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Impact of US Macroeconomic Surprises on Stock Market Returns in Developed Economies

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Abstract

Macroeconomic conditions are known to affect risks factors and thereby influence asset returns within a given economy. We explore this link in a global setting. Given the dominant role the U.S. economy plays in the global economic environment, U.S. Macro economic shocks are expected to affect asset returns in other countries. The impact should be more pronounced in the developed economies where the U.S. is a large trading and capital-flows partner. Our results shows that residual returns and conditional volatilities in major developed economies are significantly impacted by US macroeconomic surprises. We identify U.S. macro economic shocks that have spillover impact on global asset returns over and above those transmitted through equity market returns. While return levels are significantly influenced by productivity and retail sales surprises, return conditional volatilities are mainly influenced by inflation, personal income, industrial production, leading indicators, and gross domestic product surprises.

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1. Introduction

As an old adage goes, "when the US gets a cold, the rest of the world gets pneumonia", in the globally open economy the US plays a critical role. While the impact of the U.S. economic activity on other economies is well understood, the flow-through of these activities onto capital markets is yet to be fully explained. Our goal is to take a step forward in this direction by examining how the unexpected surprises in some major U.S. macro economic indicators affect stock markets in the rest of developed world.

Conventional wisdom suggests (see for example, Fama and French, 1992 and 1995) that fundamental risk factors -- captured by macroeconomic variables -- significantly impact asset pricing. Supporting evidence (Flannery and Protopapadakis, 2002) indicates that within a given economy, unexpected macroeconomic surprises, affect stock return levels and volatilities. While in a closed isolated economy the external economic shocks should not matter, in an open economy external economic shocks are expected to materially impact asset returns and their volatility. Moreover, the degree of the impact would be positively related to the size of the shock generating economy. The shocks transmitted by U.S. economy -- being the largest in world and dominant trading partner of several of the developed open economies-- should be expected to have significant impact on asset returns in these developed economies.

Until recently, the empirical evidence on the relevance of macroeconomic indicators for asset pricing for the most part remained limited. Early research suggested significance of inflation and monetary policy [see, e.g., Bodie (1976), Fama (1981), Geske and Roll (1983), Pearce and Rolley (1983, 1985)]. One important issue in

identifying the various macroeconomics influences on asset returns is that of the measurement of the macroeconomic state variables. Recently, Flannery and Protopapadakis (2002) show that when measured by their surprises -- difference between announced and expected values -- a number of macroeconomic variables seem to impact both market-wide stock returns and conditional volatilities within a given economy.

Looking at the transmission of macroeconomic shocks onto cross-border asset returns, Wongswan (2006) reports an economically significant relation between developed-economy macroeconomic announcements and the volatility and trading volume of developing-economy equity markets over intraday time horizons.

Our research straddles Flannery and Protopapadakis (2002) and Wongswan (2006) research. While the former looks at the impact of macro shocks on the within-economy financial markets the letter looks at the transmission of macro shock from a developed economy to a developing financial market.

In this paper, using Flannery and Protopapadakis' (2002) methodology, we investigate how unexpected macroeconomics surprises in the U.S. affect the behavior of daily equity market returns in major developed countries: Canada, France, Germany, Hong Kong, Italy, Japan, Singapore, and United Kingdom. The motivation for studying transmission of macro shocks from the U.S. to developed economies is twofold. First, one may argue that the channels of transmission of shock between two developed markets may be different than those between developed and developing markets. In addition, the degree of absorption of shocks is expected to differ between developed and developing markets given the differences in the depth and the breadth of these markets. Our research, thus, looks at an intermediate case between the two extremes, namely

within economy shock transfer (Flannery etc al 2002) and shock transfer between developed and developing markets (Wongswan 2006).

Our results indicate that even after controlling for seasonality, interest rates, default risk, and exchange risk, US macroeconomic surprises significantly impact equity market returns in developed economies. We report that while return levels are significantly influenced by productivity and retail sales surprises, return conditional volatilities are mainly influenced by inflation, personal income, industrial production, leading indicators, and gross domestic product surprises.

2. Model Specification and Estimation

Following Flannery and Protopapadakis (2002), we model each of the Fama-French factors with a GARCH (1,1) model, whereby the return and conditional volatility of each factor is governed by:

$$r_{i,t} = E_{t-1}(r_{i,t}) + \sum_{n=1}^{10} \beta_n^i \left[F_{nt} - E_t(F_{nt})\right] + u_{i,t} \tag{1}$$

$$E_{t-1}(r_{i,t}) = r_0^i + \delta_1^i\, r_{i,t-1} + \delta_{US}^i\, r_{US,t-1} + \delta_{FX}^i\, r_{FX,t-1} + \delta_{TB}^i\, TBILL_{t-1} + \delta_{TS}^i\, TSPRD_{t-1} + \sum_{k=1}^{4} \varphi_k^i\, DW_{k,t} + \varphi_{EYR}^i\, ENDYR_t + \varphi_{JAN}^i\, JAN_t \tag{2}$$

$$u_{i,t} \equiv h_{i,t}\, \varepsilon_{i,t} \quad \text{where } \varepsilon_{i,t} \sim N(0,1) \text{ and i.i.d.} \tag{3}$$

$$h_{i,t}^2 = \left\{ h_0^i + \rho_1^i \frac{h_{i,t-1}^2}{\Gamma_{i,t-1}} + \theta_1^i\, u_{i,t-1}^2 \right\} \times \Gamma_{i,t} \tag{4}$$

$$\Gamma_{i,t} = \eta^{i}_{TB}\, TBILL_{t-1} + \eta^{i}_{TS}\, TSPRD_{t-1} + \sum_{k=1}^{4} \eta^{i}_{k}\ DW_{kt} + \eta_{PRE}\, PRE + \eta_{POST}\, POST + \sum_{n=1}^{10} \zeta^{i}_{n}\ DF_{nt} \tag{5}$$

Where,

$r_{i,t}$ = the ith country MSCI index return minus MSCI US index return on day t.

$E_{t-1}(r_{i,t})$ = the (possibly time-varying) expected ith country's excess return on day t.

F_{nt} = the announced nth macroeconomic indicator on day t.

$E_t(F_{nt})$ = the consensus forecast of nth macroeconomic indicator on day t.

β^{i}_{n} = the sensitivity of ith risk factor to nth macroeconomic shock.

r^{i}_{0} = the zero-risk constant return for ith risk factor

$h_{i,t}$ = the conditional standard deviation of error term $u_{i,t}$

To model the expected risk factor, we use following two sets of known determinants:

1. We include three variables that have been shown to influence daily movements of stock returns and are correlated with Fama-French factors. Following the convention of extant studies (e.g., Fama, 1990; Schwert, 1990; Flannery and Protopapadakis, 2002), we include yield on a country's one-year maturity Government bond (*TBILL*), and the difference between the yields of a country's one-year and 10-year maturity Government bonds (*TSPRD*). We also include the percentage change of exchange rate vis-à-vis US dollar, r_{FX}, to capture the portion of daily return attributable to exchange rate fluctuations. To insure that effects of

US macro announcement surprises are not mixed with a spill-over effect from US market, we also control for lagged US MSCI index daily return, r_{US}.

2. Based on the findings in previous studies of calendar patterns in stock returns and volatility (e.g., Cross, 1973; Gibbons and Hess, 1981; French and Roll, 1986; Flannery and Protopapadakis, 1988; Flannery and Protopapadakis, 2002), we include a series of calendar dummy for time of the year and time of week effects. *ENDYR* is dummy variable indicating the last three days of December, *JAN* is the dummy variable indicating days in the month of January, DW_k are four dummy variables indicating if the day of the week is Monday, Tuesday, Thursday, or Friday.

To model the conditional volatility, we follow Flannery and Protopapadakis (2002). To control for calendar effects, we use four dummy variables, DW_k, indicating if the day of the week is Monday, Tuesday, Thursday, or Friday. Additionally, we use two dummy variables to indicate if the trading day is preceded by a holiday (POST*)* or followed by a holiday (*PRE).* To separate the possible volatility effects of macroeconomic announcements, we use ten dummy variables, DF_{nt}, indicating if there has been an announcement for the *n*th macroeconomic indicator on day *t*. As in Andersen and Bollerslev (1997), Jones, Lamont, Lumsdaine (1998), and Flannery and Protopapadakis (2002), we assume that aforementioned variables have multiplicative effect on conditional variance. In contrast to Flannery and Protopapadakis (2002), we also assume that both *TBILL* and *TSPRD* have multiplicative effects on conditional variance. This enables us to allow the data to reveal the governing variance structure rather than restricting the conditional variance sensitivities to Treasury and corporate yields.

3. Data

Estimating model (1) requires index levels, interest rates, foreign exchange rates, macroeconomic announcements and their respective expectations. Additionally, we need to control for seasonal and calendar effects using a series of dummy variables.

3.1 Index Levels and Other Control Variables

Our country indexes are from MSCI, measured in US dollar, reported for period of August 3, 1999 to August 30, 2007. We use daily close-close returns of these indexes in our model. For the foreign exchange rate, we use Federal Reserve Board of Governors database. For the period of our analysis, Germany's exchange rate is that of Euro. We use daily percentage changes of the exchange rates as a determinant variable. Additionally, we employ risk-free term structure of each country to construct two of our control variables, namely, TBILL and TSPRD. All term structure variables are obtained from central monetary authority of each respective country.

Holidays and weekdays have shown to affect stock returns. We use four dummy variables for weekdays and two dummy variables to denote pre- and post-holidays. These holidays are US holidays so that we can control for flow of information from US to other markets.

3.2 Macroeconomic Announcements and their Expectations

US federal agencies regularly report different macro variables. The release date of these announcements are usually known well in advance. Our goal, however, is to measure the surprise associated with these announcements. To that end, we need measures of expectations for the macro variables.

We gather macroeconomic expectations from two sources, MMS and Bloomberg. On a weekly basis, MMS International (now a part of Standard and Poors) collected money market economists' current forecasts of different economic indicators. MMS reported the median forecast as the measure of current expectation. Following previous studies such as Flannery and Protopapadakis, 2002) and Wongswan (2006), we employ MMS median forecast as a measure of current expectation. We use MMS data for a series of eleven major macro variables for the period of August 1999 to April 2007. We choose these eleven variables based on the previous evidence on their importance in the US stock market.

The macro series, their mnemonic abbreviations, descriptions and sample statistics are reported in Table 1. Most these announcements are made at the market open in the US. This, of course, can cause subtle issues concerning synchronousness of announcements and international daily returns. For instance, Frankfurt's stock exchange trading runs from 09:00 to 17:30 with closing auction from 17:30-17:35.[1] This means that for later four hours of the day, the German market could react to the US announcement. However, what transpires afterwards would not be captured by the same day returns in Germany but possibly by the price movements of the following day. To address this issue, we align our international market returns with first, contemporaneous and, second, last trading day announcements.

Following the tradition of the literature, we define surprise as a normalized surprise: the difference between actual macro indicator and its median forecast divided by its sample standard deviation. The intuition this measure is simple. The normalized

[1] In November 2003, Late DAX was introduced running from 17:45 to 20:00 and in 2006 X-DAX was introduced running from 17:45-22:00 (in line with US trading hours).

surprise assumes that markets care about the percentage surprise compared to the expected levels. Moreover, by normalizing actual surprise, we guarantee a unit variance for all of our announcement surprise variables.

Most macro indicators are reported as growth rates. For other series like housing starts and non-farm payroll, we use meaningful deflators to change these measures into comparable variables. For housing starts, HOUSEST, we use total number of houses (owned and rented) in United States as the deflator. The number houses is reported by the US Census Bureau of the Department of Commerce on a quarterly basis. We use the reported quarterly number of houses for the next three months. Alternatively, one can use linear interpolated numbers of houses. In the trade-off between accuracy and time variation, we side with caution and choose not to use interpolated numbers. We have experimented with total number of houses owned as a deflator and results are qualitatively robust. We use the US total population reported by the US Census Bureau of the Department of Commerce on a monthly basis.

We first test for the unbiasedness of the forecasts. Table 2 reports the mean forecast surprise and the corresponding zero-mean t-statistics. Except for housing starts and non-farm payroll, for all other macro announcements we cannot reject the hypothesis that mean announcement surprise is zero. Since our results in this respect resemble those of Flannery and Protopapadakis (2002), we proceed with our analysis using the aforementioned measures of announcement surprises.

4. Results

Table 4 reports the results of estimating model (1) using normalized surprise with two different measures of international stock returns, the contemporaneous and the one-day ahead returns.

The results provide evidence supporting the basic premise of the paper that various U.S. macro surprises affect both the returns and the conditional volatility of stock returns in major developed economies. These effects vary across countries. Among all the macro indicators, however, industrial production is the only one that affects stock returns in all countries significantly positively post announcement. The coefficients on industrial production surprise are of the order of magnitude of 0.40. Thus, for every percentage positive surprise in the U.S. productivity, the developed economies' stock markets subsequently rise by almost 40 basis points. We find that the stock returns in Asian countries are significantly affected by retail sales. Results also indicate that Canadian stock market returns react negatively to the U.S. CPI positive surprises. Finally, we find that Britain's stock market returns are affected adversely by expected increases in U.S. non-farm payroll.

The impact of U.S. macro surprises on developed economies' stock return volatilities are much more disperse and heterogeneous. There are no macro indicators that affect all countries consistently. Positive productivity surprises lead to greater volatility in Britain, Germany, and Singapore. Unexpected rises in the U.S. inflation, as measured by CPI and PPI surprises, increases return volatilities in Canada, Germany, and Singapore. Positive surprises in the U.S. personal income, leading indicators, gross domestic product, and housing starts affect volatility of other developed markets negatively. However, these

effects vary across countries. While an unexpected rise in leading indicators decreases stock volatilities in Canada, Germany and Hong Kong, a positive surprise in personal income only decreases stock market volatility in Canada and Germany only. Unexpected rises in the U.S. gross domestic products leads to lower volatility only in Canada and Hong Kong.

Our results also indicate that U.S. market returns have significant positive impact on both contemporaneous and one-day ahead country returns. The results provide evidence supporting the premise that the flow of information from U.S. market affects returns in other developed stock markets. Considering both the contemporaneous and one-day ahead impacts, it appears that the U.S. stock market movements influence stock market returns in Germany, Canada, Britain, Hong Kong and Singapore in a decreasing order of magnitude respectively.

Table 4 also shows that when the U.S. market movements are controlled for, the country contemporaneous and one-day ahead returns have little or no autocorrelation. The estimated conditional volatility equations, however, indicate that all country return volatilities have strong moving average properties.

5. Conclusion

We ask the question as to whether the U.S. macro economic surprises affect stock returns in developed economies. We use a GARCH model of stock market returns and their volatilities in five major markets—Britain, Canada, Germany, Hong Kong, and Singapore—to investigate the impacts of announcement surprises of eleven U.S. macro indicators. Our results show that indeed the U.S. macro announcement surprises affect

both the stock markets returns and their volatilities in these major developed economies. While not the focus of our study, our results indicate that factors such as degree of cross listing, magnitude of investors' home bias, and various dimensions of economic and capital market integration can perhaps explain why macro announcement surprises affect various markets differently. We feel that future research can indeed shed light on the reason behind these cross country differences.

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Table 1

This table reports distributions (i.e., mean, median, 1-percentile and 99-percentile) of five major economy's MSCI country indexes percentage daily returns, corresponding daily risk-free term structure and daily changes in foreign exchange rate vis-à-vis US dollar. The data spans the period of August 02, 1999 to August 30, 2007. The MSCI indexes are from MSCI, country risk-free term structures are from their corresponding monetary authority, and foreign exchange rates are from US Federal Reserve Board databases.

Variable	Description	Mean	Median	1%ile	99%ile
UKNGDM	% return on MSCI UK index in US$	0.016	0.036	-3.296	2.797
CANADA	% return on MSCI Canada index in US$	0.054	0.113	-3.236	3.259
GERMNY	% return on MSCI Germany index in US$	0.035	0.073	-4.112	3.987
HNKONG	% return on MSCI Hong Kong index in US$	0.033	0.006	-3.295	3.508
SNGPOR	% return on MSCI Singapore index in US$	0.035	0.067	-3.322	3.256
US	% return on MSCI US index	0.010	0.043	-2.886	3.357
UKGFX	% change UK/US currency rate	0.012	0.019	-1.238	1.231
CANFX	% change Canada/US currency rate	-0.017	-0.008	-1.161	1.197
GERFX	% change Germany/US currency rate	-0.014	0.000	-1.408	1.496
HNKFX	% change Hong Kong/US currency rate	0.000	0.000	-0.110	0.080
SNGFX	% change Singapore/US currency rate	-0.006	-0.006	-0.689	0.657
UKGTBILL	% yield on UK Government 1-year IOU	4.739	4.632	3.226	6.290
UKGTSPRD	% yield diff. on UK Government 10-year & 1-year IOUs	0.040	-0.024	-1.076	1.138
CANTBILL	% yield on Canada Government 1-year IOU	3.752	3.570	2.061	5.990
CANTSPRD	% yield diff. on Canada Government 10-year & 1-year IOUs	1.188	1.289	-0.130	3.240
GERTBILL	% yield on Germany Government 1-year IOU	2.903	2.290	1.940	5.130
GERTSPRD	% yield diff. on Germany Government 10-year & 1-year IOUs	1.431	1.350	0.150	2.260
HNKTBILL	% yield on Hong Kong Government 1-year IOU	3.166	3.520	0.220	6.720
HNKTSPRD	% yield diff. on Hong Kong Government 10-year & 1-year IOUs	1.915	1.690	0.138	4.020
SNGTBILL	% yield on Singapore Government 1-year IOU	1.770	1.900	0.600	3.180
SNGTSPRD	% yield diff. on Singapore Government 10-year & 1-year IOUs	1.663	1.680	0.030	3.590

Table 2

This table reports absolute and relative surprises for eleven major US macroeconomic indicators. Surprise is defined as the difference between actual value and median consensus forecast of the macroeconomic variable. Normalized surprise is defined as the absolute surprise divided by its sample standard deviation. The t-statistics for the sample zero-mean test is also reported.

Variable	Description	Time of Announcements	Number of Announcements	Average % Surprise	Average Normalized Surprise	t-stat
CPI	Consumers' price index monthly percentage change	8:30 a.m. EST	97	-0.005	-0.035	(-0.38)
PPI	Producers' price index monthly percentage change	8:30 a.m. EST	96	0.030	0.082	(0.58)
HSTH	Housing starts divided by all US houses	8:30 a.m. EST	97	0.014	0.150	(1.83)
UEMP	Unemployment monthly percentage change	8:30 a.m. EST	97	-0.031	-0.186	(-2.14)
RSL	Retail sales monthly percentage change	9:15 a.m. EST	97	0.064	0.088	(0.86)
PINC	Personal income monthly percentage	8:30 a.m. EST	81	0.051	0.198	(1.87)
NFRMH	Non-farm payroll divided by US population	8:30 a.m. EST	97	-0.014	-0.241	(-3.19)
LIND	Leading indicators monthly percentage change	8:30 a.m. EST	98	0.007	0.020	(0.34)
IP	Industrial production monthly percentage change	10:00 a.m. EST	97	-0.031	-0.105	(-1.00)
BZIN	Business inventories monthly percentage change	8:30 a.m. EST	97	0.019	0.083	(0.78)
GNP	Real GNP/GDP monthly percentage change	8:30 a.m. EST	32	-0.083	-0.108	(-0.60)

Table 3

This table reports the Pearson's pairwise correlation coefficients for 1) normalized absolute surprises and 2) MSCI indexes and their lagged values.

Panel A. Correlations among Normalized Absolute Surprises

	PPI	HOUSEST	UNEMP	RTSLS	PINC	NFRM	LEAD	INDPR	BUSINV	GNP
CPI	0.0002	-0.0664*	-0.0005	0.0034	0.0004	-0.0006	-0.0039	-0.1192*	0.0422*	-0.0002
PPI		0.0331	0.0007	0.0571*	-0.0006	0.0009	-0.0001	-0.0640*	0.0303	0.0002
HOUSEST			0.0021	-0.0008	-0.0016	0.0027	-0.0003	-0.0618*	-0.0007	0.0006
UNEMP				0.0010	0.0055	0.0486*	0.0004	-0.0012	0.0009	-0.0007
RTSLS					-0.0008	0.0013	-0.0002	-0.0321	0.0304	0.0003
PINC						0.0029	-0.0003	0.0009	-0.0007	0.0006
NFRM							0.0005	-0.0015	0.0012	-0.0009
LEAD								0.0002	-0.0002	0.0001
INDPR									-0.0777*	-0.0003
BUSINV										0.0003

Panel B. Correlations among MSCI country indexes and their lagged values

	CANADA	GERMNY	HNKONG	SNGPOR	Lag UKNGDM	Lag CANADA	Lag GERMNY	Lag HNKONG	Lag SNGPOR	US
UKNGDM	0.4407*	0.7293*	0.2896*	0.3303*	-0.0229	0.1606*	0.0666*	-0.0086	-0.0386*	0.2861*
CANADA		0.4889*	0.1985*	0.2323*	0.0129	0.0571*	0.0423*	0.0193	-0.0346	0.1307*
GERMNY			0.2407*	0.2817*	-0.0154	0.1088*	0.0016	0.0313	-0.0096	0.1733*
HNKONG				0.5930*	0.2330*	0.3174*	0.2679*	0.0629*	0.1018*	0.4089*
SNGPOR					0.1836*	0.2788*	0.2280*	0.0076	0.0361	0.3571*
LagUKNGDM						0.4450*	0.7306*	0.2939*	0.3311*	0.4136*
LagCANADA							0.4944*	0.2043*	0.2332*	0.6172*
LagGERMNY								0.2454*	0.2868*	0.5341*
LagHNKONG									0.5901*	0.1241*
LagSNGPOR										0.1526*

Table 4

This table reports the results of our model (1) using normalized absolute US macro announcement surprises (i.e., the difference between actual macro indicators and their corresponding consensus median divided by its smaple standard deviation) for the period of Aug 1999 – Apr 2007. Each country's corresponding Treasury bill and bond yield are obtained from their respective central monetary authority. The stock returns (in US$) are all based on MSCI's country indexes for Britain, Canada, Germany, Hong Kong, and Singapore.

	Using Post-Announcement Day Country Returns and US Pre-Announcement Day Returns					Using Announcement Day Country Returns and US Pre-Announcement Day Returns				
	UKNGDM	CANADA	GERMNY	HNKONG	SNGPOR	UKNGDM	CANADA	GERMNY	HNKONG	SNGPOR
Intercept	0.214	0.116	0.033	0.113	0.037	0.309	-0.035	-0.029	0.117	-0.051
	(0.86)	(0.64)	(0.14)	(1.05)	(0.25)	(1.27)	(-0.22)	(-0.17)	(0.98)	(-0.33)
r_i	-0.138***	-0.010	-0.134***	0.027	-0.006	-0.016	0.084***	-0.005	0.065***	0.045*
	(-5.72)	(-0.37)	(-5.34)	(1.27)	(-0.26)	(-0.72)	(4.69)	(-0.21)	(2.76)	(1.85)
r_{US}	0.309***	0.143***	0.354***	0.440***	0.376***	0.373***	0.629***	0.631***	0.144***	0.138***
	(14.33)	(5.24)	(11.39)	(19.08)	(15.70)	(18.07)	(33.75)	(23.00)	(5.81)	(5.82)
r_{FX}	0.034	-0.231***	-0.003	-0.451	-0.089	0.021	-0.062	-0.025	-1.634**	-0.170*
	(0.91)	(-5.00)	(-0.06)	(-0.62)	(-1.09)	(0.53)	(-1.52)	(-0.59)	(-2.00)	(-1.98)
TBILL	-0.049	-0.021	-0.039	-0.021	-0.004	-0.074	0.018	-0.034	-0.037*	0.016
	(-0.96)	(-0.55)	(-1.03)	(-1.05)	(-0.08)	(-1.49)	(0.55)	(-1.08)	(-1.75)	(0.33)
TSPRD	-0.053	-0.037	0.021	-0.029	-0.031	-0.072	0.007	0.012	-0.046*	-0.010
	(-0.82)	(-1.02)	(0.28)	(-1.26)	(-0.78)	(-1.17)	(0.22)	(0.19)	(-1.83)	(-0.23)
ENDYR	0.059	-0.045	0.112	0.035	0.293**	0.115	0.141	0.186	0.018	0.279*
	(0.49)	(-0.32)	(0.70)	(0.26)	(2.24)	(0.91)	(1.07)	(1.11)	(0.11)	(1.97)
JAN	-0.037	0.115	0.050	0.055	0.140	-0.062	0.037	0.039	0.143	0.153
	(-0.48)	(1.21)	(0.48)	(0.62)	(1.61)	(-0.80)	(0.46)	(0.41)	(1.45)	(1.65)
MON	0.007	0.003	0.019**	0.002	0.007	0.007	0.001	0.018**	0.013	0.010
	(1.10)	(0.33)	(2.21)	(0.23)	(0.89)	(1.11)	(0.16)	(2.28)	(1.63)	(1.28)
TUE	0.010	0.089	0.005	0.038	0.045	-0.020	-0.027	-0.047	-0.057	0.001
	(0.17)	(1.33)	(0.06)	(0.65)	(0.78)	(-0.40)	(-0.53)	(-0.74)	(-0.91)	(0.01)
THU	0.105**	0.121*	-0.001	0.057	0.075	0.039	-0.029	0.088	0.063	0.011
	(2.06)	(1.95)	(0.00)	(1.07)	(1.33)	(0.73)	(-0.56)	(1.34)	(0.96)	(0.16)

FRI	0.022	0.136***	0.034	0.070	0.049	0.154***	0.124***	0.090	0.072	0.101
	(0.44)	(2.38)	(0.48)	(1.18)	(0.79)	(3.06)	(2.43)	(1.42)	(1.14)	(1.62)
CPI	0.130	0.081	0.133	0.005	0.073	-0.061	-0.027	-0.048	-0.100	-0.060
	(1.54)	(0.58)	(0.98)	(0.04)	(0.61)	(-0.57)	(-0.26)	(-0.38)	(-0.87)	(-0.50)
PPI	0.025	0.055	0.039	-0.037	-0.046	0.038	-0.037	0.087	-0.087	-0.026
	(0.37)	(0.79)	(0.42)	(-0.52)	(-0.62)	(0.71)	(-0.51)	(1.23)	(-1.32)	(-0.39)
HSTRT	0.024	0.110	0.057	-0.085	-0.126	0.004	0.041	0.050	-0.176	-0.149
	(0.24)	(0.94)	(0.41)	(-0.78)	(-1.07)	(0.03)	(0.42)	(0.37)	(-1.57)	(-1.14)
UNEMP	-0.075	0.051	-0.177	-0.162	-0.021	0.212*	0.045	0.135	-0.103	0.169
	(-0.66)	(0.50)	(-1.08)	(-1.27)	(-0.14)	(1.90)	(0.51)	(1.01)	(-0.91)	(1.41)
RTLSLS	-0.073	-0.111	0.063	0.034	0.205*	-0.141	0.001	0.082	0.324***	0.261**
	(-0.79)	(-1.16)	(0.53)	(0.30)	(1.94)	(-1.49)	(0.00)	(0.70)	(2.69)	(2.04)
PINC	0.025	0.007	-0.008	0.088	0.023	0.095	-0.043	0.067	0.199	0.146
	(0.25)	(0.06)	(-0.07)	(0.82)	(0.18)	(0.94)	(-0.47)	(0.53)	(1.62)	(1.18)
NFRM	-0.044	0.221**	0.194	-0.191	-0.033	-0.303***	-0.089	-0.104	0.078	0.087
	(-0.39)	(2.10)	(1.22)	(-1.38)	(-0.21)	(-2.85)	(-0.77)	(-0.77)	(0.61)	(0.69)
LEAD	-0.129	-0.257*	-0.109	0.079	-0.212	-0.039	0.039	0.070	-0.186	0.247
	(-1.03)	(-1.69)	(-0.56)	(0.53)	(-1.41)	(-0.27)	(0.24)	(0.38)	(-1.08)	(1.31)
INDPR	0.244***	0.184*	0.162	0.172*	0.281***	-0.082	0.026	-0.118	-0.143	-0.141
	(3.12)	(1.74)	(1.40)	(1.79)	(2.46)	(-0.91)	(0.28)	(-1.08)	(-1.42)	(-1.46)
BUSINV	0.007	0.094	0.125	-0.026	-0.119	0.030	0.031	-0.007	0.018	-0.030
	(0.08)	(0.98)	(1.17)	(-0.24)	(-1.26)	(0.34)	(0.36)	(-0.06)	(0.16)	(-0.27)
GNP	0.066	0.070	-0.080	0.173	0.298*	-0.036	-0.328**	-0.167	-0.297	-0.149
	(0.41)	(0.48)	(-0.41)	(1.17)	(1.77)	(-0.27)	(-2.34)	(-0.87)	(-1.63)	(-0.89)
h_0	0.029*	0.036***	0.032***	0.021***	0.039***	0.209	0.125	0.066	-0.131	0.073
	(1.67)	(3.54)	(3.70)	(4.76)	(3.82)	(1.32)	(0.79)	(0.39)	(-0.75)	(0.43)
ρ_1	0.077	0.024***	0.047***	0.026***	0.079***	-0.210	0.570***	-0.043	-0.181	-0.203
	(1.66)	(2.91)	(3.31)	(3.48)	(4.33)	(-1.24)	(3.17)	(-0.24)	(-1.06)	(-1.20)
θ_1	0.795***	0.833***	0.847***	0.884***	0.855***	0.029	-0.234	0.212	-0.115	0.385**
	(28.67)	(27.87)	(40.22)	(53.77)	(50.71)	(0.18)	(-1.41)	(1.28)	(-0.67)	(2.32)
TBILL	0.173	0.307***	0.239***	0.182***	0.090	2.104*	-1.730*	1.766**	-0.707	-0.497
	(1.49)	(5.78)	(4.46)	(6.03)	(1.52)	(1.89)	(-1.81)	(2.21)	(-0.94)	(-0.75)
TSPRD	0.255*	0.153***	0.175*	0.278***	0.152***	0.156	-0.307*	-0.018	0.067	0.079

	(1.68)	(2.78)	(1.74)	(6.17)	(2.87)	(0.97)	(-1.87)	(-0.10)	(0.41)	(0.47)
MON	-0.017*	-0.022**	-0.021**	-0.020**	-0.024***	0.282*	-0.205	0.326*	0.002	0.049
	(-1.70)	(-2.21)	(-2.10)	(-2.08)	(-2.44)	(1.71)	(-1.24)	(1.96)	(0.01)	(0.29)
TUE	0.015	0.180**	0.158*	-0.015	-0.019	-2.058*	1.897**	-1.932***	0.333	0.357
	(0.16)	(2.01)	(1.71)	(-0.16)	(-0.20)	(-1.85)	(1.99)	(-2.43)	(0.45)	(0.54)
THU	-0.023	-0.008	0.063	-0.281***	-0.095	-0.166	0.411***	-0.035	-0.087	0.179
	(-0.25)	(-0.09)	(0.69)	(-3.10)	(-1.05)	(-1.13)	(2.71)	(-0.24)	(-0.58)	(1.20)
FRI	0.006	-0.043	0.087	0.105	0.248**	0.318*	0.319*	0.213	0.183	0.222
	(0.05)	(-0.41)	(0.81)	(0.99)	(2.34)	(1.83)	(1.77)	(1.21)	(1.01)	(1.30)
PRE	-0.981***	-1.104***	-0.575***	-0.739***	-0.812***	0.068	-0.004	-0.040	0.054	0.225
	(-4.82)	(-5.45)	(-2.87)	(-3.68)	(-4.06)	(0.41)	(-0.02)	(-0.24)	(0.33)	(1.37)
POST	0.299	0.175	0.072	0.289	-0.174	-0.043	-0.137	0.031	-0.186	-0.066
	(1.55)	(0.90)	(0.37)	(1.48)	(-0.90)	(-0.16)	(-0.51)	(0.12)	(-0.71)	(-0.25)
CPI	-0.165	0.335*	0.319*	0.318*	0.235	-0.032***	-0.021**	-0.020**	-0.020**	-0.027***
	(-0.96)	(1.82)	(1.80)	(1.78)	(1.24)	(-3.19)	(-2.14)	(-2.02)	(-2.04)	(-2.73)
PPI	0.386**	-0.031	0.383**	0.146	0.149	-0.111	-0.062	-0.211**	-0.267***	-0.362***
	(2.34)	(-0.19)	(2.26)	(0.87)	(0.92)	(-1.22)	(-0.69)	(-2.32)	(-2.86)	(-3.97)
HSTRT	-0.020	-0.182	0.089	0.029	0.065	0.082	-0.129	-0.010	-0.065	-0.213**
	(-0.12)	(-1.08)	(0.52)	(0.17)	(0.37)	(0.90)	(-1.44)	(-0.11)	(-0.73)	(-2.33)
UNEMP	-0.469	0.358	-0.096	0.569	-1.093	-0.174	-0.241**	-0.203*	-0.175	-0.212**
	(-0.72)	(0.44)	(-0.15)	(1.16)	(-1.48)	(-1.66)	(-2.25)	(-1.93)	(-1.64)	(-2.01)
RTLSLS	-0.039	-0.027	-0.230	-0.110	0.084	0.091	0.310	-0.094	-0.229	-0.422**
	(-0.24)	(-0.15)	(-1.39)	(-0.64)	(0.50)	(0.47)	(1.44)	(-0.47)	(-1.16)	(-2.17)
PINC	-0.215	-0.261	-0.374**	0.143	0.237	0.087	-0.399**	-0.029	0.092	-0.030
	(-1.29)	(-1.57)	(-2.26)	(0.86)	(1.42)	(0.44)	(-2.06)	(-0.15)	(0.46)	(-0.15)
NFRM	0.222	-0.877	0.069	-0.633	1.234*	0.163*	0.211***	0.218***	0.245***	0.112*
	(0.34)	(-1.09)	(0.11)	(-1.30)	(1.67)	(1.80)	(4.06)	(4.50)	(8.21)	(1.86)
LEAD	-0.490***	-0.393***	-0.143	-0.032	-0.246	0.237*	0.077	0.177**	0.346***	0.137***
	(-3.29)	(-2.60)	(-0.91)	(-0.21)	(-1.65)	(1.94)	(1.33)	(2.00)	(8.11)	(2.52)
INDPR	-0.036	0.134	0.071	0.096	0.502***	0.027**	0.033***	0.045***	0.035***	0.051***
	(-0.20)	(0.73)	(0.39)	(0.52)	(2.74)	(2.20)	(2.81)	(3.55)	(4.33)	(3.68)
BUSINV	-0.082	-0.112	-0.182	0.185	-0.259	0.067**	0.036***	0.053***	0.021***	0.105***
	(-0.50)	(-0.64)	(-1.08)	(1.08)	(-1.52)	(2.20)	(2.65)	(3.22)	(3.50)	(4.02)

GNP	0.163	-0.605**	-0.243	-0.382	-0.114	0.835***	0.848***	0.832***	0.846***	0.847***
	(0.63)	(-2.31)	(-0.92)	(-1.46)	(-0.44)	(40.28)	(24.56)	(34.06)	(31.71)	(47.41)
Adj R2	0.086	0.014	0.019	0.145	0.114	0.156	0.374	0.270	0.012	0.007
F-statistic	14.20	2.06	2.87	25.63	19.44	27.92	90.07	55.71	1.78	1.11

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