T-n} \sim O(1)$, (A2)-(A3), and (A8).

B. Data Sources and Transformations

Table B.1 lists all the series in the data set, the series mnemonic (label) in the source database, the transformation applied to the series (T, described in Table B.2), whether the series is used to compute the principal components (E; 1 = used), the category grouping of the series (C), and a brief data description. All series are from the Global Insight (formerly DRI) Basic Economics Database, except those that include TCB (which are from the Conference Board's Indicators Database) or AC (author's calculation).

Before using the series as predictors they were screened for outliers. Observations of the transformed series with absolute median deviations larger than 6 times the inter quartile range were replaced with the median value of the preceding 5 observations.

Table B.1
Series Descriptions

Name	Label	T	E	C	Description
RGDP	GDP251	5	0	1	Real gross domestic product, quantity index (2000=100) , saar
Cons	GDP252	5	0	1	Real personal consumption expenditures, quantity index (2000=100) , saar
Cons-Dur	GDP253	5	1	1	Real personal consumption expenditures - durable goods , quantity index (2000=
Cons-NonDur	GDP254	5	1	1	Real personal consumption expenditures - nondurable goods, quantity index (200
Cons-Serv	GDP255	5	1	1	Real personal consumption expenditures - services, quantity index (2000=100) ,
GPDInv	GDP256	5	0	1	Real gross private domestic investment, quantity index (2000=100) , saar
FixedInv	GDP257	5	0	1	Real gross private domestic investment - fixed investment, quantity index (200
NonResInv	GDP258	5	0	1	Real gross private domestic investment - nonresidential , quantity index (2000
NonResInv-struct	GDP259	5	1	1	Real gross private domestic investment - nonresidential - structures, quantity
NonResInv-Bequip	GDP260	5	1	1	Real gross private domestic investment - nonresidential - equipment & software
Res.Inv	GDP261	5	1	1	Real gross private domestic investment - residential, quantity index (2000=100
Exports	GDP263	5	1	1	Real exports, quantity index (2000=100) , saar
Imports	GDP264	5	1	1	Real imports, quantity index (2000=100) , saar
Gov	GDP265	5	0	1	Real government consumption expenditures & gross investment, quantity index (2
Gov Fed	GDP266	5	1	1	Real government consumption expenditures & gross investment - federal, quantit
Gov State/Loc	GDP267	5	1	1	Real government consumption expenditures & gross investment - state & local, Q
IP: total	IPS10	5	0	2	Industrial production index - total index
IP: products	IPS11	5	0	2	Industrial production index - products, total
IP: final prod	IPS299	5	0	2	Industrial production index - final products
IP: cons gds	IPS12	5	0	2	Industrial production index - consumer goods
IP: cons dble	IPS13	5	1	2	Industrial production index - durable consumer goods
iIP:cons nondble	IPS18	5	1	2	Industrial production index - nondurable consumer goods
IP:bus eqpt	IPS25	5	1	2	Industrial production index - business equipment
IP: matls	IPS32	5	0	2	Industrial production index - materials
IP: dble mats	IPS34	5	1	2	Industrial production index - durable goods materials
IP:nondble mats	IPS38	5	1	2	Industrial production index - nondurable goods materials
IP: mfg	IPS43	5	1	2	Industrial production index - manufacturing (sic)
IP: fuels	IPS306	5	1	2	Industrial production index - fuels

NAPM prodn	PMP	1	1	2	NAPM production index (percent)
Capacity Util	UTL11	1	1	2	Capacity utilization - manufacturing (sic)
Emp: total	CES002	5	0	3	Employees, nonfarm - total private
Emp: gds prod	CES003	5	0	3	Employees, nonfarm - goods-producing
Emp: mining	CES006	5	1	3	Employees, nonfarm – mining
Emp: const	CES011	5	1	3	Employees, nonfarm – construction
Emp: mfg	CES015	5	0	3	Employees, nonfarm – mfg
Emp: dble gds	CES017	5	1	3	Employees, nonfarm - durable goods
Emp: nondbles	CES033	5	1	3	Employees, nonfarm - nondurable goods
Emp: services	CES046	5	1	3	Employees, nonfarm - service-providing
Emp: TTU	CES048	5	1	3	Employees, nonfarm - trade, transport, utilities
Emp: wholesale	CES049	5	1	3	Employees, nonfarm - wholesale trade
Emp: retail	CES053	5	1	3	Employees, nonfarm - retail trade
Emp: FIRE	CES088	5	1	3	Employees, nonfarm - financial activities
Emp: Govt	CES140	5	1	3	Employees, nonfarm – government
Help wanted indx	LHEL	2	1	3	Index of help-wanted advertising in newspapers (1967=100;sa)
Help wanted/emp	LHELX	2	1	3	Employment: ratio; help-wanted ads:no. Unemployed clf
Emp CPS total	LHEM	5	0	3	Civilian labor force: employed, total (thous.,sa)
Emp CPS nonag	LHNAG	5	1	3	Civilian labor force: employed, nonagric.industries (thous.,sa)
Emp. Hours	LBMNU	5	1	3	Hours of all persons: nonfarm business sec (1982=100,sa)
Avg hrs	CES151	1	1	3	Avg wkly hours, prod wrkrs, nonfarm - goods-producing
Overtime: mfg	CES155	2	1	3	Avg wkly overtime hours, prod wrkrs, nonfarm - mfg
U: all	LHUR	2	1	4	Unemployment rate: all workers, 16 years & over (%,sa)
U: mean duration	LHU680	2	1	4	Unemploy.by duration: average(mean)duration in weeks (sa)
U < 5 wks	LHU5	5	1	4	Unemploy.by duration: persons unempl.less than 5 wks (thous.,sa)
U 5-14 wks	LHU14	5	1	4	Unemploy.by duration: persons unempl.5 to 14 wks (thous.,sa)
U 15+ wks	LHU15	5	1	4	Unemploy.by duration: persons unempl.15 wks + (thous.,sa)
U 15-26 wks	LHU26	5	1	4	Unemploy.by duration: persons unempl.15 to 26 wks (thous.,sa)
U 27+ wks	LHU27	5	1	4	Unemploy.by duration: persons unempl.27 wks + (thous,sa)
HStarts: Total	HSFR	4	0	5	Housing starts:nonfarm(1947-58);total farm&nonfarm(1959-)(thous.,sa
HStarts: authorizations	HSBR	4	0	5	Housing authorized: total new priv housing units (thous.,saar)
HStarts: ne	HSNE	4	1	5	Housing starts:northeast (thous.u.)s.a.
HStarts: MW	HSMW	4	1	5	Housing starts:midwest(thous.u.)s.a.
HStarts: South	HSSOU	4	1	5	Housing starts:south (thous.u.)s.a.
HStarts: West	HSWST	4	1	5	Housing starts:west (thous.u.)s.a.
PMI	PMI	1	1	6	Purchasing managers' index (sa)
NAPM new ordrs	PMNO	1	1	6	NAPM new orders index (percent)
NAPM vendor del	PMDEL	1	1	6	Napm vendor deliveries index (percent)
NAPM Invent	PMNV	1	1	6	Napm inventories index (percent)
Orders (ConsGoods)	MOCMQ	5	1	6	New orders (net) - consumer goods & materials, 1996 dollars (bci)
Orders (NDCapGoods)	MSONDQ	5	1	6	New orders, nondefense capital goods, in 1996 dollars (bci)
PGDP	GDP272A	6	0	7	Gross domestic product Price Index
PCED	GDP273A	6	0	7	Personal consumption expenditures Price Index
CPI-ALL	CPIAUCSL	6	0	7	Cpi all items (sa) fred
PCED-Core	PCEPILFE	6	0	7	PCE Price Index Less Food and Energy (SA) Fred
CPI-Core	CPILFESL	6	0	7	CPI Less Food and Energy (SA) Fred
PCED-DUR	GDP274A	6	0	7	Durable goods Price Index
PCED-DUR-MOTORVEH	GDP274_1	6	1	7	Motor vehicles and parts Price Index
PCED-DUR-HHEQUIP	GDP274_2	6	1	7	Furniture and household equipment Price Index
PCED-DUR-OTH	GDP274_3	6	1	7	Other price index
PCED-NDUR	GDP275A	6	0	7	Nondurable goods Price Index
PCED-NDUR-FOOD	GDP275_1	6	1	7	Food price index
PCED-NDUR-CLTH	GDP275_2	6	1	7	Clothing and shoes Price Index
PCED-NDUR-ENERGY	GDP275_3	6	1	7	Gasoline, fuel oil, and other energy goods Price Index
PCED-NDUR-OTH	GDP275_4	6	1	7	Other price index
PCED-SERV	GDP276A	6	0	7	Services price index
PCED-SERV-HOUS	GDP276_1	6	1	7	Housing price index
PCED-SERV-HOUSOP	GDP276_2	6	0	7	Household operation Price Index
PCED-SERV-H0-ELGAS	GDP276_3	6	1	7	Electricity and gas Price Index
PCED-SERV-HO-OTH	GDP276_4	6	1	7	Other household operation Price Index
PCED-SERV-TRAN	GDP276_5	6	1	7	Transportation price index
PCED-SERV-MED	GDP276_6	6	1	7	Medical care Price Index
PCED-SERV-REC	GDP276_7	6	1	7	Recreation price index
PCED-SERV-OTH	GDP276_8	6	1	7	Other price index
PGPDI	GDP277A	6	0	7	Gross private domestic investment Price Index
PFI	GDP278A	6	0	7	Fixed investment Price Index

PFI-NRES	GDP279A	6	0	7	Nonresidential price index
PFI-NRES-STR Price Index	GDP280A	6	1	7	Structures
PFI-NRES-EQP	GDP281A	6	1	7	Equipment and software Price Index
PFI-RES	GDP282A	6	1	7	Residential price index
PEXP	GDP284A	6	1	7	Exports price index
PIMP	GDP285A	6	1	7	Imports price index
PGOV	GDP286A	6	0	7	Government consumption expenditures and gross investment Price Index
PGOV-FED	GDP287A	6	1	7	Federal price index
PGOV-SL	GDP288A	6	1	7	State and local Price Index
Com: spot price (real)	PSCCOMR	5	1	7	Real spot market price index:bls & crb: all commodities(1967=100) (psccom/pcepilfe)
OilPrice (Real)	PW561R	5	1	7	PPI crude (relative to core PCE) (pw561/pcepilfe)
NAPM com price	PMCP	1	1	7	Napm commodity prices index (percent)
Real AHE: goods	CES275R	5	0	8	Real avg hrly earnings, prod wrkrs, nonfarm - goods-producing (ces275/pi071)
Real AHE: const	CES277R	5	1	8	Real avg hrly earnings, prod wrkrs, nonfarm - construction (ces277/pi071)
Real AHE: mfg	CES278 R	5	1	8	Real avg hrly earnings, prod wrkrs, nonfarm - mfg (ces278/pi071)
Labor Prod	LBOUT	5	1	8	Output per hour all persons: business sec(1982=100,sa)
Real Comp/Hour	LBPUR7	5	1	8	Real compensation per hour,employees:nonfarm business(82=100,sa)
Unit Labor Cost	LBLCPU	5	1	8	Unit labor cost: nonfarm business sec (1982=100,sa)
FedFunds	FYFF	2	1	9	Interest rate: federal funds (effective) (% per annum,nsa)
3 mo T-bill	FYGM3	2	1	9	Interest rate: u.s.treasury bills,sec mkt,3-mo.(% per ann,nsa)
6 mo T-bill	FYGM6	2	0	9	Interest rate: u.s.treasury bills,sec mkt,6-mo.(% per ann,nsa)
1 yr T-bond	FYGT1	2	1	9	Interest rate: u.s.treasury const maturities,1-yr.(% per ann,nsa)
5 yr T-bond	FYGT5	2	0	9	Interest rate: u.s.treasury const maturities,5-yr.(% per ann,nsa)
10 yr T-bond	FYGT10	2	1	9	Interest rate: u.s.treasury const maturities,10-yr.(% per ann,nsa)
Aaabond	FYAAAC	2	0	9	Bond yield: moody's aaa corporate (% per annum)
Baa bond	FYBAAC	2	0	9	Bond yield: moody's baa corporate (% per annum)
fygm6-fygm3	SFYGM6	1	1	9	Fygm6-fygm3
fygt1-fygm3	SFYGT1	1	1	9	Fygt1-fygm3
fygt10-fygm3	SFYGT10	1	1	9	Fygt10-fygm3
FYAAAC-Fygt10	SFYAAAC	1	1	9	Fyaaac-fygt10
FYBAAC-Fygt10	SFYBAAC	1	1	9	Fybaac-fygt10
M1	FM1	6	1	10	Money stock: m1 (curr,trav.cks,dem dep,other ck'able dep)(bil$,sa)
MZM	MZMSL	6	1	10	Mzm (sa) frb st. Louis
M2	FM2	6	1	10	Money stock:m2(m1+o'nite rps,euro$,g/p&b/d mmmfs&sav&sm time dep(bil$,
MB	FMFBA	6	1	10	Monetary base, adj for reserve requirement changes(mil$,sa)
Reserves tot	FMRRA	6	1	10	Depository inst reserves:total,adj for reserve req chgs(mil$,sa)
BUSLOANS	BUSLOANS	6	1	10	Commercial and industrial loans at all commercial Banks (FRED) Billions $ (SA)
Cons credit	CCINRV	6	1	10	Consumer credit outstanding - nonrevolving(g19)
Ex rate: avg	EXRUS	5	1	11	United states;effective exchange rate(merm)(index no.)
Ex rate: Switz	EXRSW	5	1	11	Foreign exchange rate: switzerland (swiss franc per u.s.$)
Ex rate: Japan	EXRJAN	5	1	11	Foreign exchange rate: japan (yen per u.s.$)
Ex rate: UK	EXRUK	5	1	11	Foreign exchange rate: united kingdom (cents per pound)
EX rate: Canada	EXRCAN	5	1	11	Foreign exchange rate: canada (canadian $ per u.s.$)
S&P 500	FSPCOM	5	1	12	S&p's common stock price index: composite (1941-43=10)
S&P: indust	FSPIN	5	1	12	S&p's common stock price index: industrials (1941-43=10)
S&P div yield	FSDXP	2	1	12	S&p's composite common stock: dividend yield (% per annum)
S&P PE ratio	FSPXE	2	1	12	S&p's composite common stock: price-earnings ratio (%,nsa)
DJIA	FSDJ	5	1	12	Common stock prices: dow jones industrial average
Consumer expect	HHSNTN	2	1	13	U. Of mich. Index of consumer expectations(bcd-83)

Table B.2

Transformations

Transformation Code	X_t	Y^h_{t+h}
1	Z_t	Z_{t+h}
2	$Z_t - Z_{t-1}$	$Z_{t+h} - Z_t$
3	$(Z_t - Z_{t-1}) - (Z_{t-1} - Z_{t-2})$	$h^{-1}(Z_{t+h} - Z_t) - (Z_t - Z_{t-1})$
4	$\ln(Z_t)$	$\ln(Z_{t+h})$
5	$\ln(Z_t / Z_{t-1})$	$\ln(Z_{t+h}/Z_t)$
6	$\ln(Z_t/Z_{t-1}) - \ln(Z_{t-1}/Z_{t-2})$	$h^{-1}\{\ln(Z_{t+h}/Z_t)\} - \ln(Z_t/Z_{t-1})$

Notes: This table defines the transformation codes (T) used in Table B.1. Z_t denotes the raw series, X_t denotes the transformed series used to compute the principal components, and Y^h_{t+h} denotes the series to be predicted.

C. Additional Empirical Results using Cross-Validation MSEs

Guide to supplemental tables

Supplement table	Corresponding text table	Comments
Table S-2a	Table 2	Table 2 results, computed using cross-validation RMSEs. The shrinkage coefficient estimates are computed using full-sample cross-validation, and the MSEs in Table S-2a are computed over the 1985-2008 subperiod using the full-sample cross-validation shrinkage coefficients.
Table S-2b	--	Table 2 results, computed using cross-validation RMSEs, where the MSE is computed over the full 1960-2008 sample
Table S-4	Table 4	Table 4 computed using cross-validation RMSEs, full sample
Table S-7	Table 7	Table 7 computed using cross-validation RMSEs, full sample
Table S-8	--	Detailed results by series: rolling relative RMSEs, 1985-2008
Table S-9	--	Detailed results by series: cross-validation RMSEs, 1985-2008 (subsample MSE using full-sample cross-validation parameter estimates)
Table S-10	--	Detailed results by series: cross-validation RMSEs, 1960-2008 (full-sample MSE using full-sample cross-validation parameter estimates)

Table S-2A

Distributions of Relative RMSE for 1985-2008 by Forecasting Method, Relative to DFM-5, Estimated by Cross-Validation, $h = 1, 2,$ and 4

(a) $h = 1$

Method	Percentiles				
	0.050	0.250	0.500	0.750	0.950
AR(4)	0.962	0.991	1.019	1.076	1.186
OLS	0.966	1.038	1.084	1.159	1.244
DFM-5	1.000	1.000	1.000	1.000	1.000
Pretest	0.922	0.965	0.990	1.019	1.059
Bagging	0.915	0.966	0.995	1.019	1.047
BMA	0.909	0.965	0.991	1.013	1.047
Logit	0.908	0.957	0.987	1.012	1.050

(b) $h = 2$

Method	Percentiles				
	0.050	0.250	0.500	0.750	0.950
AR(4)	0.926	0.979	1.005	1.053	1.183
OLS	0.948	1.009	1.080	1.138	1.218
DFM-5	1.000	1.000	1.000	1.000	1.000
Pretest	0.920	0.963	0.987	1.019	1.070
Bagging	0.913	0.960	0.983	1.016	1.049
BMA	0.910	0.953	0.983	1.006	1.052
Logit	0.907	0.949	0.976	1.010	1.046

(c) $h = 4$

Method	Percentiles				
	0.050	0.250	0.500	0.750	0.950
AR(4)	0.880	0.957	0.998	1.037	1.152
OLS	0.897	0.964	1.051	1.113	1.161
DFM-5	1.000	1.000	1.000	1.000	1.000
Pretest	0.871	0.937	0.977	1.010	1.078
Bagging	0.877	0.938	0.968	1.007	1.051
BMA	0.868	0.924	0.964	0.999	1.044
Logit	0.859	0.922	0.964	0.998	1.038

Notes: Entries are percentiles of distributions of relative RMSEs over the 143 variables being forecasted, by series, at the 2- and 4-quarter ahead forecast horizon. RMSEs are relative to the DFM-5 forecast RMSE. All forecasts are direct. MSEs are computed by cross-validation as described in the text.`

Table S-2B
Distributions of Relative RMSE for 1960-2008 by Forecasting Method, Relative to DFM-5,
Estimated by Cross-Validation, *h* = 1, 2, and 4

(a) *h* = 1

Method	Percentiles				
	0.050	0.250	0.500	0.750	0.950
AR(4)	0.983	1.013	1.047	1.127	1.194
OLS	0.972	1.035	1.072	1.102	1.154
DFM-5	1.000	1.000	1.000	1.000	1.000
Pretest	0.941	0.975	0.996	1.011	1.023
Bagging	0.952	0.985	1.001	1.013	1.029
BMA	0.951	0.980	0.996	1.010	1.027
Logit	0.934	0.968	0.989	1.005	1.021

(b) *h* = 2

Method	Percentiles				
	0.050	0.250	0.500	0.750	0.950
AR(4)	0.971	1.017	1.054	1.149	1.244
OLS	0.962	1.014	1.060	1.093	1.153
DFM-5	1.000	1.000	1.000	1.000	1.000
Pretest	0.932	0.972	0.990	1.006	1.023
Bagging	0.932	0.975	0.991	1.012	1.028
BMA	0.928	0.970	0.989	1.008	1.026
Logit	0.923	0.962	0.984	1.002	1.019

(c) *h* = 4

Method	Percentiles				
	0.050	0.250	0.500	0.750	0.950
AR(4)	0.956	1.018	1.069	1.171	1.280
OLS	0.933	1.007	1.067	1.119	1.175
DFM-5	1.000	1.000	1.000	1.000	1.000
Pretest	0.913	0.955	0.987	1.017	1.043
Bagging	0.926	0.959	0.992	1.021	1.047
BMA	0.920	0.955	0.986	1.013	1.049
Logit	0.909	0.947	0.985	1.008	1.037

Notes: Forecasts computed using the methods of Table S-2A, with cross-validated MSEs computed over the full 1960-2008 sample.

Table S-4

Two Measures of Similarity of Forecast Performance, Cross-Validation, $h = 1$: Correlation (lower left) and Mean Absolute Difference of Forecasts (upper right)

	OLS	**DFM-5**	**Pretest**	**Bagging**	**BMA**	**Logit**
OLS		0.069	0.070	0.064	0.068	0.076
DFM-5	0.705		0.020	0.018	0.019	0.023
Pretest	0.803	0.906		0.008	0.009	0.006
Bagging	0.825	0.922	0.985		0.005	0.012
BMA	0.842	0.921	0.982	0.996		0.008
Logit	0.831	0.897	0.986	0.983	0.988	

Notes: Entries below the diagonal are the correlation between the cross-validation RMSEs for the row/column forecasting methods, compute over the 143 series being forecasted. Entries above the diagonal are the mean absolute difference between the row/column method RMSEs, averaged across series.

Table S-7

Median RMSE by Forecasting Method and by Category of Series, Relative to DFM-5, Full-sample Cross-Validation Estimates

(a) $h = 1$

Category	Brief description	AR(4)	OLS	DFM-5	Pretest	Bagging	BMA	Logit
1	GDP components	1.093	1.056	1.000	0.989	0.995	0.992	0.987
2	IP	1.129	1.076	1.000	1.002	1.006	1.001	0.998
3	Employment	1.158	1.092	1.000	1.000	1.007	1.005	0.999
4	Unempl. rate	1.250	1.108	1.000	0.998	0.998	0.994	0.985
5	Housing	1.062	1.011	1.000	0.972	0.972	0.970	0.960
6	Inventories	1.112	1.053	1.000	1.010	1.016	1.009	0.994
7	Prices	1.020	1.049	1.000	0.995	1.002	0.992	0.981
8	Wages	1.001	0.990	1.000	0.968	0.987	0.970	0.961
9	Interest rates	1.021	1.068	1.000	0.996	1.008	0.999	0.996
10	Money	1.049	1.044	1.000	0.975	0.988	0.986	0.961
11	Exchange rates	0.985	1.074	1.000	0.983	0.982	0.979	0.966
12	Stock prices	1.017	1.075	1.000	1.011	1.010	1.006	1.007
13	Cons. exp.	1.023	1.133	1.000	1.019	1.023	1.023	1.019

(b) $h = 2$

Category	Brief description	AR(4)	OLS	DFM-5	Pretest	Bagging	BMA	Logit
1	GDP components	1.078	1.055	1.000	0.977	0.989	0.983	0.980
2	IP	1.159	1.064	1.000	1.000	1.000	1.005	0.993
3	Employment	1.161	1.080	1.000	0.997	0.998	0.999	0.989
4	Unempl. rate	1.333	1.156	1.000	0.970	0.973	0.971	0.970
5	Housing	1.053	0.991	1.000	0.980	0.980	0.978	0.979
6	Inventories	1.148	1.087	1.000	1.020	1.017	1.021	1.017
7	Prices	1.024	1.073	1.000	0.999	1.007	1.001	0.995
8	Wages	0.993	0.937	1.000	0.933	0.934	0.927	0.929
9	Interest rates	1.051	0.985	1.000	0.976	0.981	0.974	0.969
10	Money	1.072	1.057	1.000	0.993	0.991	0.993	0.987
11	Exchange rates	0.985	1.025	1.000	0.973	0.973	0.963	0.952
12	Stock prices	1.024	1.038	1.000	0.990	0.989	0.984	0.980
13	Cons. exp.	1.038	1.193	1.000	0.996	1.024	1.014	0.996

Table S-7, continued

(c) $h = 4$

Category	Brief description	AR(4)	OLS	DFM-5	Pretest	Bagging	BMA	Logit
1	GDP components	1.103	1.044	1.000	0.987	0.990	0.978	0.976
2	IP	1.202	1.139	1.000	1.019	1.034	1.031	1.019
3	Employment	1.180	1.112	1.000	0.988	0.996	1.000	0.989
4	Unempl. rate	1.312	1.170	1.000	0.970	0.976	0.973	0.970
5	Housing	1.061	0.971	1.000	0.933	0.933	0.933	0.929
6	Inventories	1.149	1.068	1.000	1.001	1.017	1.020	1.003
7	Prices	1.038	1.061	1.000	0.987	0.992	0.987	0.985
8	Wages	0.979	0.963	1.000	0.951	0.954	0.954	0.942
9	Interest rates	1.046	1.044	1.000	0.992	0.991	0.985	0.985
10	Money	1.100	1.061	1.000	0.998	1.004	0.992	0.992
11	Exchange rates	0.966	1.004	1.000	0.929	0.942	0.935	0.926
12	Stock prices	1.027	1.004	1.000	0.993	0.991	0.984	0.987
13	Cons. exp.	1.035	1.112	1.000	0.989	1.004	0.994	0.989

Notes: entries are the median relative RMSE among the relative RMSEs for the series among the row category, using the column forecasting method.

Table S-8

Relative RMSE by Series, Forecasting Method, and Horizon, Relative to DFM-5, Estimated by Rolling Pseudo Out-of-Sample Forecast RMSE: 1985-2008.

All entries for DFM-5 are 1.00 so DFM-5 is omitted

Series	h = 1						h = 2						h = 4					
	AR(4)	OLS	Prtst	Bag	BMA	Logit	AR(4)	OLS	Prtst	Bag	BMA	Logit	AR(4)	OLS	Prtst	Bag	BMA	Logit
RGDP	1.083	1.188	1.167	1.100	1.100	1.123	1.030	1.193	1.104	1.027	1.045	1.014	0.920	1.091	1.112	1.040	1.047	1.081
Cons	1.030	1.103	1.199	1.089	1.084	1.131	1.030	1.173	1.172	1.108	1.085	1.099	0.949	1.052	1.066	1.024	1.019	1.022
Cons-Dur	1.051	1.092	1.136	1.103	1.109	1.081	1.072	1.182	1.128	1.113	1.179	1.124	0.919	0.981	0.990	0.971	0.976	0.978
Cons-NonDur	1.021	1.092	1.062	1.020	1.024	1.008	1.009	1.014	1.034	1.000	1.009	1.007	1.020	1.025	1.061	1.010	1.001	1.025
Cons-Serv	0.964	1.094	1.050	0.979	0.991	0.942	0.961	1.120	0.998	0.983	1.001	1.005	0.918	1.073	1.048	1.007	0.992	0.978
GPDInv	1.276	1.212	1.077	1.088	1.093	1.082	1.072	1.188	1.103	1.038	1.039	1.012	1.071	1.185	1.097	1.080	1.092	1.098
FixedInv	1.029	1.107	1.086	1.039	1.031	1.084	0.947	1.034	0.983	1.004	1.014	1.024	0.922	1.013	1.081	1.054	1.052	1.056
NonResInv	1.100	1.134	1.113	1.090	1.086	1.081	1.077	1.077	1.025	1.014	1.041	1.028	0.989	1.016	1.086	1.039	1.049	1.054
NonResInv-Struct	1.047	1.053	1.100	1.052	1.063	1.059	1.076	0.992	0.998	0.990	0.985	1.005	1.052	1.005	1.017	1.010	1.007	1.004
NonResInv-Bequip	1.108	1.184	1.095	1.058	1.064	1.030	1.060	1.095	1.056	1.008	1.015	1.058	0.987	1.034	1.096	1.050	1.033	1.068
Res.Inv	0.906	0.964	1.053	0.947	0.972	1.014	0.904	0.963	1.053	0.963	0.980	1.006	0.981	1.034	1.089	1.046	1.067	1.104
Exports	0.955	1.075	1.009	1.027	1.028	1.002	0.965	1.075	1.050	1.026	1.034	1.014	0.999	1.045	1.056	1.016	1.033	1.031
Imports	1.223	1.369	1.123	1.046	1.032	1.016	1.274	1.370	1.153	1.140	1.133	1.152	1.166	1.244	1.121	1.081	1.074	1.096
Gov	0.958	1.121	1.052	1.019	1.003	1.094	0.937	1.044	1.042	0.993	0.983	1.052	0.945	1.137	1.128	1.096	1.038	0.995
Gov Fed	0.979	1.113	1.081	1.048	1.044	1.045	0.958	1.103	1.114	1.085	1.041	1.086	0.942	1.107	1.100	1.059	1.041	1.097
Gov State/Loc	0.984	1.198	1.060	1.009	1.001	0.995	0.977	1.154	1.029	0.999	1.009	1.078	0.982	1.094	1.072	1.019	0.996	1.012
IP: total	1.021	1.260	1.099	1.084	1.062	1.116	0.998	1.170	1.077	1.069	1.093	1.042	0.955	1.082	1.037	1.011	1.009	1.002
IP: products	1.077	1.243	1.015	1.030	1.041	0.996	1.004	1.137	1.065	1.025	1.037	1.053	0.951	1.046	1.092	1.033	1.036	1.034
IP: final prod	1.066	1.203	1.115	1.106	1.120	1.070	1.008	1.132	1.100	1.052	1.056	1.086	0.948	1.049	1.096	1.057	1.055	1.087
IP: cons gds	1.140	1.274	0.998	1.007	0.995	1.004	1.010	1.156	1.124	1.046	1.061	1.083	0.950	0.964	1.034	0.952	0.954	0.965
IP: cons dble	1.115	1.182	1.047	1.039	1.031	1.014	1.043	1.100	1.018	0.980	0.984	0.978	1.043	1.000	0.937	0.955	0.957	0.962
iIP:cons nondble	1.028	1.088	1.091	1.031	1.023	1.024	0.965	1.057	1.041	1.018	1.016	1.036	0.923	1.068	1.107	1.039	1.035	1.044
IP:bus eqpt	1.041	1.092	1.056	1.019	1.013	1.073	0.990	1.097	1.111	1.058	1.038	1.059	0.954	1.065	1.044	1.040	1.008	1.018
IP: matls	0.917	1.158	1.036	1.015	1.016	1.008	0.956	1.121	1.112	1.097	1.094	1.053	0.968	1.088	1.085	1.055	1.054	1.078
IP: dble mats	0.951	1.135	1.006	0.966	1.001	0.988	0.973	1.107	0.998	0.986	0.984	1.016	1.019	1.098	1.000	0.982	1.003	1.010
IP:nondble mats	1.012	1.121	1.077	1.065	1.084	1.089	0.987	1.111	1.044	1.062	1.056	1.047	0.953	1.095	1.104	1.059	1.083	1.097
IP: mfg	1.046	1.248	1.097	1.078	1.070	1.071	1.016	1.178	1.035	1.046	1.020	1.060	0.971	1.090	1.054	0.972	0.981	0.975
IP: fuels	0.959	1.145	0.991	0.971	0.959	0.961	0.936	1.078	0.959	0.946	0.936	0.936	0.938	1.113	1.045	0.996	0.979	0.980
NAPM prodn	1.047	1.186	1.079	1.058	1.049	1.049	1.012	1.131	1.061	1.062	1.081	1.060	0.990	1.169	1.066	1.052	1.047	1.082
Capacity Util	0.988	1.197	1.138	1.111	1.084	1.089	0.936	1.121	1.103	1.056	1.058	1.076	0.887	1.053	1.054	0.984	0.993	0.995
Emp: total	1.098	1.313	1.115	1.049	1.078	1.027	0.980	1.171	0.966	0.956	0.946	0.963	0.947	1.046	0.971	0.964	0.966	1.035
Emp: gds prod	1.022	1.297	1.208	1.103	1.133	1.097	0.894	1.162	1.012	0.982	0.961	1.022	0.881	1.048	1.072	1.031	1.051	1.062
Emp: mining	1.003	1.094	1.141	1.048	1.027	1.102	0.996	1.009	0.987	0.948	0.939	0.978	1.000	0.942	1.010	0.982	0.952	0.970
Emp: const	1.015	1.160	1.082	1.063	1.039	1.075	0.971	1.129	1.028	1.011	1.011	1.019	0.966	1.026	1.052	1.008	1.030	1.022
Emp: mfg	0.994	1.254	1.119	1.082	1.097	1.089	0.895	1.094	1.168	1.068	1.045	1.054	0.887	1.015	1.025	1.014	1.022	1.006
Emp: dble gds	0.978	1.260	1.160	1.098	1.137	1.139	0.877	1.088	1.054	1.032	1.024	1.028	0.878	1.028	1.033	0.992	0.975	1.005

Emp: nondbles	0.954	1.074	0.966	0.894	0.904	0.909	0.905	1.021	0.918	0.854	0.847	0.887	0.937	1.011	1.048	0.993	1.012	1.068
Emp: services	1.141	1.184	1.062	1.077	1.079	1.084	1.121	1.176	1.139	1.118	1.119	1.119	1.072	1.145	1.158	1.109	1.115	1.109
Emp: TTU	1.144	1.207	1.068	1.061	1.073	1.067	1.085	1.100	1.104	1.040	1.108	1.093	1.055	1.090	1.084	1.054	1.077	1.076
Emp: wholesale	1.027	1.160	1.007	0.996	0.988	0.992	0.976	1.112	1.044	1.004	0.998	0.997	0.942	1.063	1.120	1.075	1.064	0.991
Emp: retail	1.062	1.164	1.088	1.034	1.033	1.029	1.044	1.078	1.062	1.009	1.012	1.023	1.040	1.047	1.095	1.063	1.074	1.056
Emp: FIRE	0.960	1.002	1.004	1.001	0.997	1.026	0.951	0.987	1.026	1.007	0.985	1.016	0.969	1.027	1.025	1.010	1.004	1.033
Emp: Govt	0.989	0.995	1.006	0.997	0.993	1.006	0.980	1.080	1.100	1.056	1.043	1.081	0.938	1.015	1.017	1.000	0.989	0.991
Help wanted indx	0.999	1.061	1.043	1.015	0.999	1.062	0.998	1.024	1.003	0.981	0.972	0.975	1.006	1.066	1.056	1.014	1.008	1.030
Help wanted/emp	1.014	1.215	1.083	0.998	1.009	1.042	0.990	1.138	0.957	0.985	0.973	1.005	0.978	1.166	1.102	1.022	1.034	1.048
Emp CPS total	1.183	1.204	1.121	1.112	1.123	1.131	1.151	1.187	1.139	1.086	1.106	1.074	1.052	1.098	1.058	1.007	1.019	1.057
Emp CPS nonag	1.181	1.183	1.107	1.132	1.139	1.139	1.184	1.196	1.156	1.123	1.127	1.116	1.107	1.140	1.005	1.044	1.036	0.997
Emp. Hours	1.130	1.176	1.046	1.078	1.064	1.072	1.056	1.188	1.159	1.079	1.104	1.094	1.010	1.110	1.073	1.062	1.059	1.020
Avg hrs	1.057	1.110	1.050	1.025	1.024	1.032	1.030	1.042	1.007	0.972	0.964	0.969	1.041	1.049	0.957	0.944	0.931	0.932
Overtime: mfg	1.108	1.087	1.032	1.014	1.013	1.032	1.134	1.115	1.041	1.034	1.030	1.038	1.212	1.162	1.084	1.047	1.055	1.046
U: all	1.128	1.281	1.116	1.104	1.095	1.092	1.098	1.240	1.160	1.098	1.122	1.125	1.107	1.176	1.119	1.035	1.036	1.044
U: mean duration	1.127	1.094	0.969	0.968	0.967	0.966	1.235	1.156	0.951	0.963	0.944	0.953	1.456	1.316	1.014	1.027	1.013	1.012
U < 5 wks	1.048	1.142	1.096	1.056	1.061	1.039	1.037	1.081	1.018	1.030	1.021	1.009	1.074	1.111	1.073	1.070	1.069	1.072
U 5-14 wks	1.138	1.111	1.062	1.063	0.995	1.051	1.079	1.151	1.041	1.088	1.087	1.042	1.134	1.194	1.060	1.032	1.011	0.972
U 15+ wks	1.261	1.174	1.048	0.989	0.997	1.015	1.348	1.284	1.008	1.019	1.015	0.988	1.266	1.215	1.088	1.064	1.070	1.040
U 15-26 wks	1.271	1.150	0.984	0.971	0.972	0.977	1.338	1.231	1.099	1.074	1.077	1.065	1.218	1.127	1.066	1.049	1.069	1.122
U 27+ wks	1.189	1.136	1.024	0.979	0.988	1.029	1.290	1.269	1.015	0.985	0.982	0.994	1.312	1.300	1.074	1.055	1.056	1.089
HStarts: Total	0.978	0.964	0.970	0.955	0.953	0.968	0.969	0.969	0.985	0.960	0.970	0.988	0.965	0.972	0.977	0.990	0.992	1.008
HStarts: authorizations	0.940	0.946	0.932	0.928	0.944	0.941	0.955	0.974	0.977	0.945	0.961	0.989	0.957	0.958	1.019	0.972	0.970	0.969
HStarts: NE	1.052	1.098	1.101	1.078	1.053	1.054	1.025	1.015	0.974	0.986	0.979	0.983	0.988	1.039	1.086	1.055	1.047	1.042
HStarts: MW	1.061	1.092	1.120	1.043	1.050	1.093	1.032	1.106	1.115	1.080	1.082	1.083	1.052	1.078	1.030	1.034	1.034	1.029
HStarts: South	0.973	0.968	0.973	0.960	0.965	0.995	0.963	0.926	0.968	0.945	0.962	0.987	0.983	1.024	1.055	1.031	1.017	1.013
HStarts: West	0.946	0.973	1.003	0.989	0.976	1.013	0.930	0.930	1.004	0.954	0.965	0.971	0.912	0.920	0.944	0.926	0.933	0.950
PMI	1.020	1.181	1.144	1.083	1.072	1.086	0.938	1.106	1.079	1.040	1.054	1.049	0.905	1.081	1.046	1.014	1.021	1.129
NAPM new ordrs	1.036	1.218	1.097	1.096	1.069	1.092	1.004	1.123	1.086	1.052	1.069	1.079	0.976	1.117	1.048	1.034	1.039	1.113
NAPM vendor del	0.928	1.082	0.973	0.929	0.904	0.960	0.844	1.024	1.055	0.972	0.922	0.954	0.879	1.053	1.037	1.012	0.970	1.135
NAPM Invent	1.012	0.967	0.967	0.905	0.898	0.949	0.871	0.946	0.942	0.909	0.919	0.900	0.932	1.052	1.100	1.021	1.047	1.064
Orders (ConsGoods)	1.031	1.179	1.156	1.047	1.069	1.120	0.965	1.096	0.991	0.982	0.975	0.961	0.962	1.060	1.118	1.044	1.063	1.074
Orders (NDCapGoods)	1.067	1.126	0.948	0.938	0.920	0.901	1.033	1.090	1.012	0.954	0.973	1.018	0.997	1.110	0.993	0.961	0.961	0.979
PGDP	1.037	1.191	1.112	1.061	1.068	1.064	1.043	1.154	1.107	0.986	1.007	1.019	1.004	1.128	1.046	0.940	0.953	0.968
PCED	1.018	1.138	1.070	1.071	1.046	1.030	1.042	1.183	1.142	1.106	1.110	1.092	1.073	1.184	1.175	1.128	1.136	1.116
CPI-ALL	1.035	1.107	1.000	0.968	0.997	0.983	1.034	1.103	1.022	0.983	0.992	0.993	1.074	1.114	1.050	1.049	1.051	1.059
PCED-Core	0.997	1.274	1.174	1.148	1.106	1.185	0.935	1.156	1.085	1.081	1.044	1.087	0.931	1.132	1.043	0.986	0.981	0.993
CPI-Core	0.979	1.292	1.073	1.053	1.025	1.090	0.794	1.164	1.005	0.925	0.864	0.985	0.768	1.088	1.049	1.016	0.947	0.965
PCED-DUR	0.961	1.067	1.003	0.958	0.979	0.973	0.889	0.970	0.945	0.930	0.898	0.937	0.831	0.926	0.888	0.864	0.841	0.834
PCED-DUR-MOTORVEH	0.995	1.096	1.013	1.023	1.004	1.027	0.932	1.020	1.007	0.971	0.951	0.957	0.870	0.990	0.938	0.926	0.872	0.862
PCED-DUR-HHEQUIP	1.000	1.048	1.043	1.025	1.010	1.029	1.004	1.061	1.034	1.013	1.007	1.048	0.956	1.008	1.033	0.999	0.984	0.983
PCED-DUR-OTH	0.979	1.102	0.961	0.965	0.977	0.985	0.981	1.186	1.015	0.989	0.990	0.998	0.984	1.187	0.977	0.983	1.003	0.997
PCED-NDUR	1.006	1.133	1.017	1.014	1.013	1.034	1.017	1.110	1.018	1.022	1.026	1.025	1.061	1.119	1.065	1.045	1.047	1.071
PCED-NDUR-FOOD	0.959	1.172	1.033	1.054	1.019	1.025	0.974	1.271	1.102	1.042	1.028	1.033	0.973	1.188	1.156	1.011	1.013	1.120
PCED-NDUR-CLTH	1.003	1.056	1.027	1.011	1.006	1.063	0.994	1.053	1.006	1.004	0.991	1.005	1.020	1.100	1.013	1.054	1.042	1.047
PCED-NDUR-ENERGY	1.003	1.142	1.028	1.024	1.004	1.030	0.999	1.119	1.018	1.015	1.021	1.015	0.991	1.090	1.048	1.013	1.018	1.027
PCED-NDUR-OTH	1.014	1.086	1.047	1.021	1.014	1.033	1.017	1.002	0.966	0.935	0.943	0.934	1.016	1.060	1.043	0.957	0.960	0.984
PCED-SERV	1.041	1.311	1.117	1.107	1.103	1.120	1.015	1.252	1.184	1.137	1.103	1.164	1.024	1.220	1.150	1.123	1.139	1.142

PCED-SERV-HOUS	0.996	1.218	1.051	0.996	0.996	1.004	1.001	1.258	1.048	0.999	1.001	1.001	1.008	1.117	1.059	1.004	1.025	1.023
PCED-SERV-HOUSOP	1.007	1.002	1.025	1.008	1.009	1.023	1.025	1.070	1.064	1.035	1.028	1.045	1.019	1.037	1.048	1.015	1.008	1.046
PCED-SERV-H0-ELGAS	1.018	1.028	1.053	1.030	1.015	1.041	1.022	1.026	1.012	1.025	1.024	1.024	1.008	0.985	0.996	0.998	0.993	0.982
PCED-SERV-HO-OTH	0.943	1.146	1.097	1.033	0.993	1.026	0.906	1.146	0.950	0.935	0.917	0.966	0.885	1.105	0.934	0.904	0.898	0.910
PCED-SERV-TRAN	0.960	1.101	1.002	0.987	0.985	1.003	0.958	1.047	1.013	0.980	0.972	0.986	0.980	1.033	1.022	1.001	0.990	0.990
PCED-SERV-MED	0.911	1.022	1.014	0.983	0.937	0.993	0.858	0.906	0.969	0.935	0.895	0.932	0.842	0.901	0.913	0.885	0.883	0.887
PCED-SERV-REC	0.978	1.128	1.026	1.027	1.016	1.057	0.983	1.159	1.057	1.038	1.033	1.035	1.031	1.197	1.071	1.068	1.064	1.073
PCED-SERV-OTH	1.001	1.113	1.002	1.005	1.012	1.024	0.984	1.140	0.973	0.978	0.977	0.988	0.962	1.142	0.918	0.931	0.967	0.949
PGPDI	0.852	0.953	0.966	0.942	0.905	0.909	0.865	0.935	0.963	0.931	0.918	0.899	0.840	0.885	0.906	0.866	0.882	0.960
PFI	0.870	0.968	0.993	0.950	0.921	0.928	0.881	0.977	1.004	0.952	0.940	0.942	0.855	0.921	0.888	0.868	0.879	0.946
PFI-NRES	0.918	1.032	1.041	0.998	0.988	1.005	0.929	1.034	0.960	0.961	0.953	0.961	0.897	0.972	0.926	0.904	0.896	0.980
PFI-NRES-STR Price Index	0.940	1.017	0.990	0.981	0.973	0.967	0.949	0.967	0.976	0.948	0.946	0.954	0.950	0.973	1.000	0.960	0.967	0.993
PFI-NRES-EQP	0.967	1.104	1.024	0.999	0.996	1.003	0.956	1.082	0.961	0.968	0.970	0.984	0.893	1.012	1.035	0.938	0.930	0.948
PFI-RES	1.006	1.125	1.112	1.066	1.048	1.102	1.014	1.081	1.165	1.062	1.049	1.124	1.019	1.106	1.156	1.117	1.071	1.092
PEXP	1.015	1.222	1.146	1.115	1.074	1.072	1.008	1.193	1.119	1.073	1.050	1.094	1.053	1.237	1.242	1.181	1.121	1.175
PIMP	1.019	1.165	1.099	1.057	1.067	1.081	1.045	1.112	1.171	1.127	1.092	1.087	1.051	1.155	1.159	1.151	1.099	1.113
PGOV	1.013	1.061	1.035	1.021	1.010	1.026	0.989	1.104	1.086	1.023	1.012	0.991	0.953	1.133	0.999	0.984	0.981	0.977
PGOV-FED	0.983	1.104	1.024	0.998	0.983	0.995	0.985	1.119	1.020	0.983	0.989	1.026	0.901	1.113	1.016	0.980	0.943	1.067
PGOV-SL	1.017	1.061	1.010	1.012	1.011	1.016	1.003	1.098	0.994	0.988	0.989	0.998	0.972	1.095	1.031	0.995	1.012	0.981
Com: spot price (real)	1.004	1.067	1.039	1.016	1.021	1.020	0.961	1.056	1.056	1.031	1.010	1.035	0.957	1.056	1.044	1.029	0.999	0.988
OilPrice (Real)	0.998	1.108	1.048	1.024	1.014	1.016	0.981	1.002	1.025	1.003	0.989	0.996	0.966	0.989	0.999	0.997	0.991	1.002
NAPM com price	1.009	1.035	1.056	1.028	1.019	1.065	0.998	1.036	1.053	1.030	1.024	1.032	1.056	1.112	1.068	1.073	1.061	1.022
Real AHE: goods	1.006	1.073	1.119	1.076	1.042	1.108	1.003	1.076	1.082	1.041	1.034	1.028	0.975	1.074	1.083	1.060	1.025	1.030
Real AHE: const	1.015	1.116	1.050	1.021	1.013	1.049	1.008	1.073	1.007	0.983	0.989	1.039	0.970	1.036	1.071	1.053	1.013	1.014
Real AHE: mfg	0.975	1.023	1.029	1.034	1.008	1.017	0.945	1.003	1.014	0.958	0.963	0.987	0.947	1.051	1.037	1.038	1.008	1.126
Labor Prod	0.999	1.030	1.058	1.039	1.001	1.027	0.997	1.092	1.075	1.047	1.030	1.046	1.009	1.144	1.021	1.046	1.041	1.047
Real Comp/Hour	1.000	1.054	1.027	1.002	0.994	1.012	0.994	1.062	1.038	1.012	1.009	1.023	0.986	1.076	1.022	0.987	0.994	0.944
Unit Labor Cost	1.041	1.101	1.114	1.059	1.059	1.031	1.006	1.052	1.020	0.994	0.996	1.015	1.089	1.009	1.072	0.975	0.995	1.029
FedFunds	1.022	1.172	1.050	0.967	0.952	0.993	1.048	1.091	1.093	1.050	1.031	1.031	1.072	1.129	1.093	1.037	1.068	1.169
3 mo T-bill	1.001	1.179	0.964	0.972	0.973	0.983	0.997	1.057	1.031	1.035	1.019	1.022	1.024	1.093	1.049	1.015	1.017	1.044
6 mo T-bill	1.017	1.283	1.090	1.085	1.045	1.096	0.992	1.072	1.032	1.019	1.029	1.037	1.020	1.139	1.091	1.070	1.074	1.039
1 yr T-bond	1.018	1.281	1.049	1.075	1.072	1.050	0.976	1.067	1.110	1.078	1.058	1.102	1.013	1.146	1.063	1.080	1.069	1.081
5 yr T-bond	1.033	1.180	1.076	1.060	1.057	1.053	0.954	1.049	1.039	1.035	1.015	1.029	0.983	1.113	1.102	1.061	1.033	1.035
10 yr T-bond	1.035	1.169	1.120	1.091	1.069	1.116	0.958	1.060	1.042	1.035	1.020	1.039	0.983	1.095	1.067	1.044	1.020	1.032
Aaabond	1.033	1.188	1.080	1.061	1.045	1.070	0.994	1.068	1.031	1.043	1.034	1.041	1.010	1.071	1.087	1.058	1.048	1.056
Baa bond	1.006	1.135	1.022	1.032	1.025	1.041	0.982	1.035	1.037	1.018	1.005	1.035	1.016	1.021	1.052	1.028	1.023	1.036
fygm6-fygm3	0.907	1.066	0.955	0.928	0.929	0.912	0.971	1.135	0.996	0.986	0.965	0.955	0.911	1.014	1.003	0.989	0.909	0.917
fygt1-fygm3	0.941	1.028	0.948	0.954	0.936	0.953	0.927	1.000	0.916	0.904	0.906	1.031	0.916	0.902	0.893	0.889	0.882	0.893
fygt10-fygm3	0.914	0.997	0.981	0.907	0.891	0.900	0.943	0.978	0.997	1.002	0.976	1.012	1.065	1.019	1.012	1.011	1.024	1.008
FYAAAC-Fygt10	0.996	1.043	1.014	1.002	1.006	0.965	0.964	1.010	1.030	1.017	0.981	0.988	0.995	1.047	1.008	1.008	1.008	1.017
FYBAAC-Fygt10	0.994	1.037	1.091	1.058	1.020	1.034	0.918	1.012	1.015	0.989	0.985	1.026	0.919	1.018	1.022	0.995	0.972	0.983
M1	1.028	1.035	1.013	0.975	0.978	0.973	1.040	1.010	1.012	1.022	1.029	0.961	1.043	1.029	1.031	1.004	1.014	1.035
MZM	0.962	0.877	0.910	0.890	0.889	0.896	0.926	0.891	0.885	0.874	0.871	0.900	0.959	0.974	0.957	0.982	0.929	0.924
M2	0.950	0.958	0.989	0.965	0.958	0.969	0.895	0.966	1.042	0.997	0.990	0.975	0.912	1.000	1.042	1.034	1.036	1.087
MB	0.991	1.010	1.033	0.988	0.997	1.013	0.986	0.998	1.012	0.993	0.988	0.994	0.985	1.012	1.011	1.021	0.995	0.981
Reserves tot	1.077	1.074	1.030	1.021	1.025	1.006	1.073	1.063	1.013	1.025	1.026	1.068	1.058	1.087	1.011	0.995	0.998	0.998
BUSLOANS	1.032	1.125	1.075	1.044	1.038	1.087	1.061	1.120	1.117	1.085	1.087	1.122	1.080	1.178	1.085	1.094	1.086	1.097

Cons credit	1.008	1.068	0.990	1.005	1.009	1.003	0.983	1.050	1.010	0.992	1.001	0.992	0.929	1.003	0.991	0.974	0.960	0.972
Ex rate: avg	1.006	1.105	1.061	1.017	1.018	1.006	1.004	1.087	1.096	1.053	1.033	1.038	0.974	1.072	1.027	1.052	1.026	1.064
Ex rate: Switz	0.999	1.172	1.005	1.000	0.999	0.999	0.987	1.125	1.067	1.013	1.009	1.069	0.963	1.118	1.081	1.055	1.017	0.949
Ex rate: Japan	0.992	1.112	1.003	0.998	1.003	1.004	1.017	1.080	1.050	1.020	1.010	1.023	0.998	1.077	1.034	1.043	1.026	1.035
Ex rate: UK	0.992	1.041	1.026	1.009	1.014	1.049	0.964	1.022	1.025	1.020	0.994	1.001	0.914	0.995	1.011	1.021	0.977	0.992
EX rate: Canada	0.988	1.087	1.008	1.002	0.995	0.990	0.977	1.096	0.987	0.989	0.989	0.990	0.984	1.057	1.015	1.016	1.018	1.008
S&P 500	1.006	1.049	1.023	1.022	1.019	1.033	0.996	0.980	0.976	0.990	0.980	0.985	0.963	0.949	0.968	0.971	0.958	0.978
S&P: indust	1.011	1.074	0.996	1.022	1.026	1.066	1.006	0.992	1.022	1.001	0.989	1.008	0.968	0.958	0.985	0.967	0.970	0.992
S&P div yield	0.957	1.077	1.073	0.999	1.001	0.999	0.938	0.991	0.965	0.923	0.967	0.971	0.967	0.963	0.934	0.924	0.942	0.966
S&P PE ratio	0.989	1.000	1.005	0.994	0.991	0.988	1.021	0.980	0.987	0.974	0.984	0.981	1.014	0.957	0.998	0.973	0.985	0.998
DJIA	0.996	1.047	1.015	1.010	0.999	1.015	0.977	0.943	0.978	0.979	0.963	0.980	0.959	0.901	0.939	0.925	0.918	0.921
Consumer expect	0.960	1.156	0.983	0.986	0.985	0.972	0.976	1.111	1.010	0.994	0.993	1.019	1.001	1.078	1.114	1.083	1.086	1.043

Table S-9

Relative RMSE by Series, Forecasting Method, and Horizon, Relative to DFM-5, Estimated by Cross-Validation RMSE: 1985-2008.

Shrinkage coefficients are computed using full-sample cross-validation, MSEs are computed over the 1985-2008 subsample. All entries for DFM-5 are 1.00 so DFM-5 is omitted.

Series	h = 1						h = 2						h = 4					
	AR(4)	OLS	Prtst	Bag	BMA	Logit	AR(4)	OLS	Prtst	Bag	BMA	Logit	AR(4)	OLS	Prtst	Bag	BMA	Logit
RGDP	1.104	1.218	1.073	1.094	1.073	1.077	1.081	1.158	1.052	1.068	1.052	1.048	0.965	0.977	0.972	0.958	0.942	0.934
Cons	1.033	1.071	1.034	0.997	1.003	1.005	1.019	1.107	1.005	1.000	0.983	1.010	0.933	0.966	0.985	0.942	0.928	0.950
Cons-Dur	1.056	1.035	0.981	1.008	1.004	0.994	1.065	1.080	0.998	0.979	0.998	0.966	0.920	0.941	0.948	0.954	0.939	0.936
Cons-NonDur	1.028	1.153	1.027	1.027	1.024	1.028	1.005	1.109	0.991	0.998	1.010	1.010	0.968	0.986	0.968	0.983	0.945	0.944
Cons-Serv	0.987	1.084	0.964	0.960	0.959	0.964	0.985	1.008	0.843	0.863	0.860	0.834	0.947	0.897	0.826	0.845	0.844	0.826
GPDInv	1.264	1.192	1.031	1.022	1.031	1.031	1.103	1.104	0.952	0.955	0.954	0.954	1.062	1.046	0.960	0.964	0.960	0.960
FixedInv	1.073	1.158	0.946	0.942	0.947	0.944	0.983	1.009	0.891	0.910	0.907	0.897	0.926	0.876	0.851	0.875	0.871	0.846
NonResInv	1.126	1.176	0.956	0.998	1.012	0.958	1.096	1.009	0.943	0.929	0.934	0.928	1.024	0.932	0.937	0.948	0.949	0.931
NonResInv-Struct	1.033	1.048	0.992	0.982	0.993	0.992	1.053	0.971	0.978	0.971	0.978	0.957	1.059	0.900	0.910	0.889	0.889	0.889
NonResInv-Bequip	1.146	1.204	0.979	0.986	0.981	0.979	1.115	1.066	0.952	0.949	0.952	0.949	1.015	0.962	0.935	0.930	0.924	0.925
Res.Inv	0.978	0.966	0.918	0.874	0.884	0.917	0.937	0.940	0.975	0.934	0.953	0.976	0.969	0.893	0.947	0.915	0.933	0.951
Exports	1.025	1.074	0.976	0.974	0.977	0.965	1.019	1.138	0.990	0.998	0.989	0.990	1.019	1.059	0.989	1.007	0.992	0.989
Imports	1.251	1.365	0.941	0.945	0.942	0.941	1.285	1.299	0.984	0.981	0.984	0.984	1.112	1.151	0.998	0.999	0.998	0.998
Gov	0.966	1.073	0.966	0.966	0.965	0.960	0.971	0.983	0.980	0.979	0.930	0.984	1.013	1.126	1.013	1.013	1.013	0.987
Gov Fed	0.975	1.081	0.975	0.975	0.975	0.963	0.960	1.026	1.012	1.006	0.992	1.011	0.947	1.113	1.033	0.996	0.973	0.976
Gov State/Loc	1.022	1.077	1.056	1.064	0.995	0.987	1.071	1.169	1.024	1.033	1.036	1.023	1.142	1.099	1.094	1.099	1.075	1.078
IP: total	1.071	1.170	0.958	0.959	0.956	0.958	1.041	1.138	1.016	1.027	0.961	0.991	0.975	1.087	1.012	0.981	0.981	0.989
IP: products	1.181	1.244	1.051	1.036	1.057	1.050	1.088	1.156	1.035	1.012	1.019	1.034	1.022	1.102	0.974	0.974	0.971	0.973
IP: final prod	1.144	1.180	1.035	1.056	1.041	1.035	1.083	1.151	1.012	1.010	1.013	1.005	1.005	1.090	0.995	1.033	1.024	0.995
IP: cons gds	1.186	1.181	1.106	1.029	1.043	1.038	1.044	1.082	0.920	0.925	0.921	0.919	0.906	0.944	1.034	0.946	0.996	1.037
IP: cons dble	1.165	1.172	1.017	1.001	1.016	0.999	1.091	1.085	1.000	0.985	0.988	0.979	1.045	1.068	1.082	1.038	1.063	1.030
iIP:cons nondble	1.065	1.055	1.026	1.044	1.013	1.023	1.024	1.006	1.010	1.002	1.000	0.987	0.960	0.976	1.003	0.939	0.947	0.961
IP:bus eqpt	1.082	1.109	0.970	1.003	0.992	0.971	1.044	1.111	0.946	0.956	0.951	0.947	1.020	1.061	0.947	0.952	0.945	0.947
IP: matls	0.999	1.096	0.953	0.922	0.947	0.953	0.997	1.098	0.987	0.974	0.974	0.984	0.947	1.070	1.021	1.002	1.012	1.022
IP: dble mats	1.037	1.155	0.927	0.937	0.930	0.927	0.987	1.050	1.040	0.971	0.994	0.933	0.989	1.093	0.891	0.901	0.894	0.905
IP:nondble mats	1.053	1.000	1.009	0.962	0.965	0.952	1.031	1.025	1.017	1.011	0.993	0.984	0.987	0.979	0.871	0.891	0.878	0.872
IP: mfg	1.122	1.166	0.982	0.983	0.980	0.982	1.056	1.114	0.963	1.019	0.960	0.963	1.004	1.115	1.027	1.012	1.021	1.028
IP: fuels	0.962	1.107	0.962	0.962	0.962	0.962	0.938	1.109	0.938	0.938	0.938	0.938	0.945	0.958	0.945	0.931	0.905	0.905
NAPM prodn	1.043	1.081	1.020	0.997	1.005	1.018	1.000	1.082	0.972	0.974	0.967	0.972	0.994	1.028	0.980	0.982	0.978	0.975
Capacity Util	1.126	1.208	1.049	1.047	1.047	1.049	1.043	1.143	1.130	1.059	1.094	1.043	1.017	1.140	1.137	1.051	1.078	1.066
Emp: total	1.243	1.415	1.087	1.053	1.055	1.082	1.160	1.318	1.070	1.037	1.062	1.037	1.132	1.161	1.015	1.054	1.042	1.016
Emp: gds prod	1.127	1.269	0.988	0.989	0.988	0.988	1.029	1.218	0.972	0.973	0.972	0.972	1.011	1.077	1.045	1.003	0.992	1.001
Emp: mining	0.992	1.134	0.968	0.963	0.962	0.965	0.987	1.092	0.931	0.951	0.950	0.931	0.985	0.957	0.871	0.877	0.868	0.862
Emp: const	1.028	1.050	1.013	0.968	0.984	1.015	0.983	1.036	0.975	0.965	0.980	0.944	0.969	0.926	0.921	0.919	0.928	0.909
Emp: mfg	1.151	1.279	1.090	1.005	1.068	0.988	1.084	1.184	1.012	0.957	0.988	1.011	1.049	1.071	0.962	0.923	0.930	0.953
Emp: dble gds	1.108	1.251	1.047	1.047	1.046	1.047	1.037	1.162	0.986	0.985	0.983	0.938	1.019	1.078	0.997	0.982	0.976	0.950

Emp: nondbles	1.098	1.173	0.977	0.961	0.956	0.957	1.074	1.080	0.999	0.890	0.946	0.883	1.059	0.988	1.009	1.018	1.025	1.010
Emp: services	1.178	1.178	0.993	1.002	0.994	0.993	1.181	1.189	1.032	1.016	1.015	1.015	1.149	1.104	1.024	1.023	1.024	1.024
Emp: TTU	1.238	1.281	1.014	1.023	1.015	1.014	1.212	1.205	1.026	1.030	1.029	1.029	1.157	1.136	1.067	1.038	1.067	1.007
Emp: wholesale	1.092	1.175	1.042	1.076	1.082	1.063	1.059	1.177	1.045	1.049	1.053	1.045	1.021	1.116	0.998	1.032	1.022	0.998
Emp: retail	1.142	1.263	0.994	1.009	1.007	0.994	1.138	1.159	1.052	1.052	1.052	1.052	1.084	1.055	0.994	0.973	1.002	0.971
Emp: FIRE	0.992	1.073	0.994	1.003	0.995	0.992	0.972	1.001	0.972	0.972	0.962	0.962	0.999	0.979	0.941	0.958	0.959	0.947
Emp: Govt	1.007	1.012	1.007	1.007	0.977	0.979	1.013	0.999	1.009	0.991	0.975	0.974	1.022	1.000	1.000	0.951	0.951	0.950
Help wanted indx	1.060	1.034	0.965	0.976	0.967	0.967	1.069	1.006	0.992	0.980	0.985	0.963	1.077	0.962	0.984	0.947	0.958	0.937
Help wanted/emp	1.046	1.144	0.979	0.975	0.979	0.979	1.027	1.145	0.957	0.960	0.957	0.957	1.043	1.113	0.954	0.946	0.947	0.957
Emp CPS total	1.173	1.134	1.059	1.034	1.039	1.040	1.183	1.154	1.022	0.998	1.001	1.013	1.177	1.166	0.935	0.915	0.916	0.937
Emp CPS nonag	1.174	1.139	1.124	1.041	1.039	1.056	1.192	1.148	0.961	0.994	1.002	0.970	1.163	1.147	0.876	0.915	0.908	0.871
Emp. Hours	1.150	1.129	0.988	1.004	0.996	0.989	1.138	1.173	1.040	1.043	1.071	1.040	1.134	1.144	0.987	0.992	0.992	0.988
Avg hrs	1.069	1.135	0.993	0.989	0.997	0.991	1.027	1.083	0.972	0.972	0.972	0.972	0.998	1.051	0.949	0.944	0.949	0.949
Overtime: mfg	1.112	1.083	0.993	0.994	0.993	0.993	1.111	1.049	0.993	0.995	0.995	0.993	1.151	1.085	0.977	0.989	0.980	0.977
U: all	1.171	1.168	1.053	1.042	1.053	1.053	1.166	1.253	1.045	1.044	1.045	1.045	1.143	1.159	1.009	1.008	1.008	1.009
U: mean duration	1.143	1.089	0.982	0.982	0.982	0.982	1.259	1.120	0.970	0.976	0.976	0.971	1.487	1.308	0.977	0.938	0.938	0.938
U < 5 wks	1.051	1.126	0.946	0.993	0.999	0.946	1.036	1.161	0.973	0.980	0.974	0.973	1.061	1.149	1.007	1.015	1.009	1.007
U 5-14 wks	1.181	1.162	1.031	1.046	1.041	1.031	1.134	1.177	1.022	1.024	1.022	1.022	1.152	1.153	0.998	0.998	0.998	0.998
U 15+ wks	1.286	1.133	1.024	1.019	1.016	1.013	1.402	1.252	1.001	1.024	1.008	1.001	1.296	1.223	0.982	0.986	0.982	0.982
U 15-26 wks	1.310	1.129	1.031	1.027	1.040	1.020	1.399	1.216	1.029	1.004	1.011	1.029	1.254	1.150	0.982	0.983	0.982	0.982
U 27+ wks	1.195	1.139	1.015	1.008	1.013	1.012	1.323	1.222	1.020	1.023	1.036	1.043	1.355	1.297	1.015	1.004	1.011	1.013
HStarts: Total	1.009	0.953	0.952	0.953	0.951	0.948	0.988	0.992	0.923	0.943	0.934	0.929	0.974	0.932	0.930	0.947	0.949	0.934
HStarts: authorizations	0.973	0.928	0.857	0.904	0.903	0.865	0.958	0.960	0.973	0.930	0.932	0.958	0.957	0.894	0.894	0.895	0.895	0.890
HStarts: NE	1.058	1.044	1.044	1.031	1.035	1.015	1.027	1.003	1.003	0.983	0.982	0.974	0.990	1.003	0.985	0.958	0.959	0.958
HStarts: MW	1.087	1.083	1.057	1.047	1.045	1.061	1.077	1.079	1.037	1.018	1.025	1.037	1.081	1.084	1.062	1.015	1.026	1.017
HStarts: South	0.989	0.928	0.928	0.942	0.926	0.929	0.988	0.963	0.950	0.947	0.960	0.954	0.994	0.913	0.960	0.963	0.962	0.959
HStarts: West	0.952	0.957	0.994	0.965	0.954	0.991	0.941	0.915	0.963	0.913	0.904	0.912	0.911	0.870	0.891	0.858	0.892	0.892
PMI	1.046	1.145	1.015	1.018	1.015	1.015	0.987	1.094	1.009	1.002	1.009	1.009	0.974	0.983	1.014	0.998	1.004	1.015
NAPM new ordrs	1.039	1.146	0.992	0.999	1.002	0.990	1.019	1.124	1.035	1.020	1.022	1.017	1.005	1.002	0.948	0.959	0.956	0.952
NAPM vendor del	0.999	1.220	1.219	1.165	1.026	1.024	0.926	1.147	1.145	1.124	1.054	1.054	0.904	1.105	1.108	1.105	1.045	1.114
NAPM Invent	1.076	1.029	0.944	0.918	0.927	0.949	1.034	1.040	1.087	0.979	0.989	0.957	1.013	1.013	0.976	0.901	0.905	0.905
Orders (ConsGoods)	1.118	1.243	1.009	1.023	1.017	1.008	1.010	1.113	1.044	1.016	1.034	1.011	0.973	1.009	1.018	0.972	0.999	0.965
Orders (NDCapGoods)	1.148	1.146	0.938	0.952	0.953	0.954	1.130	1.113	1.053	1.013	1.025	1.059	1.082	1.112	0.967	0.990	0.994	0.985
PGDP	1.061	1.197	1.030	1.044	1.042	1.027	1.051	1.190	1.034	1.025	1.009	1.026	0.944	1.008	0.950	0.897	0.912	0.889
PCED	1.029	1.084	1.004	1.006	1.002	1.005	1.040	1.129	1.020	1.016	1.017	1.008	1.009	1.114	0.985	0.995	0.992	0.984
CPI-ALL	1.019	1.118	0.990	1.018	0.998	1.016	1.033	1.131	1.058	1.020	1.006	1.020	1.021	1.048	0.982	0.994	0.989	0.989
PCED-Core	1.008	1.076	1.008	1.045	0.982	0.988	0.956	0.981	0.980	0.976	0.910	0.912	0.891	0.977	0.982	0.928	0.872	0.863
CPI-Core	0.991	1.159	1.028	0.990	0.975	0.979	0.843	1.084	1.127	1.017	0.959	1.118	0.804	1.043	1.012	0.955	0.886	0.849
PCED-DUR	0.963	1.029	0.919	0.913	0.912	0.919	0.904	0.955	0.904	0.904	0.885	0.885	0.845	0.825	0.835	0.825	0.801	0.783
PCED-DUR-MOTORVEH	0.987	1.150	0.987	0.987	0.994	1.004	0.940	1.040	0.940	0.940	0.938	0.878	0.903	0.897	0.903	0.897	0.867	0.852
PCED-DUR-HHEQUIP	0.993	0.991	0.992	0.993	0.966	0.937	0.976	1.020	0.943	0.948	0.952	0.943	0.905	0.926	0.883	0.878	0.866	0.873
PCED-DUR-OTH	0.992	1.042	0.966	0.981	0.975	0.977	1.003	1.089	0.999	1.010	0.996	0.995	0.997	1.151	1.028	0.990	0.989	1.031
PCED-NDUR	1.008	1.082	0.956	0.992	0.983	0.956	1.035	1.088	1.014	1.024	1.018	1.014	1.043	1.069	1.003	1.026	1.019	1.003
PCED-NDUR-FOOD	0.938	1.070	1.031	1.039	0.985	1.033	0.945	1.178	1.158	1.055	0.964	0.980	0.920	1.135	0.970	1.016	1.003	1.018
PCED-NDUR-CLTH	1.007	1.082	1.007	1.007	1.007	0.999	0.993	1.090	0.962	0.993	0.993	0.963	1.012	1.092	1.011	1.012	1.005	1.006
PCED-NDUR-ENERGY	1.008	1.081	1.008	1.008	1.008	1.008	1.020	1.062	1.011	1.020	1.016	1.007	1.006	1.044	1.006	1.006	0.999	0.999
PCED-NDUR-OTH	1.004	1.138	0.987	1.005	1.008	0.987	1.033	1.082	1.004	1.013	1.003	0.998	1.058	1.125	1.043	1.018	1.006	1.044
PCED-SERV	1.069	1.143	1.069	1.069	1.060	1.061	1.048	1.140	1.039	1.021	1.022	1.020	1.006	1.149	0.903	0.947	0.943	0.911

PCED-SERV-HOUS	1.020	1.125	1.020	1.020	1.020	0.999	1.047	1.250	1.047	1.047	1.047	1.047	1.091	1.224	1.051	1.049	1.054	1.065
PCED-SERV-HOUSOP	1.012	0.993	0.976	1.008	0.982	0.981	1.045	1.047	1.013	1.027	1.021	1.013	1.032	1.031	0.974	0.981	0.978	0.974
PCED-SERV-H0-ELGAS	1.014	1.013	1.004	1.014	0.995	0.987	1.022	1.036	1.019	1.004	1.001	1.003	1.006	0.964	0.959	0.966	0.963	0.964
PCED-SERV-HO-OTH	0.998	1.171	0.998	0.998	1.008	0.978	0.989	1.210	0.989	0.989	0.989	1.009	0.966	1.153	0.966	0.964	0.963	0.961
PCED-SERV-TRAN	0.975	1.004	0.975	0.953	0.945	0.947	0.973	1.010	0.973	0.966	0.954	0.957	0.982	0.987	0.975	0.948	0.951	0.951
PCED-SERV-MED	0.966	1.219	0.966	0.966	0.978	0.968	0.943	1.194	0.943	0.943	0.965	0.955	0.909	0.999	0.911	0.931	0.923	0.911
PCED-SERV-REC	1.005	1.132	1.006	1.013	1.016	1.007	1.008	1.095	1.018	1.013	1.012	1.013	1.017	1.117	0.999	0.990	0.985	0.999
PCED-SERV-OTH	1.019	1.032	1.019	1.019	1.000	0.990	0.988	0.999	0.988	0.988	0.966	0.954	0.940	1.075	0.940	0.940	0.940	0.940
PGPDI	0.898	0.966	0.971	0.953	0.891	0.889	0.915	1.025	0.948	0.954	0.945	0.948	0.849	0.890	0.892	0.867	0.878	0.893
PFI	0.917	0.973	0.963	0.939	0.909	0.908	0.920	1.040	0.941	0.954	0.946	0.941	0.856	0.911	0.908	0.869	0.884	0.914
PFI-NRES	0.953	1.029	0.932	0.917	0.912	0.916	0.967	1.045	1.012	0.978	0.969	0.976	0.905	0.921	0.910	0.910	0.903	0.910
PFI-NRES-STR Price Index	0.964	1.116	0.964	0.964	0.981	0.993	0.980	1.137	0.978	0.980	0.990	0.986	0.981	1.080	0.995	1.001	0.989	0.996
PFI-NRES-EQP	0.962	1.026	0.925	0.940	0.956	0.962	0.951	1.011	0.969	0.971	0.946	0.970	0.877	0.960	0.941	0.900	0.862	0.884
PFI-RES	1.007	1.074	1.051	1.028	1.002	1.041	1.000	1.121	1.156	1.084	1.055	1.155	1.005	1.062	1.062	1.056	1.002	1.038
PEXP	0.996	1.182	1.022	1.038	1.014	1.020	1.000	1.109	1.019	1.024	1.021	1.018	0.982	1.084	1.084	1.077	0.999	1.008
PIMP	1.033	1.173	1.007	1.027	1.025	1.001	1.064	1.187	1.042	1.052	1.050	1.042	1.051	1.201	1.046	1.051	1.044	1.047
PGOV	1.006	1.130	1.006	1.021	1.015	1.013	0.984	1.147	1.046	0.987	0.996	1.046	0.868	1.059	0.902	0.942	0.912	0.903
PGOV-FED	0.986	1.173	0.986	0.986	0.986	0.991	0.983	1.242	0.985	0.979	0.980	0.982	0.880	1.125	1.111	1.048	0.953	1.115
PGOV-SL	1.022	1.115	1.013	1.019	1.024	1.023	1.011	1.142	0.983	0.995	0.988	0.983	0.923	1.065	0.925	0.940	0.929	0.924
Com: spot price (real)	1.024	1.056	0.944	0.969	0.958	0.946	0.997	0.984	0.948	0.954	0.949	0.953	1.007	0.998	0.998	0.998	0.977	0.976
OilPrice (Real)	1.000	1.097	0.999	1.000	1.000	0.999	0.999	1.018	0.942	0.960	0.958	0.943	0.981	0.941	0.928	0.939	0.931	0.926
NAPM com price	1.038	1.029	0.929	0.977	0.976	0.931	1.022	1.037	0.995	1.009	1.005	1.006	1.030	1.038	1.018	1.019	1.006	1.019
Real AHE: goods	1.002	1.042	1.027	1.032	0.998	1.000	1.001	1.048	1.049	1.048	1.000	0.991	0.976	1.080	1.078	1.078	1.017	1.009
Real AHE: const	0.988	1.082	1.010	0.992	0.983	0.971	0.986	1.105	1.082	1.019	0.983	0.984	0.970	1.133	0.970	0.970	0.997	0.982
Real AHE: mfg	0.997	0.990	0.979	0.979	0.964	0.980	0.984	1.032	1.010	1.025	0.991	0.975	0.974	1.056	1.050	1.035	1.010	1.019
Labor Prod	1.002	1.063	0.994	1.043	1.006	1.022	0.993	1.012	0.985	0.985	0.985	0.986	0.999	1.039	1.002	1.027	1.011	0.990
Real Comp/Hour	1.004	1.096	1.004	1.004	1.008	0.968	1.010	0.997	0.985	0.998	0.979	0.938	0.998	1.087	1.015	1.012	1.006	0.978
Unit Labor Cost	1.037	1.102	1.020	1.009	1.013	1.020	0.999	1.012	0.991	0.978	0.996	0.944	0.994	0.954	0.964	0.964	0.964	0.964
FedFunds	1.043	1.225	0.922	0.915	0.922	0.913	1.069	1.098	0.936	0.947	0.941	0.950	1.127	1.206	0.859	0.885	0.863	0.859
3 mo T-bill	0.994	1.211	0.938	0.940	0.938	0.938	1.006	1.085	0.922	0.939	0.932	0.923	1.037	1.136	0.898	0.915	0.907	0.898
6 mo T-bill	0.999	1.241	0.949	0.956	0.950	0.949	0.976	1.066	0.854	0.894	0.868	0.956	1.002	1.139	0.854	0.907	0.880	0.854
1 yr T-bond	1.003	1.226	0.971	1.006	1.006	0.971	0.961	1.011	1.004	1.011	0.990	0.978	0.988	1.126	0.881	0.938	0.914	0.882
5 yr T-bond	1.010	1.090	1.001	1.000	0.991	0.999	0.965	0.972	0.962	0.964	0.951	0.935	0.972	1.076	0.976	0.972	0.980	0.984
10 yr T-bond	1.017	1.077	1.029	1.007	0.997	1.001	0.969	0.961	0.959	0.957	0.940	0.937	0.978	1.059	0.958	0.969	0.984	0.983
Aaabond	1.024	1.055	1.025	1.013	0.995	0.997	1.000	0.960	0.957	0.960	0.944	0.943	1.004	1.046	1.027	1.042	0.998	0.995
Baa bond	0.964	0.987	0.964	0.962	0.944	0.944	0.983	0.937	0.920	0.936	0.917	0.921	1.000	0.969	0.958	0.964	0.956	0.965
fygm6-fygm3	0.959	0.966	0.966	0.966	0.904	0.912	0.968	0.939	0.968	0.968	0.913	0.912	0.962	0.989	0.962	0.962	0.921	0.916
fygt1-fygm3	0.966	0.937	0.908	0.899	0.885	0.908	0.923	0.882	0.846	0.856	0.851	0.845	0.908	0.878	0.863	0.855	0.850	0.838
fygt10-fygm3	0.969	1.022	0.920	0.903	0.898	0.898	0.999	0.983	0.930	0.926	0.932	0.934	1.144	1.118	1.042	1.008	1.018	1.010
FYAAAC-Fygt10	1.010	1.108	1.008	1.017	1.016	1.017	0.977	1.043	1.039	1.031	0.993	0.995	0.975	1.022	0.975	0.975	0.971	0.971
FYBAAC-Fygt10	1.016	1.082	0.941	0.995	0.983	0.943	0.947	1.036	0.983	1.014	0.983	0.984	0.966	1.062	0.990	0.991	0.975	0.990
M1	1.029	1.007	0.956	0.974	0.961	0.956	1.056	1.122	0.974	0.984	0.976	0.975	1.070	1.135	0.995	1.010	0.999	0.995
MZM	1.033	0.863	0.851	0.885	0.888	0.885	1.002	0.908	0.907	0.904	0.900	0.907	1.011	0.987	1.010	1.012	0.968	0.954
M2	0.963	0.909	0.944	0.904	0.918	0.902	0.901	0.924	0.980	0.921	0.975	0.980	0.876	0.931	1.031	0.936	0.905	0.939
MB	0.981	0.995	0.981	0.981	0.967	0.908	0.984	1.040	0.980	0.971	0.973	0.972	1.000	0.988	0.999	0.993	0.978	0.978
Reserves tot	1.084	1.074	0.981	1.016	1.004	0.981	1.053	1.061	0.981	0.989	0.984	0.981	1.049	1.077	0.969	0.982	0.983	0.983
BUSLOANS	1.072	1.025	0.966	0.992	0.994	0.965	1.125	1.060	0.981	1.019	1.025	1.004	1.142	1.077	1.113	1.044	1.054	1.028

Cons credit	1.022	1.057	0.942	0.956	0.955	0.942	1.000	1.063	0.990	0.976	0.990	0.973	0.943	0.956	0.948	0.953	0.952	0.951
Ex rate: avg	0.985	1.038	0.976	0.980	0.982	0.973	0.982	0.987	0.928	0.982	0.964	0.964	0.964	1.024	0.922	0.942	0.939	0.922
Ex rate: Switz	0.986	1.146	0.986	0.986	0.986	0.986	0.979	1.092	0.978	0.979	0.980	0.981	0.949	1.082	0.919	0.946	0.940	0.919
Ex rate: Japan	0.987	1.029	0.984	0.972	0.972	0.973	0.991	0.956	0.946	0.953	0.944	0.943	1.006	1.004	1.000	0.983	0.974	0.976
Ex rate: UK	0.981	1.013	0.922	0.969	0.965	0.922	0.966	0.948	0.966	0.966	0.933	0.916	0.929	0.951	0.874	0.911	0.892	0.874
EX rate: Canada	0.992	1.042	0.992	0.992	0.991	0.968	0.980	0.993	0.980	0.980	0.970	0.956	0.978	0.955	0.975	0.938	0.942	0.943
S&P 500	0.990	1.050	0.990	0.992	0.989	0.989	0.963	1.012	0.975	0.969	0.958	0.973	0.945	0.932	0.889	0.935	0.920	0.871
S&P: indust	0.983	1.051	0.974	0.980	0.979	0.982	0.958	1.000	0.917	0.941	0.936	0.916	0.941	0.914	0.906	0.924	0.912	0.907
S&P div yield	0.956	1.060	1.013	1.001	0.969	0.972	0.914	0.976	0.970	0.982	0.972	0.970	0.884	0.925	0.961	0.899	0.875	0.961
S&P PE ratio	1.009	1.023	0.967	0.996	0.993	0.997	1.017	1.000	0.999	0.983	0.981	0.983	1.029	1.015	0.980	1.020	1.012	1.020
DJIA	0.986	1.015	0.986	0.984	0.977	0.977	0.972	0.993	0.977	0.972	0.958	0.884	0.969	0.950	0.931	0.968	0.947	0.938
Consumer expect	0.976	1.067	0.968	0.976	0.978	0.968	0.955	1.127	0.993	0.996	0.997	0.993	0.908	0.961	0.987	0.966	0.965	0.987

Table S-10

Relative RMSE by Series, Forecasting Method, and Horizon, Relative to DFM-5, Estimated by Cross-Validation RMSE: 1960-2008.

Shrinkage coefficients and MSEs are computed using full-sample cross-validation. All entries for DFM-5 are 1.00 so DFM-5 is omitted.

Series	h = 1						h = 2						h = 4					
	AR(4)	OLS	Prtst	Bag	BMA	Logit	AR(4)	OLS	Prtst	Bag	BMA	Logit	AR(4)	OLS	Prtst	Bag	BMA	Logit
RGDP	1.194	1.148	1.061	1.060	1.062	1.056	1.173	1.049	1.025	1.025	1.025	1.013	1.130	1.051	1.043	1.041	1.042	1.030
Cons	1.093	1.070	1.003	1.008	1.007	1.003	1.077	1.055	1.003	1.021	1.015	1.003	1.085	1.044	1.013	1.013	1.010	1.014
Cons-Dur	1.118	1.056	1.011	1.010	1.014	1.001	1.130	1.065	0.998	0.996	0.998	0.990	1.162	1.079	1.077	1.057	1.060	1.050
Cons-NonDur	1.038	1.088	1.020	1.028	1.026	1.020	1.029	1.073	1.028	1.028	1.017	1.017	1.039	1.046	1.037	1.031	1.011	1.011
Cons-Serv	1.000	1.053	0.952	0.974	0.970	0.952	0.998	0.991	0.852	0.900	0.893	0.850	0.976	0.952	0.918	0.929	0.923	0.918
GPDInv	1.368	1.171	1.024	1.026	1.024	1.024	1.257	1.069	0.972	0.988	0.983	0.973	1.200	1.092	0.973	0.975	0.973	0.973
FixedInv	1.137	1.096	0.986	0.987	0.992	0.987	1.141	1.080	0.977	0.989	0.991	0.980	1.143	1.051	0.991	1.000	1.005	0.995
NonResInv	1.118	1.133	0.989	1.004	1.009	0.990	1.142	1.014	1.005	0.990	0.993	0.982	1.103	0.983	0.961	0.958	0.959	0.956
NonResInv-Struct	1.039	1.046	0.983	0.986	0.987	0.983	1.065	0.999	0.972	0.974	0.973	0.963	1.056	0.930	0.921	0.903	0.903	0.902
NonResInv-Bequip	1.155	1.165	0.984	0.998	0.992	0.984	1.175	1.043	0.972	0.974	0.973	0.970	1.171	1.041	0.946	0.949	0.947	0.947
Res.Inv	1.174	1.043	0.971	0.990	0.987	0.971	1.212	1.145	1.014	1.028	1.026	1.016	1.280	1.171	1.003	1.021	1.011	1.004
Exports	1.062	1.041	0.993	0.993	0.994	0.991	1.078	1.076	0.973	0.984	0.980	0.973	1.105	1.044	1.007	1.013	1.009	1.007
Imports	1.265	1.149	1.001	1.008	1.007	1.002	1.265	1.153	0.980	0.991	0.983	0.981	1.269	1.214	0.991	0.992	0.991	0.991
Gov	0.978	1.025	0.978	0.978	0.966	0.961	0.971	0.952	0.906	0.942	0.932	0.908	0.959	0.975	0.959	0.959	0.941	0.933
Gov Fed	0.972	1.035	0.972	0.972	0.964	0.959	0.957	0.962	0.909	0.927	0.921	0.909	0.951	0.994	0.940	0.932	0.927	0.929
Gov State/Loc	1.013	1.006	0.996	0.995	0.978	0.978	1.036	1.078	1.017	1.025	1.021	1.016	1.028	0.990	0.987	0.990	0.978	0.976
IP: total	1.143	1.098	1.018	1.023	1.018	1.018	1.173	1.064	1.000	1.003	1.008	0.993	1.219	1.152	1.041	1.042	1.049	1.039
IP: products	1.139	1.112	1.024	1.031	1.034	1.025	1.182	1.101	1.009	1.016	1.019	1.010	1.215	1.175	1.024	1.048	1.042	1.025
IP: final prod	1.129	1.090	1.013	1.022	1.019	1.013	1.164	1.092	1.026	1.020	1.027	1.018	1.190	1.150	1.030	1.047	1.042	1.031
IP: cons gds	1.142	1.054	0.988	0.987	0.989	0.985	1.202	1.062	0.965	0.989	0.983	0.966	1.270	1.139	1.043	1.047	1.056	1.044
IP: cons dble	1.173	1.081	1.011	0.993	0.998	0.992	1.231	1.058	1.017	1.009	1.009	1.006	1.305	1.160	1.050	1.051	1.055	1.051
iIP:cons nondble	1.063	1.049	1.021	1.041	1.022	1.021	1.080	0.980	0.979	0.976	0.977	0.974	1.084	1.017	0.972	0.972	0.973	0.969
IP:bus eqpt	1.071	1.049	0.981	0.998	0.994	0.982	1.083	1.066	0.977	0.986	0.986	0.979	1.119	1.071	1.013	1.022	1.019	1.013
IP: matls	1.127	1.051	0.970	0.986	0.988	0.971	1.144	1.014	0.945	0.955	0.955	0.947	1.202	1.119	0.960	0.980	0.974	0.963
IP: dble mats	1.151	1.085	0.998	1.006	1.001	0.998	1.159	1.019	0.967	0.959	0.967	0.954	1.229	1.144	0.957	0.958	0.959	0.956
IP:nondble mats	1.118	1.005	0.995	0.985	0.987	0.981	1.150	1.050	1.030	1.032	1.031	1.021	1.142	1.053	0.933	0.944	0.951	0.938
IP: mfg	1.170	1.095	1.009	1.011	1.009	1.009	1.187	1.064	1.008	1.007	1.008	1.008	1.244	1.185	1.019	1.043	1.031	1.019
IP: fuels	0.964	1.076	0.964	0.964	0.964	0.964	0.954	1.075	0.954	0.954	0.954	0.954	0.957	0.968	0.950	0.931	0.923	0.924
NAPM prodn	1.110	1.057	1.002	1.011	1.010	1.002	1.129	1.094	1.022	1.030	1.025	1.022	1.121	1.121	1.062	1.057	1.059	1.055
Capacity Util	1.182	1.131	1.021	1.028	1.027	1.021	1.187	1.084	1.007	1.000	1.005	0.999	1.246	1.175	1.037	1.034	1.035	1.034
Emp: total	1.174	1.169	1.021	1.044	1.040	1.022	1.182	1.135	1.017	1.016	1.018	1.016	1.228	1.154	0.995	1.021	1.007	0.997
Emp: gds prod	1.158	1.098	0.999	1.002	1.002	1.000	1.151	1.090	0.987	0.989	0.987	0.987	1.192	1.131	0.998	0.998	1.000	0.998
Emp: mining	0.999	1.074	0.979	0.989	0.985	0.979	0.995	1.043	0.944	0.958	0.957	0.945	1.001	0.957	0.862	0.880	0.872	0.863
Emp: const	1.101	0.997	0.965	0.969	0.967	0.965	1.141	1.037	0.997	0.993	0.999	0.983	1.163	1.067	1.003	0.996	1.000	0.994
Emp: mfg	1.170	1.073	1.020	1.026	1.027	1.019	1.165	1.062	0.988	0.991	0.991	0.988	1.198	1.112	0.946	0.959	0.953	0.947
Emp: dble gds	1.180	1.086	1.005	1.007	1.005	1.005	1.162	1.055	1.002	1.005	1.003	0.996	1.180	1.097	1.027	1.026	1.031	1.020
Emp: nondbles	1.101	1.068	0.997	0.991	0.992	0.990	1.144	1.065	0.998	0.998	1.006	0.989	1.203	1.107	0.988	1.013	1.000	0.989
Emp: services	1.166	1.147	0.992	1.000	0.995	0.992	1.161	1.158	0.989	0.985	0.988	0.985	1.161	1.113	0.981	0.983	0.981	0.981

Emp: TTU	1.208	1.180	1.016	1.025	1.019	1.016	1.218	1.140	1.011	1.019	1.012	1.011	1.233	1.157	1.045	1.043	1.050	1.035
Emp: wholesale	1.121	1.072	1.027	1.019	1.025	1.014	1.109	1.092	0.993	1.000	1.000	0.992	1.139	1.122	0.985	1.018	1.005	0.985
Emp: retail	1.139	1.154	0.999	1.007	1.008	0.999	1.162	1.128	1.002	1.011	1.008	1.002	1.168	1.120	0.983	0.982	0.985	0.981
Emp: FIRE	1.025	1.095	1.002	1.016	1.012	1.001	1.012	1.050	1.012	1.012	0.999	0.999	1.030	1.016	0.992	0.995	0.990	0.990
Emp: Govt	1.000	1.023	1.000	1.000	0.982	0.981	1.012	1.020	1.008	0.991	0.982	0.983	1.014	0.974	0.944	0.930	0.930	0.930
Help wanted indx	1.105	1.069	1.024	1.029	1.026	1.025	1.150	1.051	1.018	1.014	1.021	1.010	1.191	1.098	1.047	1.037	1.041	1.037
Help wanted/emp	1.063	1.092	0.999	1.006	1.001	0.999	1.072	1.065	1.004	1.017	1.012	1.004	1.089	1.075	1.038	1.048	1.044	1.034
Emp CPS total	1.185	1.092	1.000	1.001	1.000	0.999	1.222	1.110	0.946	0.973	0.960	0.948	1.240	1.167	0.936	0.960	0.956	0.936
Emp CPS nonag	1.190	1.113	1.014	1.021	1.020	1.015	1.244	1.121	0.948	0.985	0.982	0.950	1.241	1.160	0.908	0.952	0.935	0.909
Emp. Hours	1.184	1.083	0.998	1.021	1.014	0.999	1.232	1.139	0.990	1.023	1.026	0.990	1.290	1.205	1.030	1.035	1.034	1.030
Avg hrs	1.178	1.157	1.020	1.013	1.018	1.013	1.164	1.104	0.961	0.969	0.968	0.962	1.125	1.084	0.955	0.956	0.955	0.955
Overtime: mfg	1.166	1.095	0.994	1.001	0.999	0.994	1.242	1.080	1.018	1.020	1.019	1.018	1.312	1.209	1.017	1.024	1.019	1.017
U: all	1.128	1.104	1.011	1.016	1.012	1.011	1.149	1.122	0.978	0.981	0.979	0.978	1.222	1.151	0.959	0.960	0.959	0.959
U: mean duration	1.250	1.161	0.998	0.999	0.998	0.998	1.440	1.267	0.969	0.971	0.971	0.969	1.551	1.336	0.976	0.976	0.976	0.974
U < 5 wks	1.040	1.051	0.925	0.970	0.964	0.925	1.066	1.100	0.964	0.967	0.964	0.964	1.129	1.130	1.008	1.019	1.010	1.008
U 5-14 wks	1.170	1.093	0.961	0.998	0.985	0.962	1.143	1.082	0.970	0.972	0.970	0.970	1.226	1.143	0.970	0.971	0.970	0.970
U 15+ wks	1.284	1.136	1.001	1.003	1.006	1.002	1.350	1.218	0.976	0.990	0.984	0.977	1.315	1.187	0.970	0.985	0.973	0.970
U 15-26 wks	1.310	1.108	1.005	0.986	0.994	0.985	1.333	1.156	0.953	0.973	0.967	0.956	1.312	1.170	0.975	0.984	0.980	0.975
U 27+ wks	1.258	1.127	0.934	0.951	0.944	0.934	1.452	1.288	0.973	0.985	0.978	0.976	1.390	1.256	0.955	0.964	0.963	0.956
HStarts: Total	1.062	0.951	0.949	0.951	0.951	0.950	1.035	0.974	0.936	0.951	0.940	0.937	1.030	0.935	0.928	0.918	0.920	0.916
HStarts: authorizations	1.073	1.011	0.955	0.972	0.970	0.957	1.053	0.983	0.934	0.937	0.935	0.934	1.061	0.933	0.933	0.933	0.933	0.929
HStarts: NE	1.086	0.972	0.972	0.967	0.969	0.960	1.074	0.991	0.990	0.983	0.984	0.979	1.100	1.016	1.003	0.998	0.998	1.000
HStarts: MW	1.090	1.024	0.980	1.000	1.002	0.981	1.127	1.043	0.991	1.009	1.010	0.992	1.146	1.108	1.030	1.025	1.026	1.025
HStarts: South	1.059	1.018	1.015	1.005	1.002	0.999	1.092	1.042	0.984	0.993	0.997	0.986	1.127	1.025	0.985	0.993	0.988	0.985
HStarts: West	1.062	1.028	0.989	1.001	0.996	0.989	1.049	1.016	0.980	0.980	0.978	0.980	1.049	0.971	0.913	0.926	0.926	0.913
PMI	1.111	1.053	1.010	1.019	1.012	1.010	1.148	1.087	1.020	1.027	1.021	1.020	1.149	1.068	1.001	1.027	1.020	1.003
NAPM new ordrs	1.112	1.091	0.994	1.019	1.009	0.994	1.158	1.144	1.061	1.059	1.060	1.059	1.139	1.084	1.034	1.047	1.040	1.035
NAPM vendor del	1.024	1.020	1.019	1.013	0.991	0.986	1.038	0.977	0.974	0.976	0.971	0.971	1.079	0.997	0.996	0.997	0.995	0.981
NAPM Invent	1.112	0.988	0.928	0.932	0.935	0.931	1.138	0.962	0.954	0.932	0.934	0.931	1.194	1.040	0.954	0.954	0.949	0.946
Orders (ConsGoods)	1.160	1.110	1.018	1.039	1.035	1.018	1.179	1.092	1.024	1.017	1.021	1.017	1.258	1.125	1.060	1.046	1.051	1.046
Orders (NDCapGoods)	1.172	1.139	1.017	1.016	1.022	1.014	1.200	1.135	1.026	1.037	1.036	1.029	1.190	1.082	1.033	1.017	1.021	1.017
PGDP	1.042	1.083	1.007	1.021	1.017	1.008	1.069	1.093	1.006	1.018	1.013	1.007	1.101	1.063	0.981	0.979	0.980	0.980
PCED	1.037	1.064	0.995	1.005	1.002	0.995	1.058	1.102	0.995	1.006	0.999	0.996	1.096	1.111	1.027	1.036	1.033	1.027
CPI-ALL	1.094	1.106	0.990	0.994	0.994	0.992	1.117	1.108	0.988	0.984	0.992	0.984	1.179	1.120	1.020	1.014	1.023	1.013
PCED-Core	1.015	1.020	1.015	1.013	0.987	0.985	1.018	1.008	1.008	1.008	0.985	0.982	1.044	1.017	1.010	1.003	0.997	0.994
CPI-Core	1.032	1.011	0.975	0.961	0.961	0.961	1.022	0.976	0.941	0.951	0.949	0.944	1.041	0.990	0.979	0.969	0.969	0.962
PCED-DUR	0.998	1.032	0.945	0.965	0.962	0.945	0.986	1.006	0.986	0.986	0.968	0.957	0.974	0.933	0.930	0.933	0.927	0.920
PCED-DUR-MOTORVEH	0.992	1.045	0.992	0.992	0.984	0.968	0.971	1.010	0.970	0.971	0.960	0.926	0.947	0.928	0.927	0.928	0.914	0.904
PCED-DUR-HHEQUIP	1.012	1.044	1.012	1.012	0.995	0.969	1.018	1.071	0.986	1.013	1.005	0.984	1.015	1.000	0.977	0.971	0.966	0.970
PCED-DUR-OTH	0.987	1.058	0.985	0.983	0.981	0.981	0.994	1.064	0.993	0.993	0.988	0.989	1.016	1.076	1.001	1.007	1.004	1.002
PCED-NDUR	1.031	1.105	0.967	1.002	0.992	0.967	1.071	1.126	1.016	1.035	1.022	1.016	1.128	1.127	1.043	1.062	1.055	1.043
PCED-NDUR-FOOD	1.040	0.978	0.962	0.973	0.969	0.962	1.054	1.024	1.020	1.013	1.003	1.003	1.108	1.061	0.983	0.979	0.981	0.980
PCED-NDUR-CLTH	1.006	1.083	1.006	1.006	1.002	0.997	0.992	1.075	0.978	0.992	0.989	0.978	1.012	1.074	1.011	1.012	1.004	1.004
PCED-NDUR-ENERGY	1.005	1.121	1.005	1.005	1.005	1.005	1.017	1.097	1.011	1.017	1.013	1.008	1.026	1.096	1.026	1.026	1.018	1.018
PCED-NDUR-OTH	1.020	1.090	1.004	1.013	1.010	1.004	1.036	1.049	1.011	1.003	0.997	0.998	1.063	1.080	0.995	1.011	1.003	0.996
PCED-SERV	1.023	1.109	1.023	1.023	1.020	1.020	1.039	1.090	1.023	1.017	1.014	1.017	1.075	1.093	0.985	0.999	0.993	0.985
PCED-SERV-HOUS	0.984	1.119	0.984	0.984	0.984	0.977	1.003	1.168	1.003	1.003	1.003	1.003	1.038	1.109	1.032	1.034	1.024	1.027
PCED-SERV-HOUSOP	1.024	1.038	1.017	1.019	1.002	1.002	1.050	1.119	1.005	1.028	1.021	1.005	1.053	1.116	0.975	0.993	0.983	0.975

PCED-SERV-H0-ELGAS	1.018	1.040	1.018	1.018	0.999	0.996	1.022	1.065	1.020	1.012	1.004	1.006	1.018	1.029	0.989	0.991	0.985	0.987
PCED-SERV-HO-OTH	0.997	1.049	0.997	0.997	0.989	0.968	0.988	1.082	0.988	0.988	0.988	0.960	0.928	1.045	0.928	0.927	0.927	0.927
PCED-SERV-TRAN	0.995	1.018	0.995	0.992	0.973	0.972	0.983	0.996	0.982	0.975	0.956	0.953	0.976	0.988	0.969	0.952	0.947	0.947
PCED-SERV-MED	1.010	1.083	1.009	1.010	1.006	1.005	1.012	1.116	1.012	1.012	1.008	1.009	0.997	1.009	0.950	0.951	0.952	0.950
PCED-SERV-REC	1.047	1.099	0.972	1.002	1.001	0.973	1.065	1.077	1.021	1.009	1.008	1.009	1.091	1.130	1.018	1.024	1.021	1.018
PCED-SERV-OTH	0.999	1.047	0.999	0.999	0.987	0.975	1.002	1.060	1.002	1.002	0.993	0.971	0.987	1.084	0.987	0.987	0.987	0.987
PGPDI	1.022	0.987	0.983	0.982	0.971	0.971	1.045	1.073	0.991	1.010	1.001	0.991	1.047	1.047	0.918	0.951	0.949	0.921
PFI	1.030	0.980	0.969	0.969	0.965	0.967	1.047	1.092	0.995	1.009	1.002	0.995	1.045	1.049	0.913	0.933	0.926	0.915
PFI-NRES	1.041	1.008	0.970	0.962	0.961	0.962	1.054	1.070	1.013	1.006	1.004	1.006	1.063	1.051	0.971	0.984	0.978	0.971
PFI-NRES-STR Price Index	1.012	1.041	1.012	1.012	0.995	0.988	1.024	1.109	1.023	1.024	1.018	1.019	1.044	1.104	1.003	1.029	1.019	1.003
PFI-NRES-EQP	1.036	1.024	1.003	1.013	1.000	0.999	1.047	1.031	0.999	1.019	1.008	0.999	1.058	1.030	1.011	1.002	0.997	0.995
PFI-RES	0.975	0.925	0.870	0.910	0.909	0.871	0.960	0.920	0.893	0.901	0.898	0.891	0.937	0.890	0.889	0.888	0.885	0.878
PEXP	1.023	0.991	0.942	0.965	0.965	0.943	1.035	1.003	0.941	0.956	0.955	0.940	1.030	0.998	0.998	0.992	0.982	0.981
PIMP	1.020	1.170	0.983	1.012	1.011	0.984	1.039	1.150	1.021	1.033	1.029	1.021	1.037	1.131	1.036	1.037	1.032	1.034
PGOV	1.029	1.102	1.027	1.027	1.022	1.022	1.035	1.109	1.020	1.030	1.027	1.019	1.035	1.069	0.980	0.991	0.991	0.981
PGOV-FED	1.010	1.121	1.010	1.010	1.010	1.008	1.021	1.119	1.006	1.010	1.007	1.000	0.993	1.007	0.958	0.981	0.970	0.957
PGOV-SL	1.017	1.081	1.014	1.013	1.010	1.010	1.022	1.085	0.982	1.007	1.000	0.983	1.035	1.061	0.987	1.008	1.002	0.988
Com: spot price (real)	1.055	1.072	0.966	0.988	0.980	0.965	1.048	1.031	0.997	0.990	0.986	0.989	1.053	1.004	1.003	1.004	0.995	0.994
OilPrice (Real)	0.990	1.108	0.989	0.990	0.990	0.989	0.987	1.052	0.944	0.948	0.947	0.945	0.990	1.003	0.939	0.951	0.944	0.938
NAPM com price	1.056	1.033	0.957	0.978	0.978	0.956	1.040	1.041	0.995	0.996	0.992	0.994	1.069	1.077	1.030	1.046	1.035	1.032
Real AHE: goods	0.991	0.957	0.953	0.952	0.941	0.919	0.980	0.934	0.933	0.934	0.923	0.916	0.956	0.917	0.913	0.916	0.906	0.902
Real AHE: const	1.001	1.046	0.994	1.000	0.990	0.981	0.993	1.011	0.991	0.991	0.973	0.973	0.979	0.999	0.979	0.979	0.961	0.942
Real AHE: mfg	0.987	0.926	0.910	0.919	0.915	0.914	0.980	0.914	0.905	0.913	0.907	0.896	0.972	0.914	0.911	0.909	0.905	0.889
Labor Prod	1.013	0.990	0.968	0.987	0.970	0.961	1.026	0.937	0.932	0.928	0.927	0.929	1.030	0.963	0.951	0.954	0.954	0.946
Real Comp/Hour	1.014	1.088	1.014	1.014	1.011	0.974	1.008	0.990	0.984	0.990	0.968	0.931	0.984	1.038	0.978	0.980	0.973	0.968
Unit Labor Cost	1.067	1.083	0.982	1.006	0.996	0.982	1.126	1.033	1.002	1.011	1.010	0.995	1.222	1.099	0.985	0.988	0.986	0.986
FedFunds	1.172	1.142	1.012	1.015	1.015	1.008	1.255	1.105	1.004	1.006	1.006	0.995	1.209	1.161	0.975	0.987	0.979	0.976
3 mo T-bill	1.073	1.119	0.978	0.984	0.981	0.978	1.145	1.056	1.000	1.011	1.004	1.001	1.133	1.137	0.996	1.003	0.999	0.996
6 mo T-bill	1.055	1.116	0.996	1.008	1.003	0.996	1.076	1.011	0.978	0.986	0.983	0.977	1.046	1.093	0.947	0.950	0.950	0.947
1 yr T-bond	1.049	1.121	1.012	1.015	1.015	1.012	1.059	0.979	0.976	0.979	0.977	0.972	1.036	1.093	0.969	0.991	0.981	0.969
5 yr T-bond	1.021	1.068	0.986	1.009	1.001	0.988	1.023	0.966	0.959	0.964	0.959	0.946	1.021	1.074	1.020	1.021	1.014	1.001
10 yr T-bond	1.013	1.053	1.009	1.013	0.997	0.999	1.016	0.972	0.972	0.971	0.960	0.955	1.017	1.044	1.009	1.012	1.001	1.001
Aaabond	1.023	1.040	1.011	1.014	0.999	1.000	1.051	0.984	0.981	0.984	0.977	0.975	1.048	1.029	1.026	1.028	1.010	1.007
Baa bond	0.993	1.008	0.993	0.988	0.971	0.972	1.037	0.985	0.969	0.983	0.974	0.969	1.065	0.999	0.992	0.990	0.988	0.990
fygm6-fygm3	0.966	0.929	0.929	0.929	0.913	0.875	0.966	1.000	0.966	0.966	0.953	0.952	0.961	0.996	0.959	0.961	0.947	0.946
fygt1-fygm3	0.957	0.895	0.878	0.887	0.885	0.878	0.943	0.934	0.894	0.909	0.905	0.895	0.940	0.919	0.892	0.901	0.900	0.892
fygt10-fygm3	1.019	1.019	0.974	0.963	0.963	0.961	1.056	0.974	0.950	0.957	0.959	0.950	1.079	1.010	0.990	0.969	0.974	0.967
FYAAAC-Fygt10	1.015	1.102	1.014	1.008	1.007	1.007	0.997	0.986	0.978	0.981	0.963	0.959	0.993	1.044	0.993	0.993	0.985	0.985
FYBAAC-Fygt10	1.075	1.102	1.016	1.040	1.035	1.017	1.053	1.043	0.995	1.021	1.015	0.995	1.069	1.103	1.039	1.031	1.026	1.031
M1	1.049	1.030	0.989	0.996	0.993	0.989	1.081	1.117	1.003	1.010	1.005	1.004	1.100	1.152	1.019	1.027	1.024	1.019
MZM	1.048	0.964	0.958	0.952	0.952	0.953	1.007	0.938	0.923	0.930	0.928	0.923	1.012	1.010	0.993	1.009	0.984	0.975
M2	1.097	1.052	0.963	0.961	0.964	0.961	1.087	1.043	1.001	1.007	1.003	1.001	1.101	1.061	1.046	1.037	1.036	1.032
MB	0.996	1.044	0.996	0.996	0.986	0.947	0.996	1.079	0.993	0.988	0.988	0.987	1.004	1.051	0.998	0.999	0.992	0.992
Reserves tot	1.068	1.102	0.988	1.015	1.008	0.989	1.048	1.057	0.984	0.984	0.988	0.984	1.033	1.087	0.971	0.968	0.971	0.969
BUSLOANS	1.042	1.029	0.975	0.988	0.990	0.975	1.072	1.015	0.990	0.991	0.993	0.984	1.121	1.051	1.028	1.004	1.007	1.001
Cons credit	1.076	1.064	0.944	0.959	0.958	0.944	1.110	1.096	0.993	0.992	0.994	0.991	1.140	1.113	0.986	0.996	0.990	0.988
Ex rate: avg	0.985	1.079	0.964	0.978	0.977	0.966	0.992	1.028	0.981	0.992	0.979	0.979	0.972	1.038	0.920	0.931	0.926	0.920

Ex rate: Switz	0.983	1.139	0.983	0.983	0.983	0.983	0.985	1.072	0.985	0.985	0.984	0.984	0.953	1.055	0.920	0.942	0.935	0.920
Ex rate: Japan	0.991	1.053	0.989	0.982	0.979	0.980	0.996	0.973	0.955	0.963	0.952	0.952	1.006	1.004	1.000	0.977	0.968	0.971
Ex rate: UK	0.979	1.044	0.941	0.975	0.972	0.942	0.973	0.977	0.973	0.973	0.949	0.931	0.966	0.974	0.929	0.950	0.939	0.929
EX rate: Canada	0.987	1.074	0.987	0.987	0.986	0.965	0.970	1.025	0.970	0.970	0.963	0.951	0.950	0.959	0.946	0.939	0.926	0.926
S&P 500	1.011	1.075	1.011	1.008	1.005	1.005	1.005	1.038	0.979	0.989	0.983	0.980	0.988	0.989	0.939	0.982	0.960	0.941
S&P: indust	1.009	1.081	0.994	1.000	0.999	0.993	1.002	1.036	0.970	0.978	0.973	0.970	0.983	0.980	0.952	0.965	0.952	0.952
S&P div yield	1.043	1.079	1.030	1.035	1.027	1.029	1.050	1.051	0.991	1.016	1.002	0.991	1.044	1.025	0.994	1.007	1.001	0.996
S&P PE ratio	1.023	1.072	1.011	1.015	1.008	1.011	1.041	1.054	0.990	0.984	0.984	0.984	1.051	1.075	1.023	1.017	1.013	1.014
DJIA	1.017	1.064	1.017	1.010	1.006	1.007	1.024	1.032	1.007	1.024	1.003	0.978	1.027	1.004	0.993	0.991	0.984	0.987
Consumer expect	1.023	1.133	1.019	1.023	1.023	1.019	1.038	1.193	0.996	1.024	1.014	0.996	1.035	1.112	0.989	1.004	0.994	0.989