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On the Link between Value of the Dollar and Housing Production in the U.S.: Evidence from State Level Data

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Currency depreciation is said to affect domestic output in either direction, depending on the relative strength of its impact on next exports and the cost of imported inputs. Since increased net exports and eventual economic growth affect the demand for housing and increased cost of imported materials that are used in housing construction affects the supply of housing, we assume that currency depreciation could have an impact on housing output. We test our assumption by using time-series data from each of the states in the U.S. and show that when a linear model is estimated, dollar depreciation has short-run effects in 41 states and long-run effects in only three states. However, when dollar depreciation is separated from appreciation and a nonlinear model is estimated, we find short-run asymmetric effects in all of the states and long-run asymmetric effects in 32 states. Additional analysis reveals that while dollar depreciation increases housing output in 10 states, dollar appreciation hurts the output in 11 states, thus supporting the expansionary depreciation of the dollar in the U.S. housing market.

Keywords

House Permits, Exchange Rate, Asymmetry Analysis, The United States.

1. Introduction

A distinct area in international economics raises the following question: Are devaluations under fixed exchange rates or depreciations under floating rates expansionary or contractionary? It is not difficult to infer that both are possibilities. By simply referring to the aggregate demand and aggregate supply model, we gather that depreciation stimulates aggregate demand by increasing its net export components. On the other hand, since depreciation raises the cost of imported inputs, it reduces the aggregate supply. Depending on which effect is stronger, depreciation could be expansionary or contractionary in terms of its effect on domestic production. Empirical studies that have been reviewed by Bahmani-Oskooee and Miteza (2003) find mixed results. Even recent studies such as Bahmani-Oskooee and Miteza (2006), Kim and Ying (2007), Narayan and Narayan (2007), Bahmani-Oskooee and Kutan (2008), Bahmani-Oskooee and Kandil (2009), Kappler et al. (2013), Eltalla (2013), Bahmani-Oskooee and Gelan (2013), and Manalo et al. (2015) find mixed results too.

Another group of studies assess the impact of depreciation on the different components of aggregate demand or domestic output due to the presumption that the above studies may suffer from aggregation bias. For example, while Campa and Goldberg (1995, 1999), Nucci and Pozzolo (2001), Forbes (2002), Harchaoui et al. (2005), Landon and Smith (2009), Bahmani-Oskooee and Hajilee (2010), and Bahmani-Oskooee and Maki-Nayeri (2019) assess the effects of depreciation on domestic investment, Bahmani-Oskooee (1985), Moffet (1989), Rose and Yellein (1989), Halicioglu (2007, 2008), Durmaz (2015), Bahmani-Oskooee and Fariditavana (2016), Nusair (2017), and Arize et al. (2017) consider the response of net exports to changes in the exchange rate.[1]

Since housing constitutes a major component of domestic investment, recently, Bahmani-Oskooee and Ghodsi (2019) take an important step in trying to link the effective exchange rate of the dollar to housing market in the U.S. by using state level data. Since almost all studies try to identify the determinants of house prices, they assess the effects of dollar depreciation on house prices in each state of the U.S.[2] In this paper, we add to the literature by investigating the other side of the coin, i.e., the link between the value of the dollar and housing volume measured by the number of permits issues in each state. To that end, we introduce our model in Section 2 which also includes our estimation methods.

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[1] Bahmani-Oskooee and Ratha (2004) and Bahmani-Oskooee and Hegerty (2010) are the latest review articles on the link between net exports and the exchange rate.

[2] Some example of studies that try to identify determinants of house prices are Malpezzi (1999), Meen (2002), Apergis (2003), Gallin (2006), Chen et al. (2007), McQuinn and O'Reilly (2008), Kim and Bhattacharya (2009), Mikhed and Zemcik (2009), Zhou (2010), Holly et al. (2010), Madsen (2012), Ding et al. (2014), Apergis et al. (2015), Batayneh and Al-Malki (2015), and Bahmani-Oskooee and Ghodsi (2017).

The results are then reported in Section 3 followed by a summary in Section 4. Definition of the variables and sources of the data are provided in the Appendix.

2. Model and Methods

In this section, we discuss the modification of the model in Bahmani-Oskooee and Ghodsi, (2019) in which we replace house price with housing permits issued. Thus, we begin with the following log-linear specification:

$$LnHP_t = a + bLnI_t + cLnM_t + dLnEX_t + \varepsilon_t \quad (1)$$

where HP denotes house permits issued in each state in a given quarter since our data are quarterly. It is assumed in Equation (1) that household income, *I*, and mortgage rates, *M*, and the real effective exchange rate of the dollar, *EX*, are the main determinants of housing volume. Indeed, Case and Shiller (2003) emphasize only household income and mortgage rate as the two fundamentals that drive the housing market.[3] We are adding the effective exchange rate of the dollar to determine if movement in the value of the dollar has any effect on housing volume. Note that once Equation (1) is estimated, we expect an estimate of b to be positive since an increase in household income increases the demand for housing which encourages builders to construct more. On the other hand, since higher mortgage rates discourage demand, we expect that builders would not build more, hence a negative estimate for c. Finally, an estimate of d could be negative or positive, depending on whether dollar depreciation is expansionary or contractionary. A depreciation that increases net exports could lead to economic expansion via the multiplier effect and eventually to an increase in demand for housing and housing production. On the other hand, dollar depreciation raises the cost of imported materials that are used by builders in the housing market. Increased costs could hurt the housing volume.

The estimates that we discuss above are all long-run estimates. However, to infer the short-run effects of exogenous variables, a common practice is to turn Equation (1) into an error-correction model which includes a short-run dynamic adjustment as outlined by Equation (2):

$$\begin{aligned} \Delta LnHP_t = \alpha + \sum_{k=1}^{n1} \beta_k \Delta LnHP_{t-k} + \sum_{k=0}^{n2} \delta_k \Delta LnI_{t-k} \\ + \sum_{k=0}^{n3} \pi_k \Delta LnM_{t-k} + \sum_{k=0}^{n4} \theta_k \Delta LnEX_{t-k} + \lambda_0 LnHP_{t-1} \\ + \lambda_1 LnI_{t-1} + \lambda_2 LnM_{t-1} + \lambda_3 LnEX_{t-1} + \mu_t \end{aligned} \quad (2)$$

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[3] Although changes in the exchange rate affects the demand and supply of housing, omission of other variables that contribute to production cost such as wages may bias the model towards overstating the influence of the included variables.

The above error-correction specification in Equation (2) is based on Pesaran et al. (2001) and has a few advantages over other methods. First, since short-run adjustment dynamics are included in estimating long-run effects, the method allows feedback effects among variables to be realized which reduces the severity of multicollinearity or endogeniety issues.[4] Second, short-run and long-run effects are estimated in one step. Indeed, short-run effects are judged by the estimates of coefficients attached to first-differenced variables and long-run effects are inferred by the estimates of $\lambda_1 - \lambda_3$ normalized on λ_0. However, for the long-run estimates to be meaningful, an F test is recommended to establish joint significance of the lagged level variables as a sign of cointegration. New critical values are tabulated for the F test which consider the integrating properties of the variables, which is the third advantage of this approach. Indeed, variables could be combination of I(0) and I(1).

Bahmani-Oskooee and Ghodsi (2019) also argue and show that the response of house prices to changes in the exchange rate could be asymmetric. If house prices respond to exchange rate changes in an asymmetric manner, we would expect it to be even more true of the response of house volume to exchange rate changes as well as changes in other determinants. For a given change in any of the determinants, the rate at which builders add to housing volume is different than the rate at which they could reduce it. In testing the asymmetric effects of the exogenous variables, we follow Shin et al. (2014) and decompose each exogenous variable into two components; one that reflects an increase in our variable of concern and one that reflects declines. Focusing on the real effective exchange rate of the dollar, EX_t, we first form $\Delta LnEX_t$ which includes positive changes when the dollar appreciates and negative changes when it depreciates. Then the concept of partial sum is used to generate the two variables as follows:

$$EX_t^+ = \sum_{j=1}^{t} \max\left(\Delta LnEX_j, 0\right)$$
$$EX_t^- = \sum_{j=1}^{t} \min(\Delta LnEX, 0) \quad (3)$$

where EX_t^+ which is the partial sum of the positive changes and reflects only dollar appreciation, and EX_t^- which is the partial sum of negative changes and reflects only dollar depreciation. Using the same approach ,we also generate I_t^+, which reflects only increases in household income and I_t^- , which reflects only the declines. Similarly, we construct M_t^+ and M_t^- which reflect the increases and declines in mortgage rates respectively. We then move back to Equations (1) and (2) and replace each variable with its two partial sums to arrive at:

[4] See Pesaran et al. (2001, p. 299).

$$\begin{aligned}\Delta LnHP_t &= \alpha + \sum_{k=1}^{n1} \beta_k \Delta LnHP_{t-k} + \sum_{k=0}^{n2} \delta_k^+ \Delta I_{t-k}^+ \\ &+ \sum_{k=0}^{n3} \delta_k^- \Delta I_{t-k}^- + \sum_{k=0}^{n4} \pi_k^+ \Delta M_{t-k}^+ + \sum_{k=0}^{n5} \pi_k^- \Delta M_{t-k}^- \\ &+ \sum_{k=0}^{n6} \theta_k^+ \Delta EX_{t-k}^+ + \sum_{k=0}^{n7} \theta_k^- \Delta EX_{t-k}^- + \lambda_0 LnHP_{t-1} + \lambda_1^+ I_{t-1}^+ \\ &+ \lambda_1^- I_{t-1}^- + \lambda_2^+ M_{t-1}^+ + \lambda_2^- M_{t-1}^- + \lambda_3^+ EX_{t-1}^+ + \lambda_3^- EX_{t-1}^- + \mu_t\end{aligned} \quad (4)$$

Due to the nature of constructing partial sum variables, Shin et al. (2014) call models like (4), a nonlinear autoregressive distributed lag (ARDL) model, whereas models like (2) are labeled as a linear ARDL model. They then demonstrate that the same estimation and the tests applied to the linear model are equally applicable to the nonlinear model. They even argue that in testing for asymmetric cointegration in (4), the critical values of the *F* test should stay at the same high level when we move from (2) to (4).[5]

Like the linear ARDL model, short-run asymmetric effects are embodied in the estimates of the coefficients attached to first-differenced variables, and long-run asymmetric effects are inferred by the estimates of the normalized coefficients attached to the lagged level of the partial sum variables. However, to establish strong evidence of asymmetric effects, we must test a few hypotheses. Concentrating on the asymmetric effects of the exchange rate changes, if ΔEX^+ takes a different lag order than ΔEX_t^-, a short-run adjustment asymmetry will be supported and if estimates attached to ΔEX_t^+ are different than those attached to ΔEX_t^-, short-run asymmetric effects of the exchange rate changes will be justified. However, stronger short-run asymmetric effects are established if the Wald test rejects the null of $\sum \theta_k^+ = \sum \theta_k^-$. Finally, if the Wald test rejects the null of $-\lambda_3^+/\lambda_0 = -\lambda_3^-/\lambda_0$, long-run asymmetric effects of the exchange rate changes will be established.

3. Results

As shown in the Appendix, we use quarterly data over the period of 1994I-2016III to estimate the linear ARDL model (2) first and the nonlinear ARDL model next. Both models are estimated for each of the 50 states and the District of Columbia (DC) in the U.S.[6] In estimating both models, we imposed eight lags on all first-differenced variables and used Akaike's information criterion (AIC) to select optimum lags. Furthermore, for ease of explanation, we

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[5] See Shin et al. (2014, p. 291).

[6] Note that no data were available for Puerto Rico. Furthermore, the main reason to begin with 1994 is due to the availability of the real effective exchange rate from that date.

collected all required critical values in the notes to each table and used them to indicate the significant estimates or diagnostics, in which * is used to indicate significance at the 5% level, and ** is used to indicate significance at the 10% level. We first review the estimates of the linear model for each state that is reported in Table 1.

Table 1 Estimation of Linear ARDL Model for Each State

	Alaska	Alabama	Arkansas	Arizona
Panel A: Short-Run				
ΔLnI_t	-0.48(0.19)	-0.53(0.34)	-0.08(0.04)	1.99(1.08)
ΔLnI_{t-1}	-7.1(2.14)*	-4.92(2.64)*	-0.79(0.37)	-0.55(0.22)
ΔLnI_{t-2}	5.47(2.15)*	7.87(4.21)*	4.78(2.32)*	7.25(3.06)*
ΔLnI_{t-3}		-0.34(0.17)	2.29(1.08)	0.88(0.35)
ΔLnI_{t-4}		-2.55(1.62)	-2.6(1.25)	-5.73(2.49)*
ΔLnI_{t-5}			-5.39(2.51)*	2.59(1.4)
ΔLnI_{t-6}			7.82(3.66)*	
ΔLnI_{t-7}			-3.94(2.13)*	
ΔLnM_t	0.22(0.36)	0.02(0.09)	0.58(1.42)	-0.72(3.74)*
ΔLnM_{t-1}		-0.57(1.51)		
ΔLnM_{t-2}		-0.26(0.7)		
ΔLnM_{t-3}		0.73(2.83)*		
ΔLnM_{t-4}				
ΔLnM_{t-5}				
ΔLnM_{t-6}				
ΔLnM_{t-7}				
$\Delta LnEX_t$	-0.09(0.95)	-0.07(0.76)	-0.25(1.84)**	0.23(1.8)**
$\Delta LnEX_{t-1}$		0.07(0.47)	0.16(0.7)	0.18(0.92)
$\Delta LnEX_{t-2}$		0.27(1.77)**	-0.06(0.27)	-0.02(0.11)
$\Delta LnEX_{t-3}$		-0.32(2)*	0.21(1.42)	0.27(1.26)
$\Delta LnEX_{t-4}$		0.3(1.78)**		0.01(0.06)
$\Delta LnEX_{t-5}$		-0.49(2.64)*		-0.51(2.14)*
$\Delta LnEX_{t-6}$		0.15(0.78)		0.33(2.23)*
$\Delta LnEX_{t-7}$		0.21(1.77)**		
Panel B: Long-Run				
Constant	218.73(1.52)	-1044.2(0.23)	744.21(0.14)	489.67(0.41)
LnI_t	-10.32(1.49)	43.72(0.23)	-24.63(0.13)	-17.97(0.39)
LnM_t	-6.71(1.37)	36.11(0.23)	-40.99(0.14)	-22.73(0.42)
$LnEX_t$	-0.61(0.89)	10.74(0.21)	-14.75(0.14)	-3.56(0.53)
Panel C: Diagnostic				
F	3.33	5.4*	4.85*	5.89*
ECM_{t-1}	-0.15(1.8)	0.01(0.22)	-0.01(0.14)	-0.03(0.45)
LM	2.04	0.11	0.63	0.05
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.82	0.49	0.57	0.48

(Continued…)

(Table 1 Continued)

	California	Colorado	Connecticut	Delaware
Panel A: Short-Run				
ΔLnI_{t}	0.25(0.19)	-0.12(0.07)	1.28(0.71)	-1.27(1.36)
ΔLnI_{t-1}	-0.43(0.26)	-2.49(1.02)		
ΔLnI_{t-2}	6.14(3.69)*	1.87(0.82)		
ΔLnI_{t-3}	-3.65(2.65)*	2.66(1.62)		
ΔLnI_{t-4}				
ΔLnI_{t-5}				
ΔLnI_{t-6}				
ΔLnI_{t-7}				
$\Delta \text{Ln}M_{t}$	0.33(0.95)	0(0.01)	0.21(0.44)	0.29(0.99)
$\Delta \text{Ln}M_{t-1}$	-0.26(0.53)		0.58(1.34)	0.46(1.1)
$\Delta \text{Ln}M_{t-2}$	-0.2(0.45)			-0.52(1.8)**
$\Delta \text{Ln}M_{t-3}$	-0.25(0.56)			
$\Delta \text{Ln}M_{t-4}$	-0.46(1.07)			
$\Delta \text{Ln}M_{t-5}$	1.18(2.69)*			
$\Delta \text{Ln}M_{t-6}$	-0.45(1.41)			
$\Delta \text{Ln}M_{t-7}$				
$\Delta \text{Ln}EX_{t}$	-0.18(1.46)	0.17(1.26)	-0.02(0.27)	-0.18(1.7)**
$\Delta \text{Ln}EX_{t-1}$	-0.2(1.17)	0(0.02)		0.46(2.71)*
$\Delta \text{Ln}EX_{t-2}$	0.18(1.02)	0(0.01)		-0.2(1.06)
$\Delta \text{Ln}EX_{t-3}$	0.23(1.27)	0.29(1.9)**		0.04(0.21)
$\Delta \text{Ln}EX_{t-4}$	0.22(1.13)			0.14(0.67)
$\Delta \text{Ln}EX_{t-5}$	-0.43(2.01)*			-0.46(2.04)*
$\Delta \text{Ln}EX_{t-6}$	0.02(0.09)			0.26(1.22)
$\Delta \text{Ln}EX_{t-7}$	0.24(1.66)**			0.18(1.36)
Panel B: Long-Run				
Constant	374.24(0.46)	300.29(0.59)	1051.36(0.2)	32.48(0.81)
LnI_{t}	-10.07(0.4)	-9.79(0.54)	-48.32(0.2)	0.11(0.07)
LnM_{t}	-21.2(0.52)	-16.17(0.62)	-24.89(0.19)	-3.45(1.45)
LnEX_{t}	-8.3(0.62)	-3.95(0.79)	-0.85(0.21)	-2.05(1.94)**
Panel C: Diagnostic				
F	2.23	7.5*	2.83	3.37
ECM_{t-1}	-0.03(0.59)	-0.05(0.69)	-0.02(0.21)	-0.11(1.88)
LM	0.05	0.3	0.89	2.31
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.56	0.42	0.62	0.53

(Continued…)

(Table 1 Continued)

	Florida	Georgia	Hawaii	Iowa
Panel A: Short-Run				
$\Delta \mathrm{LnI}_{t}$	-1.57(1.61)	-0.4(0.32)	-0.42(0.11)	-1.53(2.97)*
$\Delta \mathrm{LnI}_{t-1}$	-1.18(0.85)	0.32(0.2)	6.53(1.13)	
$\Delta \mathrm{LnI}_{t-2}$	2.75(2.67)*	4.36(2.72)*	-8.51(1.48)	
$\Delta \mathrm{LnI}_{t-3}$		-2.09(1.6)	7.6(1.36)	
$\Delta \mathrm{LnI}_{t-4}$			-2.99(0.52)	
$\Delta \mathrm{LnI}_{t-5}$			10.62(2.53)*	
$\Delta \mathrm{LnI}_{t-6}$				
$\Delta \mathrm{LnI}_{t-7}$				
$\Delta \mathrm{Ln}M_{t}$	-0.43(1.69)**	0.15(0.53)	-0.58(0.8)	0(0.01)
$\Delta \mathrm{Ln}M_{t-1}$		0.03(0.08)	1.34(1.99)*	0.89(2.25)*
$\Delta \mathrm{Ln}M_{t-2}$		-0.14(0.39)		
$\Delta \mathrm{Ln}M_{t-3}$		-0.56(1.54)		
$\Delta \mathrm{Ln}M_{t-4}$		0.55(2.17)*		
$\Delta \mathrm{Ln}M_{t-5}$				
$\Delta \mathrm{Ln}M_{t-6}$				
$\Delta \mathrm{Ln}M_{t-7}$				
$\Delta \mathrm{Ln}EX_{t}$	-0.02(0.27)	0.15(1.61)	0.08(0.32)	-0.26(2.01)*
$\Delta \mathrm{Ln}EX_{t-1}$	-0.16(1.18)	-0.39(2.47)*	-0.61(1.55)	0.27(1.27)
$\Delta \mathrm{Ln}EX_{t-2}$	0.37(2.79)*	0.32(1.97)*	0.63(2.28)*	-0.09(0.43)
$\Delta \mathrm{Ln}EX_{t-3}$	0.17(1.24)	0.23(1.39)		0.31(2.09)*
$\Delta \mathrm{Ln}EX_{t-4}$	-0.25(1.67)**	-0.41(2.47)*		
$\Delta \mathrm{Ln}EX_{t-5}$	0.04(0.28)	0.3(1.8)**		
$\Delta \mathrm{Ln}EX_{t-6}$	-0.18(1.11)	-0.49(2.89)*		
$\Delta \mathrm{Ln}EX_{t-7}$	0.32(3.2)*	0.44(4.09)*		
Panel B: Long-Run				
Constant	2413.58(0.76)	112.41(0.88)	141.19(1.35)	814.54(0.45)
LnI_{t}	-82.81(0.18)	-3.06(0.63)	-6.83(1.29)	-34.35(0.44)
LnM_{t}	-110.61(0.19)	-6.02(1.07)	-3.07(1.18)	-28.06(0.45)
LnEX_{t}	-28.36(0.19)	-2.79(1.72)**	-0.25(0.48)	-6.48(0.48)
Panel C:Diagnostic				
F	8.5*	3.88**	6.11*	11.48*
ECM_{t-1}	-0.01(0.19)	-0.06(1.64)	-0.26(2.07)	-0.04(0.47)
LM	2.63	7.04*	1.16	0.68
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.51	0.64	0.44	0.85

(Continued…)

(Table 1 Continued)

	Idaho	Illinois	Indiana	Kansas
Panel A: Short-Run				
ΔLnI_{t}	-0.75(1.82)**	-0.42(1.01)	-0.86(2.24)*	-1.62(3.13)*
ΔLnI_{t-1}				
ΔLnI_{t-2}				
ΔLnI_{t-3}				
ΔLnI_{t-4}				
ΔLnI_{t-5}				
ΔLnI_{t-6}				
ΔLnI_{t-7}				
$\Delta\text{Ln}M_{t}$	-0.54(1.19)	0.56(1.56)	0.19(0.55)	-0.37(0.7)
$\Delta\text{Ln}M_{t-1}$	-0.08(0.13)			1.55(2.17)*
$\Delta\text{Ln}M_{t-2}$	-0.84(1.43)			0.27(0.37)
$\Delta\text{Ln}M_{t-3}$	1.29(2.14)*			-0.52(0.74)
$\Delta\text{Ln}M_{t-4}$	-0.87(1.4)			-0.87(1.26)
$\Delta\text{Ln}M_{t-5}$	0.68(1.71)**			0(0)
$\Delta\text{Ln}M_{t-6}$				0.78(1.71)**
$\Delta\text{Ln}M_{t-7}$				
$\Delta\text{Ln}EX_{t}$	-0.02(0.15)	-0.12(0.95)	-0.11(1.03)	-0.06(0.82)
$\Delta\text{Ln}EX_{t-1}$	0.05(0.2)	0.12(0.58)	-0.04(0.22)	
$\Delta\text{Ln}EX_{t-2}$	0.34(1.42)	0.01(0.03)	0.3(2.33)*	
$\Delta\text{Ln}EX_{t-3}$	0.02(0.08)	0.4(1.92)**		
$\Delta\text{Ln}EX_{t-4}$	0(0.01)	-0.31(1.39)		
$\Delta\text{Ln}EX_{t-5}$	-0.3(1.09)	0.2(0.83)		
$\Delta\text{Ln}EX_{t-6}$	-0.14(0.48)	-0.39(1.64)		
$\Delta\text{Ln}EX_{t-7}$	0.53(3.06)*	0.35(2.34)*		
Panel B: Long-Run				
Constant	-398.36(0.7)	166.69(0.78)	337.29(0.8)	-577.11(0.45)
LnI_{t}	14(0.81)	-5.86(0.65)	-13.89(0.77)	26.48(0.45)
LnM_{t}	23.47(0.73)	-5.7(0.9)	-9.83(0.79)	17.71(0.48)
LnEX_{t}	6.37(0.63)	-3.1(1.35)	-3.7(1)	0.95(0.34)
Panel C: Diagnostic				
F	5.65*	3.95**	7.19*	4.79*
ECM_{t-1}	0.05(0.64)	-0.07(1.31)	-0.06(0.92)	0.06(0.45)
LM	2.19	2.37	0.92	0.74
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.7	0.71	0.76	0.48

(Continued…)

(Table 1 Continued)

	Kentucky	Louisiana	Massachusetts	Maryland
Panel A: Short-Run				
ΔLnI_t	-3.01(1.84)**	1.11(0.81)	-0.97(2.33)*	-3.38(1.57)
ΔLnI_{t-1}	-1.94(0.91)			
ΔLnI_{t-2}	4.12(2.5)*			
ΔLnI_{t-3}				
ΔLnI_{t-4}				
ΔLnI_{t-5}				
ΔLnI_{t-6}				
ΔLnI_{t-7}				
$\Delta \text{Ln}M_t$	0.15(0.45)	0.1(0.3)	0.14(0.29)	-0.42(2.1)*
$\Delta \text{Ln}M_{t-1}$	0.49(1.59)		1.1(2.28)*	
$\Delta \text{Ln}M_{t-2}$				
$\Delta \text{Ln}M_{t-3}$				
$\Delta \text{Ln}M_{t-4}$				
$\Delta \text{Ln}M_{t-5}$				
$\Delta \text{Ln}M_{t-6}$				
$\Delta \text{Ln}M_{t-7}$				
$\Delta \text{Ln}EX_t$	-0.08(0.7)	-0.03(0.57)	0.18(1.08)	0.13(0.9)
$\Delta \text{Ln}EX_{t-1}$	-0.16(0.96)		-0.61(2.35)*	-0.29(1.4)
$\Delta \text{Ln}EX_{t-2}$	0.32(2.73)*		0.32(1.11)	0.12(0.55)
$\Delta \text{Ln}EX_{t-3}$			0.06(0.21)	0.34(1.5)
$\Delta \text{Ln}EX_{t-4}$			-0.18(0.64)	-0.13(0.51)
$\Delta \text{Ln}EX_{t-5}$			0.4(2.12)*	0.03(0.12)
$\Delta \text{Ln}EX_{t-6}$				-0.45(1.72)**
$\Delta \text{Ln}EX_{t-7}$				0.44(2.77)*
Panel B: Long-Run				
Constant	-1059.4(0.31)	-610.46(0.43)	-925.57(0.28)	150(0.64)
LnI_t	44.97(0.31)	28.47(0.44)	33.74(0.28)	-5.41(0.57)
LnM_t	37.08(0.31)	16(0.44)	41.98(0.28)	-5.65(0.64)
LnEX_t	8.29(0.28)	0.65(0.33)	10.11(0.26)	-1.98(0.91)
Panel C: Diagnostic				
F	8.55*	5.07*	6.65*	2.77
ECM_{t-1}	0.02(0.29)	0.04(0.41)	0.03(0.27)	-0.07(0.8)
LM	0.34	0.16	1.38	14.74*
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.61	0.5	0.53	0.42

(Continued…)

(Table 1 Continued)

	Maine	Michigan	Minnesota	Missouri
Panel A: Short-Run				
ΔLnI_t	-0.56(1.4)	1.23(0.83)	2.91(1.77)**	-0.34(0.17)
ΔLnI_{t-1}		0.13(0.07)	-1.94(0.79)	-1.85(0.76)
ΔLnI_{t-2}		3.44(1.81)**	1.56(0.66)	8.13(3.42)*
ΔLnI_{t-3}		2.62(1.34)	-0.04(0.02)	-0.6(0.25)
ΔLnI_{t-4}		-3.92(2.04)*	2.01(0.87)	-0.68(0.28)
ΔLnI_{t-5}		-0.79(0.41)	-7.24(3.19)*	-5.16(2.2)*
ΔLnI_{t-6}		-2.56(1.38)	0.92(0.38)	-3.73(1.69)**
ΔLnI_{t-7}		3.59(2.56)*	3.25(1.94)**	5.19(2.67)*
ΔLnM_t	0.4(1.28)	0.18(0.53)	-0.05(0.12)	-0.56(1.43)
ΔLnM_{t-1}				0.75(1.3)
ΔLnM_{t-2}				-1.39(2.46)*
ΔLnM_{t-3}				0.56(1)
ΔLnM_{t-4}				-0.38(0.7)
ΔLnM_{t-5}				1.22(2.25)*
ΔLnM_{t-6}				-1.33(2.28)*
ΔLnM_{t-7}				0.64(1.67)**
$\Delta LnEX_t$	-0.14(3.28)*	-0.15(1.26)	-0.16(1.27)	-0.12(0.8)
$\Delta LnEX_{t-1}$		-0.09(0.51)	-0.38(1.89)**	-0.18(0.78)
$\Delta LnEX_{t-2}$		0.21(1.13)	-0.03(0.14)	0.72(3.23)*
$\Delta LnEX_{t-3}$		0.18(0.91)	0.35(1.58)	-0.14(0.6)
$\Delta LnEX_{t-4}$		0.13(0.58)	-0.01(0.06)	0.17(0.7)
$\Delta LnEX_{t-5}$		-0.34(1.52)	-0.12(0.48)	-0.45(1.64)
$\Delta LnEX_{t-6}$		-0.14(0.6)	0.01(0.02)	-0.25(0.92)
$\Delta LnEX_{t-7}$		0.41(2.8)*	0.22(1.4)	0.54(3.24)*
Panel B: Long-Run				
Constant	-177.9(1.32)	179.61(0.83)	205.99(0.75)	2134.86(0.14)
LnI_t	8.12(1.37)	-5.49(0.64)	-5.89(0.6)	-83.41(0.13)
LnM_t	6.35(1.26)	-8.42(1.08)	-11.9(0.89)	-81.76(0.14)
$LnEX_t$	2.06(0.84)	-4.86(1.46)	-4.92(1.17)	-24.51(0.14)
Panel C: Diagnostic				
F	5.03*	4.41*	4.78*	3.56
ECM_{t-1}	0.07(0.9)	-0.08(1.36)	-0.07(1.04)	-0.01(0.14)
LM	4.27*	1.04	0.56	1.96
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.92	0.88	0.88	0.63

(Continued…)

(Table 1 Continued)

	Mississippi	Montana	North Carolina	North Dakota
Panel A: Short-Run				
ΔLnI_t	-1.57(0.83)	-0.68(1.01)	1.51(1.7)**	0.89(0.54)
ΔLnI_{t-1}	0.1(0.04)		-1.61(1.43)	-4.28(1.87)**
ΔLnI_{t-2}	5.99(2.72)*		2.69(2.37)*	4.38(2.52)*
ΔLnI_{t-3}	-3.31(1.42)		1.74(1.5)	
ΔLnI_{t-4}	3.59(1.54)		-2.15(2.36)*	
ΔLnI_{t-5}	-3.05(1.58)			
ΔLnI_{t-6}				
ΔLnI_{t-7}				
ΔLnM_t	1(2.39)*	0.14(0.24)	-0.39(2.76)*	2.84(3.56)*
ΔLnM_{t-1}	-1.66(2.67)*	1.57(1.92)**		0.42(0.34)
ΔLnM_{t-2}	0.58(0.97)	-2.19(2.66)*		-2.42(2.02)*
ΔLnM_{t-3}	-0.55(0.92)	0.16(0.2)		0.6(0.52)
ΔLnM_{t-4}	0.74(1.94)**	0.82(1.5)		1.19(1.01)
ΔLnM_{t-5}				1.2(1.37)
ΔLnM_{t-6}				
ΔLnM_{t-7}				
$\Delta LnEX_t$	-0.15(1.04)	0.17(0.87)	0.21(2.48)*	-1.01(3.24)*
$\Delta LnEX_{t-1}$	0.07(0.31)	-0.57(1.83)**		0.88(1.76)**
$\Delta LnEX_{t-2}$	-0.04(0.2)	0.53(2.37)*		0.75(1.41)
$\Delta LnEX_{t-3}$	-0.19(0.86)			-0.62(1.2)
$\Delta LnEX_{t-4}$	0.49(2.05)*			0.58(1.04)
$\Delta LnEX_{t-5}$	-0.74(2.82)*			-0.98(1.72)**
$\Delta LnEX_{t-6}$	0.51(2.94)*			-0.37(0.67)
$\Delta LnEX_{t-7}$				0.7(2.06)*
Panel B: Long-Run				
Constant	-583.4(0.23)	747.31(0.19)	-5728.1(0.03)	27.28(1.48)
LnI_t	23.68(0.24)	-29.7(0.18)	240.83(0.03)	-0.38(0.45)
LnM_t	24.15(0.22)	-36.59(0.2)	184.76(0.03)	-2.33(2.9)*
$LnEX_t$	7.38(0.2)	-6.13(0.21)	17(0.03)	-0.2(1.19)
Panel C: Diagnostic				
F	2.58	3.2	4.78*	4.35*
ECM_{t-1}	0.02(0.2)	-0.02(0.21)	0(0.03)	-0.84(3.93)**
LM	0.08	2.95**	0.47	0.02
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.54	0.62	0.53	0.9

(Continued…)

(Table 1 Continued)

	Nebraska	New Hampshire	New Jersey	New Mexico
Panel A: Short-Run				
ΔLnI_t	-4.97(3.58)*	0.8(0.51)	3.3(1.7)**	-2.73(1.6)
ΔLnI_{t-1}	-5.39(2.74)*	-4.3(2.07)*		0.79(0.34)
ΔLnI_{t-2}	5.89(2.85)*	5.95(2.82)*		1.73(0.75)
ΔLnI_{t-3}	4.41(2.06)*	0.4(0.19)		2.32(1.01)
ΔLnI_{t-4}	-1.04(0.5)	1.01(0.48)		-6.55(2.88)*
ΔLnI_{t-5}	-5.79(2.79)*	-3.14(1.98)*		3.73(2.11)*
ΔLnI_{t-6}	1.51(0.69)			
ΔLnI_{t-7}	2.15(1.34)			
ΔLnM_t	-0.07(0.17)	0.41(0.89)	0.08(0.2)	-0.63(2.54)*
ΔLnM_{t-1}				
ΔLnM_{t-2}				
ΔLnM_{t-3}				
ΔLnM_{t-4}				
ΔLnM_{t-5}				
ΔLnM_{t-6}				
ΔLnM_{t-7}				
$\Delta LnEX_t$	0.29(2.34)*	-0.26(1.69)**	0.39(2.69)*	0.16(1.23)
$\Delta LnEX_{t-1}$	0.2(1.44)	0.2(0.83)	-0.48(1.98)*	-0.29(1.35)
$\Delta LnEX_{t-2}$		0.22(0.91)	0.67(2.56)*	0.11(0.48)
$\Delta LnEX_{t-3}$		0.13(0.5)	-0.22(0.81)	0.4(1.64)
$\Delta LnEX_{t-4}$		0.45(1.59)	-0.29(1.05)	-0.58(2.24)*
$\Delta LnEX_{t-5}$		-0.89(2.89)*	0.2(0.68)	0.62(2.3)*
$\Delta LnEX_{t-6}$		0.18(0.57)	-0.21(0.75)	-0.66(2.61)*
$\Delta LnEX_{t-7}$		0.37(1.8)**	0.33(2.04)*	0.44(2.86)*
Panel B: Long-Run				
Constant	812.56(0.26)	32.25(0.48)	2379.85(0.07)	-8350.6(0.02)
LnI_t	-37.01(0.26)	0.4(0.16)	-94.52(0.07)	336.9(0.02)
LnM_t	-25.31(0.26)	-3.69(0.99)	-80.44(0.07)	363.8(0.02)
$LnEX_t$	-2.32(0.3)	-3.16(1.73)**	-18.88(0.08)	96.7(0.02)
Panel C: Diagnostic				
F	5.35*	4.07*	3.3	2.57
ECM_{t-1}	-0.03(0.28)	-0.13(1.43)	-0.01(0.07)	0(0.02)
LM	0.48	0.002	1.6	1.51
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.81	0.77	0.56	0.56

(Continued…)

(Table 1 Continued)

	Nevada	New York	Ohio	Oklahoma
Panel A: Short-Run				
ΔLnI_t	3.85(1.86)**	-0.61(0.63)	-2.92(2.02)*	1.32(0.88)
ΔLnI_{t-1}	-6.35(2.18)*		-0.26(0.14)	1.32(0.67)
ΔLnI_{t-2}	4.24(2.07)*		-3.74(2.04)*	4.3(2.22)*
ΔLnI_{t-3}			3.68(2.62)*	-2.84(1.39)
ΔLnI_{t-4}				-0.68(0.33)
ΔLnI_{t-5}				-3.29(1.62)
ΔLnI_{t-6}				0.9(0.43)
ΔLnI_{t-7}				3.29(2.17)*
ΔLnM_t	0.09(0.16)	1.88(2.5)*	0.28(1.06)	-0.1(0.23)
ΔLnM_{t-1}		0.12(0.11)		
ΔLnM_{t-2}		0.44(0.43)		
ΔLnM_{t-3}		-0.62(0.61)		
ΔLnM_{t-4}		-0.76(0.75)		
ΔLnM_{t-5}		1.09(1.07)		
ΔLnM_{t-6}		-1.54(1.49)		
ΔLnM_{t-7}		1.95(2.85)*		
$\Delta LnEX_t$	0.1(0.52)	0.58(2.18)*	0.03(0.33)	-0.06(1.01)
$\Delta LnEX_{t-1}$	-0.08(0.3)		-0.21(1.47)	
$\Delta LnEX_{t-2}$	0.32(1.06)		0.05(0.32)	
$\Delta LnEX_{t-3}$	0.03(0.1)		0.27(2.55)*	
$\Delta LnEX_{t-4}$	0.21(0.66)			
$\Delta LnEX_{t-5}$	-0.76(2.36)*			
$\Delta LnEX_{t-6}$	0.66(3.15)*			
$\Delta LnEX_{t-7}$				
Panel B: Long-Run				
Constant	-872.44(0.19)	107.79(0.53)	633.44(0.57)	313.36(0.79)
LnI_t	27.91(0.19)	-3.86(0.45)	-25.9(0.55)	-13.4(0.76)
LnM_t	56.29(0.18)	-3.25(0.64)	-17.55(0.58)	-10.41(0.79)
$LnEX_t$	12.09(0.17)	-0.66(0.81)	-6.67(0.67)	-0.65(0.85)
Panel C: Diagnostic				
F	4.4*	1.9	8.1*	8.62*
ECM_{t-1}	0.02(0.17)	-0.16(1.14)	-0.03(0.65)	-0.1(0.88)
LM	0.02	4.88*	1.14	2.88**
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.45	0.56	0.83	0.5

(Continued…)

(Table 1 Continued)

	Oregon	Pennsylvania	Rhode Island	South Carolina
Panel A: Short-Run				
ΔLnI_t	-4.41(2.78)*	1.32(0.74)	3.56(1.65)	-1.36(1.07)
ΔLnI_{t-1}	3(1.87)**	-0.93(0.41)	-1.3(0.48)	2.66(1.53)
ΔLnI_{t-2}		3.69(1.6)	5.11(2.29)*	3.35(2)*
ΔLnI_{t-3}		0.86(0.37)		1.05(0.63)
ΔLnI_{t-4}		2.86(1.28)		-6.29(3.72)*
ΔLnI_{t-5}		-4.61(2.62)*		3.59(2.74)*
ΔLnI_{t-6}				
ΔLnI_{t-7}				
$\Delta \text{Ln}M_t$	-0.5(1.4)	0.77(2.44)*	0.26(0.58)	0(0.01)
$\Delta \text{Ln}M_{t-1}$	0.71(1.55)	0.11(0.24)	1.15(2.01)*	0.15(0.43)
$\Delta \text{Ln}M_{t-2}$	-1.06(2.36)*	0.34(0.76)	-0.3(0.52)	-0.28(0.78)
$\Delta \text{Ln}M_{t-3}$	0.64(1.42)	-0.06(0.14)	0.87(1.53)	-0.34(0.93)
$\Delta \text{Ln}M_{t-4}$	-0.81(1.82)**	-0.56(1.28)	-0.56(0.97)	0.63(2.44)*
$\Delta \text{Ln}M_{t-5}$	0.63(2.11)*	1.11(2.57)*	0.88(1.55)	
$\Delta \text{Ln}M_{t-6}$		-0.68(2.34)*	0.29(0.53)	
$\Delta \text{Ln}M_{t-7}$			-0.74(1.99)*	
$\Delta \text{Ln}EX_t$	0.1(0.86)	-0.07(1.74)**	-0.06(0.99)	0.19(2.13)*
$\Delta \text{Ln}EX_{t-1}$	-0.23(1.3)			-0.18(1.25)
$\Delta \text{Ln}EX_{t-2}$	0.31(2.55)*			0.03(0.18)
$\Delta \text{Ln}EX_{t-3}$				0.34(2.25)*
$\Delta \text{Ln}EX_{t-4}$				-0.28(1.69)**
$\Delta \text{Ln}EX_{t-5}$				0.07(0.41)
$\Delta \text{Ln}EX_{t-6}$				-0.2(1.13)
$\Delta \text{Ln}EX_{t-7}$				0.29(2.76)*
Panel B: Long-Run				
Constant	138.98(0.62)	-227.32(1.29)	-93.68(5.72)*	-324.44(1.66)**
LnI_t	-4.87(0.52)	10.15(1.29)	4.46(5.35)*	13.93(1.73)**
LnM_t	-6.04(0.68)	5.95(1.54)	3.7(8.35)*	12.08(1.6)
LnEX_t	-1.97(1.03)	0.71(0.92)	0.13(0.85)	1.77(1.1)
Panel C: Diagnostic				
F	3.46	4.23*	6.95*	5.92*
ECM_{t-1}	-0.06(1)	0.11(1.19)	0.5(3.24)	0.08(1.25)
LM	1.48	0.5	1.78	6.86*
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.61	0.75	0.72	0.61

(Continued…)

(Table 1 Continued)

	S. Dakota	Tennessee	Texas	Utah
Panel A: Short-Run				
ΔLnI_t	-2.73(1.6)	-1.24(2.97)*	1.76(1.95)**	-0.97(3.29)*
ΔLnI_{t-1}	0.79(0.34)		2.3(1.77)**	
ΔLnI_{t-2}	1.73(0.75)		2.44(1.92)**	
ΔLnI_{t-3}	2.32(1.01)		-0.28(0.21)	
ΔLnI_{t-4}	-6.55(2.88)*		-1.06(0.82)	
ΔLnI_{t-5}	3.73(2.11)*		-0.94(0.72)	
ΔLnI_{t-6}			-1.98(1.62)	
ΔLnI_{t-7}			2.1(2.37)*	
$\Delta \text{Ln}M_t$	-0.63(2.54)*	-0.03(0.09)	-0.28(1.95)**	0.38(1.05)
$\Delta \text{Ln}M_{t-1}$		0.33(0.66)		-0.06(0.13)
$\Delta \text{Ln}M_{t-2}$		-0.47(0.98)		-0.28(0.59)
$\Delta \text{Ln}M_{t-3}$		0.95(2.02)*		0.1(0.2)
$\Delta \text{Ln}M_{t-4}$		-0.6(1.26)		0.13(0.28)
$\Delta \text{Ln}M_{t-5}$		0.51(1.09)		0.85(1.83)**
$\Delta \text{Ln}M_{t-6}$		-1.11(2.4)*		-0.95(1.99)*
$\Delta \text{Ln}M_{t-7}$		1.17(3.72)*		0.55(1.69)**
$\Delta \text{Ln}EX_t$	0.16(1.23)	0.05(0.39)	-0.05(0.59)	-0.11(0.94)
$\Delta \text{Ln}EX_{t-1}$	-0.29(1.35)	0(0.02)	0(0.03)	-0.21(1.62)
$\Delta \text{Ln}EX_{t-2}$	0.11(0.48)	0.18(1.41)	0.05(0.43)	
$\Delta \text{Ln}EX_{t-3}$	0.4(1.64)		0(0.04)	
$\Delta \text{Ln}EX_{t-4}$	-0.58(2.24)*		-0.11(0.72)	
$\Delta \text{Ln}EX_{t-5}$	0.62(2.3)*		0.08(0.48)	
$\Delta \text{Ln}EX_{t-6}$	-0.66(2.61)*		-0.29(1.83)**	
$\Delta \text{Ln}EX_{t-7}$	0.44(2.86)*		0.36(3.75)*	
Panel B: Long-Run				
Constant	-8350.6(0.02)	-1125.1(0.33)	48.79(0.79)	-3047.9(0.08)
LnI_t	336.9(0.02)	47.02(0.34)	-0.92(0.4)	131.53(0.08)
LnM_t	363.8(0.02)	39.27(0.34)	-2.86(1.09)	118.2(0.08)
LnEX_t	96.7(0.02)	5.75(0.31)	-1.03(1.69)**	3.15(0.07)
Panel C: Diagnostic				
F	2.57	6*	4.7*	4.27*
ECM_{t-1}	0(0.02)	0.03(0.32)	-0.1(1.93)**	0.01(0.08)
LM	1.51	0.002	9.24*	3.76**
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.56	0.36	0.62	0.63

(Continued…)

(Table 1 Continued)

	Virginia	Vermont	Washington	Wisconsin
Panel A: Short-Run				
$\Delta \mathrm{LnI}_{t}$	2.5(1.83)**	-3.48(1.33)	1.17(1.29)	1.13(0.82)
$\Delta \mathrm{LnI}_{t-1}$		-7(2)**	2.47(2.81)*	-3.91(2.27)*
$\Delta \mathrm{LnI}_{t-2}$		8.09(2.31)*		2.36(1.7)**
$\Delta \mathrm{LnI}_{t-3}$		-4.06(1.11)		
$\Delta \mathrm{LnI}_{t-4}$		6.3(1.72)**		
$\Delta \mathrm{LnI}_{t-5}$		-0.13(0.04)		
$\Delta \mathrm{LnI}_{t-6}$		-5.33(2)*		
$\Delta \mathrm{LnI}_{t-7}$				
$\Delta \mathrm{Ln}M_{t}$	0.21(0.75)	0.21(0.41)	-0.46(2.41)*	0.44(1.52)
$\Delta \mathrm{Ln}M_{t-1}$	0.43(1.1)			
$\Delta \mathrm{Ln}M_{t-2}$	-0.5(1.82)**			
$\Delta \mathrm{Ln}M_{t-3}$				
$\Delta \mathrm{Ln}M_{t-4}$				
$\Delta \mathrm{Ln}M_{t-5}$				
$\Delta \mathrm{Ln}M_{t-6}$				
$\Delta \mathrm{Ln}M_{t-7}$				
$\Delta \mathrm{Ln}EX_{t}$	-0.03(0.81)	-0.16(0.85)	-0.02(0.22)	-0.01(0.07)
$\Delta \mathrm{Ln}EX_{t-1}$		-0.02(0.06)	0.38(2.15)*	0(0.01)
$\Delta \mathrm{Ln}EX_{t-2}$		0.65(2.11)*	-0.23(1.24)	0.14(0.9)
$\Delta \mathrm{Ln}EX_{t-3}$		-0.18(0.59)	0.28(1.48)	0.1(0.58)
$\Delta \mathrm{Ln}EX_{t-4}$		0.76(2.29)*	0.16(0.81)	0.25(1.4)
$\Delta \mathrm{Ln}EX_{t-5}$		-1.23(3.67)*	-0.52(2.65)*	-0.47(2.73)*
$\Delta \mathrm{Ln}EX_{t-6}$		0.73(3.31)*	0.34(2.54)*	0.23(2.02)*
$\Delta \mathrm{Ln}EX_{t-7}$				
Panel B: Long-Run				
Constant	169488.89(0)	67.04(0.44)	193.89(0.48)	107.5(0.74)
LnI_{t}	-7123.13(0)	1(0.22)	-6.24(0.43)	-3.04(0.52)
LnM_{t}	-5392.06(0)	-9.12(0.66)	-9.81(0.49)	-5.56(0.93)
LnEX_{t}	-514.28(0)	-6.31(0.78)	-2.61(0.6)	-2.91(1.39)
Panel C: Diagnostic				
F	2.33	6.72*	3	3.54
ECM_{t-1}	0(0)	-0.09(0.74)	-0.05(0.57)	-0.07(1.17)
LM	0.1	0.001	3.54**	1.55
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.56	0.77	0.62	0.91

(Continued…)

(Table 1 Continued)

	West Virginia	Wyoming	District of Columbia
Panel A: Short-Run			
$\Delta \mathrm{LnI}_t$	-1.47(1.81)**	0.28(0.16)	-2.97(0.38)
$\Delta \mathrm{LnI}_{t-1}$		-3.99(1.57)	-13.68(1.34)
$\Delta \mathrm{LnI}_{t-2}$		-1.23(0.47)	-0.54(0.05)
$\Delta \mathrm{LnI}_{t-3}$		4.55(2.37)*	19.33(2.43)*
$\Delta \mathrm{LnI}_{t-4}$			
$\Delta \mathrm{LnI}_{t-5}$			
$\Delta \mathrm{LnI}_{t-6}$			
$\Delta \mathrm{LnI}_{t-7}$			
$\Delta \mathrm{Ln}M_t$	0.09(0.18)	0.13(0.23)	-1.15(1.15)
$\Delta \mathrm{Ln}M_{t-1}$	0.84(1.31)		
$\Delta \mathrm{Ln}M_{t-2}$	-1.27(2)*		
$\Delta \mathrm{Ln}M_{t-3}$	0.02(0.03)		
$\Delta \mathrm{Ln}M_{t-4}$	0.65(1.44)		
$\Delta \mathrm{Ln}M_{t-5}$			
$\Delta \mathrm{Ln}M_{t-6}$			
$\Delta \mathrm{Ln}M_{t-7}$			
$\Delta \mathrm{Ln}EX_t$	-0.02(0.13)	0.18(0.91)	-0.18(0.65)
$\Delta \mathrm{Ln}EX_{t-1}$	-0.08(0.34)	-0.05(0.15)	
$\Delta \mathrm{Ln}EX_{t-2}$	0.42(1.62)	0.06(0.21)	
$\Delta \mathrm{Ln}EX_{t-3}$	-0.32(1.2)	0.53(1.62)	
$\Delta \mathrm{Ln}EX_{t-4}$	0.23(0.79)	-0.15(0.44)	
$\Delta \mathrm{Ln}EX_{t-5}$	0.1(0.32)	0.01(0.01)	
$\Delta \mathrm{Ln}EX_{t-6}$	-0.66(2.1)*	-0.53(1.39)	
$\Delta \mathrm{Ln}EX_{t-7}$	0.6(3.12)*	0.45(2.03)*	
Panel B: Long-Run			
Constant	10863.4(0.03)	-258.16(0.51)	21.46(0.11)
LnI_t	-503.19(0.03)	11.63(0.52)	1.03(0.1)
LnM_t	-321.37(0.03)	11.44(0.53)	-5.15(0.89)
LnEX_t	-78.17(0.03)	1.21(0.47)	-0.82(0.6)
Panel C: Diagnostic			
F	3.82**	5.23*	1.86
ECM_{t-1}	0(0.03)	0.08(0.49)	-0.22(1.92)
LM	0.96	0.2	0.53
QS (QS^2)	S(S)	S(S)	S(S)
Adjusted R^2	0.59	0.72	0.76

Notes:

a. Numbers inside parentheses are absolute values of the t-ratios and * (**) indicates significance at the 5% (10%) confidence level.

b. At the 5% (10%) significance level, when there are three exogenous variables (k=3), the critical value of the F test is 4.35 (3.77). This comes from Pesaran et al. (2001, Table CI-Case III, page 300).

c. At the 5% (10%) significance level, when there are three exogenous variables (k=3), the critical value of the t-test for significance of ECM_{t-1} is -3.78 (-3.46). This comes from Pesaran et al. (2001, Table CII-Case III, page 303).

d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom since we are testing for 1st order serial correlation. Its critical value at the 5% (10%) level is 3.84 (2.71).

From the short-run estimates in Panel A of Table 1, we gather that the real effective exchange rate carries at least one significant lagged coefficient in all of the states except Alaska, Connecticut, Kansas, Louisiana, Oklahoma, Rhode Island, Tennessee, Utah, Virginia, and DC. Thus, movements in the value of the dollar affect housing permits issued in 41 states. In some states like Maine, there is only one significant lagged coefficient which makes it easy to conclude that dollar depreciation is expansionary in the short run. However, in some other states like Massachusetts, there are a few significant short-run coefficients with different signs which makes it difficult to conclude whether dollar depreciation is expansionary or contractionary. This is not the case for the long run. From the long-run results reported in Panel B, we gather that the exchange rate carries a significant coefficient only in the results for Delaware, Georgia, New Hampshire, and Texas. These long-run effects are valid since the F test for cointegration is significant in all four states except Delaware. Therefore, following Pesaran et al. (2001, p. 299), we try an alternative test known as the t-test for cointegration. Under this alternative, we use normalized long-run coefficient estimates and long-run model (1) to generate the error term. Labeling this error term as the error correction model (ECM), we return to Equation (2) and replace the linear combination of lagged level variables with ECM_{t-1} and estimate the new specification in the same optimum lag order. A significantly negative coefficient attached to ECM_{t-1} will be an alternative way of supporting cointegration. The t-test that is used to evaluate the significance of this estimate has a new distribution for which Pesaran et al. (2001, p. 303) provide new critical values. Clearly our effort is futile since ECM_{t-1} does not carry a significant coefficient. As for the short-run and long-run effects of personal income and mortgage rates, the story is the same, i.e., most states have short-run but not long-run effects. Indeed, only in North Dakota, Rhode Island, and South Carolina do at least one of them carry a significant coefficient.[7] How do the results change if we shift to estimates of the nonlinear model (4) that are reported in Table 2?

From the short-run estimates in Panel A, it is obvious that either ΔEX^{+} or ΔEX^{-} carry at least one significant coefficient in all 51 states, thus providing support for the short-run effects of exchange rate changes in the short run. The increase in number of states from 41 in the linear model (Table 1) to 51 in the nonlinear model (Table 2) must be attributed to introducing nonlinear adjustment of all three exogenous variables. Furthermore, as can be seen, at a given lag order k, the short-run estimate attached to ΔEX^{+}_{t-k} is different than the one attached to ΔEX^{-}_{t-k} in almost all cases, thus supporting the short-run asymmetric effects of dollar appreciation versus dollar depreciation. However, the sum of the short-run estimates attached to ΔEX^{+}_{t-k} is significantly different

[7] Following Bahmani-Oskooee and Ghodsi (2019) we have also reported Lagrange Multiplier (LM) tests for serial correlation, and cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ; denoted by QS and QS^2) tests for stability of the coefficient estimates, and the adjusted R^2 in panel C.

Table 2 Estimation of Nonlinear ARDL Model for Each State
Panel A: Short-Run

	Alaska	Alabama	Arkansas	Arizona	California
ΔI_t^+	-13.35(2.65)*	-4.79(2.31)*	-5.12(1.57)	0.18(0.07)	-0.51(0.23)
ΔI_{t-1}^+	-12.07(2.06)*	-11.98(4.49)*	-1.53(0.33)	0.73(0.2)	2.22(0.6)
ΔI_{t-2}^+	7.67(1.2)	13.47(5.29)**	5.32(1.07)	7.01(1.9)**	10.57(2.98)*
ΔI_{t-3}^+	0.75(0.11)	-3.46(1.7)**	-0.48(0.1)	-3.61(0.91)	-7.47(1.8)**
ΔI_{t-4}^+	-14.6(2.12)*		-6.9(1.51)	0.77(0.19)	3.13(1)
ΔI_{t-5}^+	10.24(1.4)		-11.99(2.75)*	0.86(0.22)	
ΔI_{t-6}^+	9.14(1.41)			2.38(0.6)	
ΔI_{t-7}^+	-5.99(1.07)			-6.18(2.34)*	
ΔI_t^-	7.07(0.95)	3.4(1.19)	5.39(1.26)	11.68(2.73)*	6.05(2.16)*
ΔI_{t-1}^-	0.06(0.01)		-9.76(1.5)	-0.52(0.08)	6.6(1.79)**
ΔI_{t-2}^-	1.22(0.13)		-6.26(0.85)	-6.33(0.76)	-3.49(0.85)
ΔI_{t-3}^-	11.61(1.4)		5.37(0.83)	11.12(1.72)**	0.87(0.22)
ΔI_{t-4}^-			7.79(1.26)	5.58(0.76)	-2.48(0.72)
ΔI_{t-5}^-			-3.98(0.67)	-8.1(1.17)	-3.38(1.3)
ΔI_{t-6}^-			13.07(3.53)*	-5.71(1)	
ΔI_{t-7}^-				13.74(3.12)*	
ΔM_t^+	2.99(1.86)**	0.3(0.64)	2.06(2.1)*	-1.17(1.25)	-1.23(1.56)
ΔM_{t-1}^+	2.45(1.44)	-1.79(3.24)*	2.03(1.84)**	0.4(0.4)	1.2(1.38)
ΔM_{t-2}^+	-0.64(0.46)	0.76(1.4)	0.37(0.35)	1.35(1.48)	-0.27(0.29)
ΔM_{t-3}^+	-1.4(1.12)	0.37(0.75)	0.41(0.36)	-0.71(0.89)	-1.97(2.83)*
ΔM_{t-4}^+	-1.34(1.09)	0.19(0.42)	-0.37(0.43)	-0.61(0.85)	0.09(0.13)
ΔM_{t-5}^+	2.16(2.11)*	-0.18(0.4)	1.16(1.42)	1.21(1.76)**	-0.25(0.38)
ΔM_{t-6}^+		0.57(1.52)	0.84(1.04)	1.04(1.74)**	0.73(1.39)
ΔM_{t-7}^+			0.91(1.42)		
ΔM_t^-	0.7(0.41)	0.85(1.67)**	0.16(0.16)	1.59(1.56)	1.29(1.87)**
ΔM_{t-1}^-	1.98(1.01)	1.01(1.43)	0.04(0.03)		-3.16(2.92)*
ΔM_{t-2}^-	-3.63(1.86)**	-1.89(2.67)*	0.44(0.36)		1.11(1.15)
ΔM_{t-3}^-	2.19(1.07)	2.82(3.65)*	-0.18(0.14)		0.6(0.69)
ΔM_{t-4}^-	0.96(0.53)	-1.87(2.51)*	0.17(0.14)		-1.09(1.28)
ΔM_{t-5}^-	-0.69(0.36)	1.49(2.25)*	0.86(0.77)		2.25(2.75)*
ΔM_{t-6}^-	-1.86(1.31)	-2.11(3.41)*	-2.05(2.5)*		-0.97(1.2)
ΔM_{t-7}^-		1.7(4.04)*			-0.89(1.4)
ΔEX_t^+	-0.99(1.68)**	0.04(0.23)	-0.42(1.29)	-0.48(1.6)	-0.15(0.52)
ΔEX_{t-1}^+	-0.56(0.65)	0.28(1.04)	0.88(2.47)*		-0.35(0.99)
ΔEX_{t-2}^+	-0.18(0.21)	0.18(0.58)			-0.3(0.83)
ΔEX_{t-3}^+	-1(1.33)	-0.61(2.11)*			1.26(3.27)*
ΔEX_{t-4}^+	1.3(1.69)**	0.55(2.05)*			-0.53(1.95)**
ΔEX_{t-5}^+	-1.04(1.23)	-1.02(3.38)*			
ΔEX_{t-6}^+	0.2(0.27)	1.04(3.65)*			
ΔEX_{t-7}^+	-1.06(1.7)**	-0.43(2.29)*			
ΔEX_t^-	-0.63(1.32)	-0.35(2.3)*	-0.84(3.24)*	0.49(2.08)*	-0.22(1.1)
ΔEX_{t-1}^-	-0.41(0.73)	0.14(0.7)	-0.44(1.39)	0.41(1.35)	0.18(0.71)
ΔEX_{t-2}^-	0.37(0.66)	0.33(1.64)	-0.32(1.02)	-0.1(0.34)	0.45(1.88)**
ΔEX_{t-3}^-	0.77(1.34)	-0.39(1.87)**	-0.33(0.99)	-0.17(0.53)	-0.38(1.41)
ΔEX_{t-4}^-	-1.32(1.89)**	0.2(0.95)	0.49(1.19)	0.66(1.74)**	0.53(1.8)*
ΔEX_{t-5}^-	1.02(2.09)*	-0.25(1.52)	-0.64(1.36)	-0.76(2.7)*	0.05(0.16)
ΔEX_{t-6}^-			0.37(0.82)		-0.52(1.68)**
ΔEX_{t-7}^-			-0.57(1.91)**		0.84(3.75)*

(Continued…)

(Panel A Continued)

	Colorado	Connecticut	Delaware	Florida	Georgia
ΔI_t^+	0.01(0.01)	2.46(1.13)	-3.21(1.6)	3.48(1.28)	0.27(0.15)
ΔI_{t-1}^+	6.04(2.37)*	1.08(0.35)	2.13(0.93)	-3.05(1.13)	0.81(0.29)
ΔI_{t-2}^+	-6.69(2.58)*	-3.35(1.11)	2.86(1.38)	6.01(2.17)*	5.17(1.9)**
ΔI_{t-3}^+	3.33(1.58)	9.01(2.9)*	-3.1(1.44)	0.28(0.1)	-1.58(0.59)
ΔI_{t-4}^+		-7.83(2.31)*	-0.17(0.08)	-1.77(0.57)	-3.59(1.76)**
ΔI_{t-5}^+		4.17(1.53)	1.43(0.74)	0.9(0.28)	
ΔI_{t-6}^+			-4.84(2.41)*	5.3(1.87)**	
ΔI_{t-7}^+			3.2(2.06)*	-3.48(1.54)	
ΔI_t^-	7.54(1.68)**	3.31(0.99)	0.62(0.23)	-5.62(1.91)**	5.56(1.89)**
ΔI_{t-1}^-	-20.1(3.1)*	1.44(0.34)	-0.29(0.08)	4.03(1.01)	1.1(0.27)
ΔI_{t-2}^-	26.09(3.39)*	1.67(0.42)	-3.51(0.99)	-1.71(0.44)	-2.3(0.62)
ΔI_{t-3}^-	-6.96(0.93)	-5.88(1.49)	-4.79(1.2)	-0.44(0.12)	-2.51(0.68)
ΔI_{t-4}^-	8.68(1.11)	8.83(2.25)*	7.48(2.22)*	-5.12(1.22)	7(2.09)*
ΔI_{t-5}^-	0.12(0.02)	-9.92(3.39)*		-4.42(0.99)	-1.55(0.41)
ΔI_{t-6}^-	-15.17(2.37)*			-1.03(0.25)	6.63(1.69)**
ΔI_{t-7}^-	18.21(4.46)*			4.93(1.73)**	7.79(2.4)*
ΔM_t^+	-1.11(1.18)	-0.27(0.49)	1.37(1.89)**	-2.41(2.54)*	-0.22(0.38)
ΔM_{t-1}^+	-0.23(0.23)		0.58(0.69)	1.47(1.69)**	1.56(2.76)*
ΔM_{t-2}^+	2.12(2.12)*		-0.04(0.06)	-2.03(2.26)*	0.86(1.55)
ΔM_{t-3}^+	-1.62(1.65)**		0.22(0.35)	-1.83(2.45)*	-0.95(1.9)**
ΔM_{t-4}^+	-0.1(0.11)		-1.09(1.77)**	0.76(0.92)	0.86(1.75)**
ΔM_{t-5}^+	1.39(2.11)*		1.21(1.87)**	0.43(0.69)	1.45(3.09)*
ΔM_{t-6}^+			0.12(0.17)	0.6(1.08)	0.63(1.62)
ΔM_{t-7}^+			0.97(1.53)	-1.14(1.89)**	
ΔM_t^-	0.85(1.04)	-0.97(1.32)	-0.16(0.2)	1.71(2.31)*	0.44(0.81)
ΔM_{t-1}^-	2.37(2.01)*	1.78(1.94)**	2.52(1.97)*	-0.83(0.84)	
ΔM_{t-2}^-	-2.22(1.97)*	0.93(1.27)	-1.96(1.71)**	0.16(0.16)	
ΔM_{t-3}^-	1.45(1.25)		1.18(1.12)	1.83(1.8)**	
ΔM_{t-4}^-	-0.91(0.81)		1.08(1.07)	-0.8(0.97)	
ΔM_{t-5}^-	-0.41(0.41)		1.02(1.07)		
ΔM_{t-6}^-	1.52(1.67)**		-0.94(1.33)		
ΔM_{t-7}^-	-1.85(2.5)*				
ΔEX_t^+	-0.35(1.19)	-0.2(1)	-1.05(4.07)*	-0.03(0.09)	-0.38(1.77)**
ΔEX_{t-1}^+	-0.37(0.83)		-0.38(0.93)	0.32(0.86)	-0.5(1.61)
ΔEX_{t-2}^+	0.34(0.7)		0.28(0.61)	0.25(0.63)	0.09(0.31)
ΔEX_{t-3}^+	-0.11(0.22)		-0.23(0.53)	0.66(1.77)**	0.21(0.79)
ΔEX_{t-4}^+	-0.14(0.31)		0.79(1.95)**	-0.11(0.28)	-0.61(2.11)*
ΔEX_{t-5}^+	0.32(0.72)		-1.05(2.3)*	-0.71(1.84)**	0.47(1.49)
ΔEX_{t-6}^+	-1.05(2.52)*		0.05(0.11)	-0.32(0.81)	-0.61(2.02)*
ΔEX_{t-7}^+	1.01(3.62)*		0.56(1.77)**	0.42(1.52)	0.43(2.23)*
ΔEX_t^-	0.43(1.9)**	0.21(1.78)**	-0.08(0.37)	0.02(0.09)	0.5(3.13)*
ΔEX_{t-1}^-	-0.67(2.23)*		0.58(2.24)*	-0.52(2.18)*	0.12(0.52)
ΔEX_{t-2}^-	0.48(1.7)**		0.48(1.49)	0.56(2.32)*	0.36(1.56)
ΔEX_{t-3}^-	0.07(0.25)		-0.81(3.17)*	-0.03(0.12)	-0.46(1.89)**
ΔEX_{t-4}^-	0.34(1.09)			-0.35(1.1)	0.01(0.03)
ΔEX_{t-5}^-	-0.36(1.3)			0.76(2.02)*	-0.19(0.7)
ΔEX_{t-6}^-				-0.24(0.69)	-0.39(1.6)
ΔEX_{t-7}^-				0.68(2.58)*	

(Continued…)

(Panel A Continued)

	Hawaii	Iowa	Idaho	Illinois	Indiana
$\Delta \mathrm{I}_{t}^{+}$	-7.85(1.15)	-9.93(3.83)*	-3.48(2.62)*	-1.44(0.58)	-7.71(2.56)*
$\Delta \mathrm{I}_{t-1}^{+}$	6.11(0.75)	-0.34(0.11)		0.27(0.08)	3.91(1.18)
$\Delta \mathrm{I}_{t-2}^{+}$	-2.6(0.31)	-6.64(2.05)*		4.04(1.19)	2.71(0.81)
$\Delta \mathrm{I}_{t-3}^{+}$	3.96(0.51)	2.64(0.78)		-7.77(3.09)*	-0.31(0.09)
$\Delta \mathrm{I}_{t-4}^{+}$	-2.58(0.33)	6.38(1.82)**			-8.32(2.29)*
$\Delta \mathrm{I}_{t-5}^{+}$	17.42(2.47)*	-3.56(0.96)			4.89(1.34)
$\Delta \mathrm{I}_{t-6}^{+}$		0.51(0.15)			-2.98(1.15)
$\Delta \mathrm{I}_{t-7}^{+}$		-3.78(1.92)**			
$\Delta \mathrm{I}_{t}^{-}$	31.25(2.56)*	12.77(2.96)*	6.89(1.81)**	6.86(2.14)*	8.74(3.15)*
$\Delta \mathrm{I}_{t-1}^{-}$	9.88(0.66)	0.02(0.01)	-2.26(0.41)	12.95(2.98)*	
$\Delta \mathrm{I}_{t-2}^{-}$	-18.86(1.25)	8.05(1.79)**	-6.14(1.12)	-14.21(3.3)*	
$\Delta \mathrm{I}_{t-3}^{-}$	6.73(0.42)	1.48(0.28)	1.73(0.3)	8.62(2.07)*	
$\Delta \mathrm{I}_{t-4}^{-}$	-12.6(0.83)	-6.41(1.24)	-3.3(0.54)	2.72(0.66)	
$\Delta \mathrm{I}_{t-5}^{-}$	-17.38(1.53)	-14.15(2.86)*	-21.16(3.25)*	-11.4(2.86)*	
$\Delta \mathrm{I}_{t-6}^{-}$		-6.07(1.38)	17.21(2.38)*	-0.15(0.04)	
$\Delta \mathrm{I}_{t-7}^{-}$			-5.59(1.12)	3.24(1.15)	
ΔM_{t}^{+}	3.1(2.08)*	-2.34(3.12)*	-0.2(0.25)	-1.44(3.11)*	0.56(0.94)
ΔM_{t-1}^{+}	6.57(3.68)*	0.92(1.03)	2.2(2.44)*		1.25(1.84)**
ΔM_{t-2}^{+}	-1.75(1.03)	-0.55(0.81)	1.41(1.58)		0.25(0.38)
ΔM_{t-3}^{+}	-0.06(0.04)	-1.73(2.53)*	-2.02(2.43)*		-1.13(1.83)**
ΔM_{t-4}^{+}	-3.81(2.6)*	0.54(0.76)	-0.07(0.09)		1.11(1.78)**
ΔM_{t-5}^{+}	1.7(1.56)	0.68(0.98)	-0.18(0.25)		0.4(0.66)
ΔM_{t-6}^{+}		-0.81(1.11)	0.27(0.41)		-1.03(1.56)
ΔM_{t-7}^{+}		1.24(1.96)**	2.13(3.47)*		1.45(2.81)*
ΔM_{t}^{-}	-1.03(0.65)	0.25(0.32)	1.08(1.37)	2.16(3.66)*	0.67(1)
ΔM_{t-1}^{-}	-0.95(0.43)	0.27(0.27)	-2.56(1.97)*	0.73(1.03)	-0.33(0.35)
ΔM_{t-2}^{-}	-0.45(0.22)	1.72(1.74)**	-1.38(1.18)	-0.46(0.65)	0.28(0.32)
ΔM_{t-3}^{-}	0.44(0.2)	3.26(3.1)*	3.82(3.92)*	1.09(1.9)**	2.25(2.51)*
ΔM_{t-4}^{-}	-1.58(0.77)		-2.06(2.07)*		-1.86(2.16)*
ΔM_{t-5}^{-}	5.96(3.16)*		0.9(0.95)		1.29(1.52)
ΔM_{t-6}^{-}	-3.48(1.65)**		2.82(3.09)*		0.78(0.96)
ΔM_{t-7}^{-}	1.47(0.99)		-1.72(2.27)*		-1.62(2.61)*
ΔEX_{t}^{+}	-1.55(2.53)*	-0.91(3.25)*	-0.72(2.62)*	-0.62(5.41)*	-0.63(2.57)*
ΔEX_{t-1}^{+}	-1.66(1.83)**	-0.32(0.77)	0.14(0.32)		-0.43(1.63)
ΔEX_{t-2}^{+}	0.42(0.44)	0.18(0.39)	-1.2(2.58)*		
ΔEX_{t-3}^{+}	0.02(0.02)	0.28(0.62)	1.07(2.34)*		
ΔEX_{t-4}^{+}	0.67(0.77)	0.15(0.35)	0.09(0.22)		
ΔEX_{t-5}^{+}	0.57(0.63)	0.34(0.8)	-0.52(1.64)		
ΔEX_{t-6}^{+}	-1.72(2.63)*	-0.86(2.63)*			
ΔEX_{t-7}^{+}					
ΔEX_{t}^{-}	-0.17(0.33)	0.02(0.09)	-0.1(0.4)	0.19(1.15)	-0.05(0.25)
ΔEX_{t-1}^{-}	0.35(0.52)	0.69(2.33)*	0.5(1.65)**	0.23(1.04)	0.03(0.12)
ΔEX_{t-2}^{-}	0.68(1.04)	-0.42(1.3)	0.98(3.05)*	-0.17(0.75)	0.6(2.58)*
ΔEX_{t-3}^{-}	-0.97(1.46)	0.03(0.11)	-0.7(2.18)*	0.6(2.52)*	-0.22(0.94)
ΔEX_{t-4}^{-}	2.17(2.95)*	0.35(0.98)	0.46(1.24)	-0.23(0.89)	-0.15(0.51)
ΔEX_{t-5}^{-}	-1.89(2.53)*	0.29(0.74)	-0.49(1.23)	0.55(2.05)*	0.68(1.87)**
ΔEX_{t-6}^{-}	1.02(1.94)**	0.5(1.46)	0.01(0.03)	-0.57(2.02)*	-0.79(2.19)*
ΔEX_{t-7}^{-}		0.36(1.68)**	0.45(1.61)	0.9(4.73)*	0.5(2.17)*

(Continued…)

(Panel A Continued)

	Kansas	Kentucky	Louisiana	Massachusetts	Maryland
ΔI_t^+	-1.36(0.48)	-6.61(2.59)*	0.15(0.08)	-2.38(0.66)	-1.38(0.42)
ΔI_{t-1}^+	-3.06(0.81)	-2.1(0.5)	2.85(1.37)	-3.52(0.71)	-4.42(1.02)
ΔI_{t-2}^+	4.63(1.19)	3.48(0.87)		-0.21(0.04)	7.5(1.75)**
ΔI_{t-3}^+	1.13(0.3)	0.03(0.01)		-1.4(0.3)	-1.1(0.25)
ΔI_{t-4}^+	-6.06(1.69)**	6.12(1.62)		9.26(1.97)*	-3.15(0.68)
ΔI_{t-5}^+	2.47(0.7)	-8.83(2.36)*		-12.75(2.83)*	0.39(0.08)
ΔI_{t-6}^+	-8.47(2.27)*	2.61(0.7)		5.6(1.22)	-5.21(1.14)
ΔI_{t-7}^+	6.31(2.02)*	4.04(1.55)		3.83(1.19)	9.37(2.95)*
ΔI_t^-	7.31(1.36)	5.8(1.73)**	0.64(0.4)	10.55(2.2)*	1.85(0.64)
ΔI_{t-1}^-	1.09(0.16)	-16.56(3.3)*		11.32(1.48)	
ΔI_{t-2}^-	-11.21(1.6)	0.36(0.06)		-10.34(1.26)	
ΔI_{t-3}^-	-9.08(1.42)	5.64(0.96)		21.65(2.57)*	
ΔI_{t-4}^-	14.13(2.71)*	-13.44(2.35)*		-7.38(1.13)	
ΔI_{t-5}^-		-4.32(0.76)			
ΔI_{t-6}^-		5.79(1.69)**			
ΔI_{t-7}^-					
ΔM_t^+	0.48(0.39)	1.3(2.29)*	0.72(1.24)	-0.74(0.56)	0.48(0.67)
ΔM_{t-1}^+	-0.76(0.52)	-0.08(0.12)		3.69(2.81)*	
ΔM_{t-2}^+	2.73(2.1)*	-0.11(0.19)		0.56(0.42)	
ΔM_{t-3}^+	0.68(0.61)	-1.17(2.03)*		-1.8(1.62)	
ΔM_{t-4}^+	-3.24(3.06)*	0.89(1.67)**		-0.62(0.56)	
ΔM_{t-5}^+	1.04(0.97)	0.17(0.32)		1.43(1.37)	
ΔM_{t-6}^+	-0.13(0.11)	0.68(1.57)		1.12(1.26)	
ΔM_{t-7}^+	1.13(1.32)				
ΔM_t^-	-1.48(1.33)	0.42(0.62)	0.4(0.61)	0.6(0.49)	-0.78(2.12)*
ΔM_{t-1}^-	2.85(2.03)*	-0.14(0.16)	-0.21(0.25)	-1.79(1.08)	
ΔM_{t-2}^-	-1.51(1.11)	1.34(2.1)*	1.24(1.46)	2.51(1.59)	
ΔM_{t-3}^-	-0.31(0.22)		-1.12(1.34)	0.06(0.04)	
ΔM_{t-4}^-	2.01(1.41)		-0.48(0.58)	2.34(1.73)**	
ΔM_{t-5}^-	-2.85(2.06)*		0.98(1.81)**	0.37(0.29)	
ΔM_{t-6}^-	2.05(1.85)**			-0.34(0.27)	
ΔM_{t-7}^-				-2.3(2.26)*	
ΔEX_t^+	-0.72(1.92)**	-0.88(4.39)*	-0.36(1.61)	-0.64(1.61)	-0.49(1.49)
ΔEX_{t-1}^+		0.35(1.08)	0.1(0.28)	-0.18(0.32)	-0.46(1.44)
ΔEX_{t-2}^+		-0.59(1.6)	0.19(0.53)	0.5(1.34)	
ΔEX_{t-3}^+		1(2.98)*	0.14(0.43)		
ΔEX_{t-4}^+		-0.33(1.24)	-0.54(1.59)		
ΔEX_{t-5}^+			-0.15(0.42)		
ΔEX_{t-6}^+			-0.17(0.49)		
ΔEX_{t-7}^+			-0.42(1.53)		
ΔEX_t^-	0.59(1.89)**	0.14(0.75)	0.21(1.14)	0.1(0.31)	0.39(1.77)**
ΔEX_{t-1}^-		-0.39(1.48)	0.14(0.56)	-0.93(2.35)*	-0.19(0.64)
ΔEX_{t-2}^-		0.56(2.1)*	-0.23(0.95)		0.34(1.14)
ΔEX_{t-3}^-		-0.02(0.09)	-0.01(0.05)		0.09(0.28)
ΔEX_{t-4}^-		0.43(1.85)**	0.36(1.79)**		0.06(0.17)
ΔEX_{t-5}^-					0(0.01)
ΔEX_{t-6}^-					-0.86(2.15)*
ΔEX_{t-7}^-					0.52(2.07)*

(Continued…)

(Panel A Continued)

	Maine	Michigan	Minnesota	Missouri	Mississippi
ΔI_t^+	-1.26(0.35)	0.3(0.06)	8.42(2.23)*	4.01(0.91)	-9.21(3.82)*
ΔI_{t-1}^+	-8.46(2.29)*	2.54(0.44)	-13.94(2.36)*	-2.63(0.4)	
ΔI_{t-2}^+	7.1(1.72)*	-9.76(1.69)*	6.32(1.57)	5.66(0.93)	
ΔI_{t-3}^+	3.74(0.75)	9.31(1.75)*		-3.05(0.53)	
ΔI_{t-4}^+	-3.86(0.83)	-8.68(1.56)		1.48(0.25)	
ΔI_{t-5}^+	-4.85(1.16)	7.94(1.58)		-3.78(0.71)	
ΔI_{t-6}^+	3.22(0.71)	-4.78(1.08)		7.84(1.44)	
ΔI_{t-7}^+	7.23(1.83)**	7.18(2.58)*		8.67(1.75)**	
ΔI_t^-	14.33(2.74)*	9.73(2.84)*	-5.06(1.18)	-6.11(1.32)	4.23(1.42)
ΔI_{t-1}^-	11.7(1.79)**	-4.43(1.12)	6.4(1.39)	-4.11(0.5)	-4.2(1.2)
ΔI_{t-2}^-	-11.73(1.86)**	7.4(1.77)**	6.21(1.25)	5.13(0.73)	14.04(3.61)*
ΔI_{t-3}^-	-0.05(0.01)	8.26(1.74)**	-2.01(0.38)	3.63(0.51)	-7.11(2.35)*
ΔI_{t-4}^-	4.21(0.6)	10.83(2.14)*	-4.56(0.87)	2.49(0.38)	
ΔI_{t-5}^-	-3.51(0.64)	-5.97(1.44)	-7.75(1.47)	2.72(0.4)	
ΔI_{t-6}^-	3.85(0.65)		-3.89(0.77)	-13.34(1.93)**	
ΔI_{t-7}^-	-8.32(1.78)**		5.64(1.57)	-7.19(1.36)	
ΔM_t^+	-0.11(0.1)	-0.91(0.94)	1.63(1.47)	1.22(1.08)	1.9(3.06)*
ΔM_{t-1}^+	2.73(2.47)*	2.92(2.66)*	0.97(0.8)	1.63(1.46)	-1.34(2.43)*
ΔM_{t-2}^+	1.92(1.49)	0.5(0.54)	-1.97(1.64)	-1.05(1.13)	
ΔM_{t-3}^+	-2.33(2.88)*	-1.47(1.89)**	-0.51(0.47)	-0.51(0.58)	
ΔM_{t-4}^+	-0.76(0.9)	0.64(0.85)	1.2(1.09)	-1.13(1.47)	
ΔM_{t-5}^+	-0.65(0.85)	1.01(1.49)	-0.54(0.51)		
ΔM_{t-6}^+	2.3(3.36)*		0.02(0.02)		
ΔM_{t-7}^+			0.99(1.41)		
ΔM_t^-	1.96(2.31)*	0.67(0.85)	0.72(0.78)	-1.01(1.16)	0.13(0.2)
ΔM_{t-1}^-	-1.63(1.18)	0.25(0.22)	-2.62(2.01)*	-0.78(0.61)	
ΔM_{t-2}^-	0.18(0.15)	-0.29(0.27)	1.13(0.93)	-0.73(0.61)	
ΔM_{t-3}^-	0.51(0.48)	2.23(2.08)*	1.11(0.92)	0.25(0.23)	
ΔM_{t-4}^-	-1.53(1.49)	-1.88(1.63)	-2.65(2.43)*	-1.08(1.05)	
ΔM_{t-5}^-	1.33(1.28)	-1.28(0.95)	2.33(2.01)*	2.85(2.62)*	
ΔM_{t-6}^-	0.58(0.59)	-0.2(0.14)	-1.14(1.28)	-1.52(1.54)	
ΔM_{t-7}^-	-2.04(2.5)*	-1.81(1.72)**			
ΔEX_t^+	-0.63(2.39)*	0.18(0.51)	-0.69(1.95)**	-0.88(2.79)*	-0.06(0.26)
ΔEX_{t-1}^+	-0.08(0.18)	0.09(0.21)	-0.08(0.17)	-0.86(1.74)**	-0.66(2.76)*
ΔEX_{t-2}^+	-0.68(1.53)	-0.8(1.96)*	-0.82(1.67)**	1.12(2.2)*	
ΔEX_{t-3}^+	0.2(0.45)	0.68(1.63)	1.23(2.55)*	0.53(1.12)	
ΔEX_{t-4}^+	0.13(0.26)	-0.52(1.15)	0.41(0.83)	0.46(0.96)	
ΔEX_{t-5}^+	1.11(2.22)*	0.35(0.7)	-1.03(1.67)**	-0.39(0.75)	
ΔEX_{t-6}^+	-0.45(1.06)	-0.65(1.38)	0.77(1.44)	-0.94(2.03)*	
ΔEX_{t-7}^+	-0.95(2.33)*	0.58(1.72)**	-0.63(1.54)		
ΔEX_t^-	0.18(0.67)	-0.02(0.07)	-0.35(1.29)	-0.09(0.32)	-0.11(1.21)
ΔEX_{t-1}^-	0.15(0.52)	-0.27(0.96)	-0.14(0.44)	0.45(1.27)	
ΔEX_{t-2}^-	0.43(1.61)	0.35(1.2)	0.43(1.29)	0.6(1.58)	
ΔEX_{t-3}^-	-0.23(0.79)	-0.39(1.23)	-0.07(0.22)	-0.66(1.73)**	
ΔEX_{t-4}^-	-0.26(0.81)	0.33(0.81)	-0.03(0.06)	0.4(0.81)	
ΔEX_{t-5}^-	0.24(0.67)	-0.36(0.82)	0.34(0.82)	-0.35(0.75)	
ΔEX_{t-6}^-	-0.26(0.61)	-0.08(0.17)	-0.08(0.2)	0.55(1.08)	
ΔEX_{t-7}^-	0.56(2.07)*	-0.37(0.9)	0.58(1.91)**	1.19(3.83)*	

(Continued…)

(Panel A Continued)

	Montana	North Carolina	North Dakota	Nebraska
ΔI_t^+	-2.4(0.53)	-1.06(0.57)	1.1(1.62)	-9.24(4.12)*
ΔI_{t-1}^+	-0.52(0.1)	0.87(0.39)		-8.03(2.76)*
ΔI_{t-2}^+	-6.27(1.26)	0.37(0.17)		3.13(1.01)
ΔI_{t-3}^+	14.31(3.33)*	1.17(0.51)		4.28(1.56)
ΔI_{t-4}^+		0.76(0.31)		1.64(0.58)
ΔI_{t-5}^+		-5.22(2.79)*		-7.9(3.15)*
ΔI_{t-6}^+				2.26(0.92)
ΔI_{t-7}^+				
ΔI_t^-	-7.84(1.14)	4.29(2.08)*	-1.96(0.54)	-7.75(1.51)
ΔI_{t-1}^-	-2.23(0.24)	-2.86(1.15)	-1.02(0.24)	3.82(0.63)
ΔI_{t-2}^-	0.64(0.07)	-0.07(0.03)	0.6(0.14)	7.75(1.77)**
ΔI_{t-3}^-	-23.05(2.91)*	-5.08(1.79)**	-4.68(1.01)	
ΔI_{t-4}^-	15.51(2.05)*	-3.26(1.31)	4.89(1.14)	
ΔI_{t-5}^-	-18.13(2.57)*	0.16(0.07)	4.87(1.41)	
ΔI_{t-6}^-	13.88(2.32)*	1.32(0.65)		
ΔI_{t-7}^-		5.17(2.93)*		
ΔM_t^+	-1.41(0.89)	-0.05(0.08)	1.92(1.3)	-0.17(0.22)
ΔM_{t-1}^+	2.13(1.44)	-0.08(0.12)	0.2(0.12)	-1.35(1.34)
ΔM_{t-2}^+	-4.26(3.01)*	-0.19(0.31)	-0.84(0.54)	1.52(1.78)**
ΔM_{t-3}^+	-3.82(2.66)*	-0.83(1.53)	0.84(0.61)	0.19(0.24)
ΔM_{t-4}^+	2.69(2.02)*	-0.34(0.64)	-0.85(0.67)	-1.38(1.65)**
ΔM_{t-5}^+	-0.81(0.64)	0.12(0.23)	2.37(1.77)**	1.05(1.11)
ΔM_{t-6}^+	2.77(2.89)*	0.35(0.67)	2.22(1.64)	-1.18(1.65)
ΔM_{t-7}^+		0.84(1.91)**	2.57(2.02)*	
ΔM_t^-	4(2.59)*	0.28(0.5)	2.15(1.39)	-1.42(1.49)
ΔM_{t-1}^-	-5.32(2.65)*	-0.01(0.01)	2.14(1.32)	2.6(2.06)*
ΔM_{t-2}^-	2.2(1.24)	0.21(0.27)		-0.72(0.6)
ΔM_{t-3}^-	1.7(1.07)	1(1.22)		0.32(0.3)
ΔM_{t-4}^-	0.8(0.52)	-0.09(0.13)		-1.52(1.35)
ΔM_{t-5}^-	0.68(0.47)	0.88(1.72)**		3.02(2.61)*
ΔM_{t-6}^-	-3.31(2.86)*			-1.88(1.8)**
ΔM_{t-7}^-				
ΔEX_t^+	-1.01(2.17)*	-0.95(4)*	-2.23(4.8)*	-0.49(1.47)
ΔEX_{t-1}^+	0.74(1.03)		0.68(0.8)	-0.36(0.79)
ΔEX_{t-2}^+	-0.65(0.87)		0.36(0.41)	1.41(2.71)*
ΔEX_{t-3}^+	2.29(3.38)*		-0.66(0.83)	-0.4(0.87)
ΔEX_{t-4}^+	-1.39(1.89)**		2.25(3.01)*	-0.07(0.16)
ΔEX_{t-5}^+	-0.73(1.41)		-0.18(0.24)	0.75(1.62)
ΔEX_{t-6}^+			-1.42(1.87)**	0.32(0.73)
ΔEX_{t-7}^+			-1.11(1.73)**	-0.93(2.89)*
ΔEX_t^-	0.14(0.38)	0.8(5.05)*	0(0)	0.72(2.96)*
ΔEX_{t-1}^-	-0.16(0.34)	0.29(1.45)	0.66(1.23)	0.49(1.46)
ΔEX_{t-2}^-	1.04(2.17)*	0.2(1)	0.37(0.65)	-1.15(3.41)*
ΔEX_{t-3}^-	-1.02(2.07)*	-0.12(0.56)	-0.46(0.8)	0.35(1.02)
ΔEX_{t-4}^-	0.86(2.02)*	0.44(1.84)**	0.77(1.16)	0.73(1.77)**
ΔEX_{t-5}^-		-0.5(2.56)*	-1.95(3.01)*	-0.64(1.58)
ΔEX_{t-6}^-			1.61(3.65)*	-0.18(0.43)
ΔEX_{t-7}^-				1.02(3.59)*

(Continued…)

(Panel A Continued)

	New Hampshire	New Jersey	New Mexico	Nevada
ΔI_t^+	-0.81(0.7)	-2.91(0.81)	-7.88(1.85)**	-8.44(2.45)*
ΔI_{t-1}^+		-9.83(2.35)*	-0.43(0.09)	-2.78(0.62)
ΔI_{t-2}^+		-2.53(0.58)	3.99(0.89)	10.03(2.27)*
ΔI_{t-3}^+		2.2(0.5)	4.35(0.98)	-6.38(1.47)
ΔI_{t-4}^+		7.64(1.73)**	-6.05(1.38)	7.42(1.84)**
ΔI_{t-5}^+		-4.8(1.08)	1.15(0.26)	-2.69(0.63)
ΔI_{t-6}^+		-2.21(0.47)	1.31(0.29)	-0.78(0.17)
ΔI_{t-7}^+		6.31(1.58)	6.4(1.58)	5.38(1.61)
ΔI_t^-	5.14(1.78)**	16.48(3.1)*	1.28(0.29)	14.85(3.9)*
ΔI_{t-1}^-	-7.49(1.79)**	15.05(2.57)*	-3.97(0.67)	-3.56(0.56)
ΔI_{t-2}^-	18.76(4.12)*	9.61(1.6)	5.06(0.84)	-22.96(3.23)*
ΔI_{t-3}^-	-17.21(3.73)*	-0.15(0.03)	7.15(1.14)	11.64(1.7)**
ΔI_{t-4}^-	6.72(1.68)**	-7.01(1.27)	-4.37(0.73)	-6.74(1.08)
ΔI_{t-5}^-	2.16(0.54)	14.36(2.61)*	-2.37(0.36)	-10.87(1.74)**
ΔI_{t-6}^-	-4.11(1.05)	-0.45(0.07)	8.33(1.23)	-2.05(0.35)
ΔI_{t-7}^-	-5.85(1.72)**	-4.97(0.94)	-16.91(2.84)*	-12.3(2.15)*
ΔM_t^+	-0.56(0.62)	-1.23(1.49)	1.98(1.73)*	1.97(1.5)
ΔM_{t-1}^+	-2.69(3.24)*		2.84(2.35)*	1.76(1.4)
ΔM_{t-2}^+			1.03(0.96)	-0.04(0.03)
ΔM_{t-3}^+			-2.12(2.06)*	-3.61(3.4)*
ΔM_{t-4}^+			-0.11(0.09)	-1.46(1.2)
ΔM_{t-5}^+			-1.59(1.73)**	-1.2(1.23)
ΔM_{t-6}^+				-0.48(0.54)
ΔM_{t-7}^+				1.1(1.38)
ΔM_t^-	1.82(2.13)*	0.77(0.77)	-1.48(1.45)	2.05(1.75)**
ΔM_{t-1}^-	-0.34(0.32)	1.15(0.92)	-2.81(1.98)*	-4.26(2.89)*
ΔM_{t-2}^-	1.55(2.24)*	0.88(0.82)	-1.27(0.92)	2.3(1.65)**
ΔM_{t-3}^-		1.02(1.01)	0.12(0.09)	2.35(1.63)
ΔM_{t-4}^-		0.07(0.07)	-1.07(0.87)	-0.5(0.36)
ΔM_{t-5}^-		0.3(0.29)	3.5(3.07)*	3.03(2.24)*
ΔM_{t-6}^-		-0.36(0.36)	0(0)	-1.11(0.92)
ΔM_{t-7}^-		-1.93(2.12)*	-1.42(1.69)**	1.37(1.5)
ΔEX_t^+	-0.86(3.18)*	-0.35(1.07)	0.08(0.23)	-0.96(3.33)*
ΔEX_{t-1}^+	-0.24(0.55)	-0.73(1.47)	-0.58(0.99)	
ΔEX_{t-2}^+	-0.07(0.15)	1.07(2.43)*	-1.07(1.68)**	
ΔEX_{t-3}^+	0.51(1.66)**	0.73(1.99)*	0.63(1.2)	
ΔEX_{t-4}^+			0.14(0.27)	
ΔEX_{t-5}^+			0.1(0.17)	
ΔEX_{t-6}^+			-0.76(1.42)	
ΔEX_{t-7}^+			-0.74(1.87)**	
ΔEX_t^-	0.02(0.11)	0.52(2.15)*	-0.79(2.43)*	-0.39(1.18)
ΔEX_{t-1}^-	0.31(0.98)	-0.49(1.37)	-0.2(0.57)	0.46(1.28)
ΔEX_{t-2}^-	0.65(2.05)*	0(0)	0.4(1.07)	0.66(1.9)**
ΔEX_{t-3}^-	-0.68(2.11)*	-0.49(1.27)	0.16(0.43)	0(0.01)
ΔEX_{t-4}^-	0.85(2.38)*	-0.11(0.23)	-0.48(1.12)	0.43(1.01)
ΔEX_{t-5}^-	-1.25(3.28)*	0.2(0.42)	0(0.01)	-0.32(0.75)
ΔEX_{t-6}^-	0.45(1.1)	-0.42(0.94)	0.05(0.09)	-0.08(0.17)
ΔEX_{t-7}^-	0.66(2.44)*	0.85(3)*	0.45(1.25)	0.89(2.52)*

(Continued…)

(Panel A Continued)

	New York	Ohio	Oklahoma	Oregon	Pennsylvania
ΔI_t^+	-3.34(1.01)	1.71(0.52)	-2.26(1.23)	-13.35(2.65)*	3.48(1)
ΔI_{t-1}^+	-7.85(2.14)*	8.39(2.11)*	7.97(3.23)*	-12.07(2.06)*	-10.73(2.36)*
ΔI_{t-2}^+		-4.59(1.56)	0.51(0.2)	7.67(1.2)	13.43(2.83)*
ΔI_{t-3}^+			-4.18(1.69)**	0.75(0.11)	-9.23(1.78)**
ΔI_{t-4}^+			1.94(0.79)	-14.6(2.12)*	6.92(1.41)
ΔI_{t-5}^+			-4.82(2.1)*	10.24(1.4)	-12.28(2.66)*
ΔI_{t-6}^+			3.16(1.75)**	9.14(1.41)	17.23(3.5)*
ΔI_{t-7}^+				-5.99(1.07)	-14.24(4.35)*
ΔI_t^-	4.98(1.01)	-2.89(0.88)	-3.44(0.89)	7.07(0.95)	6.33(1.81)**
ΔI_{t-1}^-	3.32(0.63)	1.94(0.45)	-12.97(2.82)*	0.06(0.01)	8.17(1.69)**
ΔI_{t-2}^-	-11.01(2.08)*	-7.57(2.12)*	7.04(1.48)	1.22(0.13)	0.38(0.07)
ΔI_{t-3}^-	14.71(2.99)*	0.16(0.04)	3.12(0.7)	11.61(1.4)	-4.84(0.91)
ΔI_{t-4}^-	-6.17(1.43)	0.43(0.12)	-9.26(2.97)*		-3.71(0.74)
ΔI_{t-5}^-		-0.42(0.11)			9.74(1.97)*
ΔI_{t-6}^-		-6.74(1.82)**			-4.96(1.49)
ΔI_{t-7}^-		6.83(2.48)*			
ΔM_t^+	1.77(1.43)	-0.58(1.1)	-0.1(0.14)	2.99(1.86)**	-0.57(0.82)
ΔM_{t-1}^+	5.74(4.28)*			2.45(1.44)	-0.21(0.27)
ΔM_{t-2}^+	0.13(0.11)			-0.64(0.46)	0.13(0.17)
ΔM_{t-3}^+	-3.26(3.46)*			-1.4(1.12)	0.14(0.2)
ΔM_{t-4}^+				-1.34(1.09)	0.38(0.61)
ΔM_{t-5}^+				2.16(2.11)*	-0.37(0.6)
ΔM_{t-6}^+					-1.13(1.81)**
ΔM_{t-7}^+					1.38(2.62)*
ΔM_t^-	-0.63(0.48)	0.88(1.51)	0.84(1.02)	0.7(0.41)	2.16(3.13)*
ΔM_{t-1}^-	-2.2(1.35)		0.55(0.53)	1.98(1.01)	-0.73(0.85)
ΔM_{t-2}^-	0.2(0.13)		2.11(2.2)*	-3.63(1.86)**	2.47(2.94)*
ΔM_{t-3}^-	0.79(0.52)		-1.57(1.62)	2.19(1.07)	-0.09(0.11)
ΔM_{t-4}^-	-2.99(2.08)*		0.85(0.91)	0.96(0.53)	-0.67(0.83)
ΔM_{t-5}^-	5.05(3.34)*		-0.02(0.02)	-0.69(0.36)	1.49(1.8)**
ΔM_{t-6}^-	0.68(0.44)		0.49(0.51)	-1.86(1.31)	1.24(1.68)**
ΔM_{t-7}^-	-2.44(2.01)*		2.41(3.17)*		-2.32(3.68)*
ΔEX_t^+	-0.82(1.81)**	-0.71(3.32)*	-0.73(2.81)*	-0.99(1.68)**	-0.6(2.87)*
ΔEX_{t-1}^+	-1.05(1.57)	-0.31(0.97)	-0.78(1.86)**	-0.56(0.65)	0.25(0.72)
ΔEX_{t-2}^+	0.45(0.67)	-0.06(0.18)	0.72(1.7)**	-0.18(0.21)	-0.92(2.35)*
ΔEX_{t-3}^+	1.25(2)*	0.01(0.02)	-0.53(1.83)**	-1(1.33)	1(2.92)*
ΔEX_{t-4}^+	0.73(1.16)	0.16(0.52)		1.3(1.69)**	-1.08(3.23)*
ΔEX_{t-5}^+	-0.27(0.4)	0.39(1.32)		-1.04(1.23)	0.55(1.45)
ΔEX_{t-6}^+	-1.19(2.37)*	-0.27(1.35)		0.2(0.27)	-0.09(0.25)
ΔEX_{t-7}^+				-1.06(1.7)**	0.26(1)
ΔEX_t^-	1.16(3.52)*	0.43(2.55)*	0.3(1.39)	-0.63(1.32)	0.16(0.85)
ΔEX_{t-1}^-	-0.6(1.21)	0.04(0.17)	0.31(1.14)	-0.41(0.73)	0.04(0.17)
ΔEX_{t-2}^-	-0.18(0.34)	0.15(0.65)		0.37(0.66)	0.63(2.75)*
ΔEX_{t-3}^-	-0.78(1.34)	0.15(0.61)		0.77(1.34)	-0.38(1.6)
ΔEX_{t-4}^-	-0.37(0.59)	0.57(2.01)*		-1.32(1.89)**	0.23(0.94)
ΔEX_{t-5}^-	2.08(3.29)*	-0.56(1.89)**		1.02(2.09)*	
ΔEX_{t-6}^-	-0.74(1.21)	-0.05(0.16)			
ΔEX_{t-7}^-	1.44(3.83)*	0.59(2.88)*			

(Continued…)

(Panel A Continued)

	Rhode Island	South Carolina	South Dakota	Tennessee
ΔI_t^+	1.56(0.37)	-4.5(2.48)*	-5.06(2.48)*	-1.28(0.43)
ΔI_{t-1}^+	2.71(0.42)	-2.55(0.78)	5.11(1.8)**	0.3(0.07)
ΔI_{t-2}^+	6.66(1.34)	3.53(1.08)	1.33(0.47)	6.61(1.58)
ΔI_{t-3}^+		2.82(0.87)	-1.17(0.4)	-5.36(1.22)
ΔI_{t-4}^+		-11.03(3.42)*	-4.71(1.62)	1.05(0.27)
ΔI_{t-5}^+		9.96(2.89)*	-3.27(1.38)	-1.91(0.51)
ΔI_{t-6}^+		-4.66(2.02)*		-3.63(1.44)
ΔI_{t-7}^+				
ΔI_t^-	3.07(0.6)	2.71(0.84)	-0.8(0.21)	6.33(1.8)**
ΔI_{t-1}^-	-5.51(0.71)	13.14(2.46)*	-16.08(4.11)*	1.53(0.27)
ΔI_{t-2}^-	2.35(0.35)	3.96(0.71)		-10.78(1.77)**
ΔI_{t-3}^-	11.58(1.63)	-14.6(2.62)*		-12.38(2.05)*
ΔI_{t-4}^-	-6.68(0.9)	10.18(1.81)**		5.82(0.99)
ΔI_{t-5}^-	-1.15(0.17)	-2.38(0.51)		8.92(1.72)**
ΔI_{t-6}^-	-8.41(1.82)**	-7.16(1.72)**		-0.39(0.08)
ΔI_{t-7}^-		8.71(2.72)*		10.24(2.7)*
ΔM_t^+	0.66(0.73)	0.09(0.15)	1.82(1.32)	-0.27(0.34)
ΔM_{t-1}^+	2.96(2.78)*	-0.61(0.87)	1.95(1.55)	-0.96(1.15)
ΔM_{t-2}^+	-0.8(0.72)	0.14(0.22)	3.1(2.82)*	0.61(0.78)
ΔM_{t-3}^+	-1.36(1.58)	-0.11(0.18)	0.38(0.37)	1.07(1.48)
ΔM_{t-4}^+		-0.29(0.5)	-2.27(2.13)*	-1.43(2.11)*
ΔM_{t-5}^+		0.54(1.04)	-0.69(0.61)	0.84(1.33)
ΔM_{t-6}^+		-0.26(0.51)	3.23(3.63)*	0.03(0.05)
ΔM_{t-7}^+		0.78(1.97)*		1.69(3.42)*
ΔM_t^-	0.01(0.01)	1.08(1.78)**	-1.68(1.86)**	0.89(1.18)
ΔM_{t-1}^-	-0.46(0.33)	1.86(2.37)*		2.62(2.95)*
ΔM_{t-2}^-	-0.41(0.33)	0.1(0.12)		-2.01(2.19)*
ΔM_{t-3}^-	3.35(2.79)*	0(0)		2.09(2.24)*
ΔM_{t-4}^-	-1.29(1.09)	0.67(0.92)		0(0)
ΔM_{t-5}^-	1.21(1.02)	0.67(1.11)		0.41(0.5)
ΔM_{t-6}^-	1.29(1.06)			-1.21(1.92)**
ΔM_{t-7}^-	-1.69(1.68)**			
ΔEX_t^+	-0.06(0.15)	-0.21(2.09)*	-0.27(0.59)	-0.97(4.06)*
ΔEX_{t-1}^+	-0.99(1.7)**		-1.62(2.36)*	-0.35(1.3)
ΔEX_{t-2}^+	0.69(1.64)		-0.22(0.31)	
ΔEX_{t-3}^+			0.31(0.47)	
ΔEX_{t-4}^+			0.25(0.38)	
ΔEX_{t-5}^+			0.97(1.41)	
ΔEX_{t-6}^+			-0.01(0.01)	
ΔEX_{t-7}^+			-0.74(1.63)	
ΔEX_t^-	0.25(0.8)	-0.08(0.88)	0.7(2.25)*	0.68(3.05)*
ΔEX_{t-1}^-	0.44(1.18)		0.9(2.09)*	0.36(1.09)
ΔEX_{t-2}^-	-0.19(0.53)		0.57(1.34)	0.84(2.53)*
ΔEX_{t-3}^-	0.3(0.83)		-0.19(0.42)	-0.44(1.68)**
ΔEX_{t-4}^-	-0.73(1.62)		-0.56(1.08)	
ΔEX_{t-5}^-	1.14(2.31)*		0.65(1.22)	
ΔEX_{t-6}^-	-0.8(1.63)		-0.5(0.91)	
ΔEX_{t-7}^-	0.81(2.46)*		0.58(1.58)	

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(Panel A Continued)

	Texas	Utah	Virginia	Vermont	Washington
ΔI_t^+	3.13(1.74)**	-4.09(1.92)**	5.98(2.25)*	-8.61(1.59)	-1.16(0.7)
ΔI_{t-1}^+		-1.62(0.5)	4.63(1.4)	-12.96(1.95)**	5.93(1.9)**
ΔI_{t-2}^+		0.57(0.19)	-0.03(0.01)	-0.21(0.03)	1.51(0.47)
ΔI_{t-3}^+		6.45(2.14)*	-2.34(0.77)	-0.24(0.04)	-4.35(1.34)
ΔI_{t-4}^+		-2.28(0.73)	3.04(1.06)	9.72(1.41)	5.5(2.3)*
ΔI_{t-5}^+		-1.94(0.68)	-4.2(1.53)	-4.49(0.61)	
ΔI_{t-6}^+		3.28(1.2)	-3.64(1.37)	-6.42(0.95)	
ΔI_{t-7}^+		3.43(1.47)	5.87(2.57)*	8.77(1.42)	
ΔI_t^-	-2.87(1.19)	1.68(0.45)	4.81(1.94)**	-13.91(1.27)	7.58(2.91)*
ΔI_{t-1}^-	2.84(0.97)	-8.94(1.53)		-14.68(0.94)	2.77(0.68)
ΔI_{t-2}^-	5.63(2.19)*	-1.19(0.21)		41.23(2.31)*	-5.41(1.34)
ΔI_{t-3}^-	-4.55(1.55)	6.43(1.21)		3.38(0.22)	1.64(0.47)
ΔI_{t-4}^-	1.57(0.55)	-11.25(2.68)*		-19.28(1.09)	0.07(0.03)
ΔI_{t-5}^-	-4.32(1.62)			38.77(2.18)*	0.79(0.36)
ΔI_{t-6}^-	-3.17(1.24)			-25.47(1.4)	-3.32(2.03)*
ΔI_{t-7}^-	2.98(1.73)**			-17.81(1.27)	
ΔM_t^+	-0.8(1.64)	2.48(3.22)*	1.02(1.69)**	0.84(0.51)	-0.18(0.2)
ΔM_{t-1}^+		1.58(1.79)**	2.33(3.26)*	4(2.05)*	1.04(1.17)
ΔM_{t-2}^+		0.43(0.52)	-0.77(1.22)	-1.9(0.81)	1.7(1.94)**
ΔM_{t-3}^+		-1.27(1.96)*	-1.22(2.02)*	-0.35(0.16)	-0.41(0.58)
ΔM_{t-4}^+		-0.81(1.2)	-0.92(1.36)	-1.13(0.59)	-1.58(2.3)*
ΔM_{t-5}^+		0.44(0.69)	0.09(0.14)	-0.36(0.22)	-0.94(1.16)
ΔM_{t-6}^+		-1.04(1.82)**	1.36(2.31)*	0.05(0.04)	0.46(0.64)
ΔM_{t-7}^+				1.62(1.45)	0.87(1.34)
ΔM_t^-	1.01(2.34)*	-0.61(0.77)	-1.42(2.18)*	-0.3(0.15)	0.06(0.07)
ΔM_{t-1}^-	-0.46(0.75)	-0.34(0.38)	-0.42(0.5)	-0.45(0.19)	-0.82(0.84)
ΔM_{t-2}^-	-0.35(0.59)	-1.76(1.98)*	-0.47(0.54)	-1.04(0.49)	0.39(0.39)
ΔM_{t-3}^-	0.33(0.55)	1.01(1.1)	0.63(0.83)	0.91(0.47)	-0.91(0.9)
ΔM_{t-4}^-	-0.26(0.47)	-1.45(1.66)**	1.03(1.43)	0.15(0.08)	-0.08(0.08)
ΔM_{t-5}^-	1.01(1.85)**	2.53(2.98)*	1.42(1.98)*	2.59(1.44)	1.57(1.69)**
ΔM_{t-6}^-	-1.17(2.14)*	-0.27(0.31)	-0.96(1.31)	1.46(0.81)	1.33(1.39)
ΔM_{t-7}^-	0.85(1.73)**	1.32(1.98)*	-1.82(2.77)*	-4.01(2.73)*	-0.98(1.22)
ΔEX_t^+	-0.6(3.31)*	-0.54(2.35)*	-0.95(3.79)*	-0.23(0.41)	-0.73(2.45)*
ΔEX_{t-1}^+	0.42(1.48)	-0.06(0.16)	-1.08(3.42)*	-1.66(1.95)**	-0.56(1.33)
ΔEX_{t-2}^+	-0.09(0.29)	-0.26(0.71)	0.5(1.6)	0.49(0.48)	-0.37(0.89)
ΔEX_{t-3}^+	0.19(0.76)	-0.34(0.97)	0.84(2.85)*	1.1(1.13)	0.03(0.06)
ΔEX_{t-4}^+	-0.14(0.54)	0.64(1.86)**	-0.17(0.56)	0.46(0.56)	0.31(0.77)
ΔEX_{t-5}^+	0.22(0.85)	0.2(0.51)	0.17(0.52)	-0.9(1.25)	0.09(0.18)
ΔEX_{t-6}^+	-0.37(2.05)*	0.18(0.49)	-0.79(2.63)*		-0.5(1.02)
ΔEX_{t-7}^+		-0.52(2.04)*	0.33(1.53)		-0.41(1.1)
ΔEX_t^-	0.03(0.22)	0.13(0.59)	0.35(2.11)*	-0.91(1.97)*	0.51(2.31)*
ΔEX_{t-1}^-	-0.21(1.14)		0.57(2.73)*	-0.4(0.67)	0.73(2.56)*
ΔEX_{t-2}^-	0.25(1.29)		0.22(1.02)	1.2(2.23)*	-0.13(0.47)
ΔEX_{t-3}^-	-0.18(0.93)		-0.67(2.87)*	-0.13(0.22)	-0.05(0.18)
ΔEX_{t-4}^-	0.35(1.46)		0.2(0.76)	-0.37(0.52)	0.45(1.39)
ΔEX_{t-5}^-	-0.46(1.79)**		-0.26(0.97)	0.25(0.35)	-0.19(0.54)
ΔEX_{t-6}^-	0.19(0.75)		-0.09(0.31)	-0.1(0.14)	-0.34(0.83)
ΔEX_{t-7}^-	0.51(2.96)*		0.79(3.94)*	1.08(1.93)**	0.63(2.11)*

(Continued…)

(Panel A Continued)

	Wisconsin	West Virginia	Wyoming	District of Columbia
ΔI_t^+	0.65(0.24)	-3.37(0.67)	-7.7(3.74)*	24.8(4.03)*
ΔI_{t-1}^+	-6.75(1.85)**	1.39(0.29)	1.83(0.63)	
ΔI_{t-2}^+	-0.87(0.22)	-1.95(0.42)	-8.93(3.24)*	
ΔI_{t-3}^+	7.85(2.07)*	4.01(0.85)	7.28(2.72)*	
ΔI_{t-4}^+	-3.34(1.12)	-0.94(0.19)	3.12(1.22)	
ΔI_{t-5}^+		1.07(0.22)	-5.47(2.15)*	
ΔI_{t-6}^+		-10.36(2.04)*	2.22(1.13)	
ΔI_{t-7}^+		13.65(2.81)*		
ΔI_t^-	2.44(0.62)	-4.64(1.16)	13.26(3.68)*	-11.35(1.01)
ΔI_{t-1}^-	0.3(0.06)		-10.09(1.98)*	
ΔI_{t-2}^-	2.19(0.45)		-1.07(0.18)	
ΔI_{t-3}^-	-4.27(0.81)		2.06(0.38)	
ΔI_{t-4}^-	2.73(0.53)		11.01(1.7)**	
ΔI_{t-5}^-	-9.83(2.29)*		-5.32(1)	
ΔI_{t-6}^-	2.73(0.75)		7.79(2.41)*	
ΔI_{t-7}^-	4.26(1.49)			
ΔM_t^+	0.87(1.1)	-1.83(2.46)*	-1.29(1.27)	1.54(0.41)
ΔM_{t-1}^+	0.68(0.72)		-0.28(0.27)	
ΔM_{t-2}^+	1.29(1.5)		2.73(2.64)*	
ΔM_{t-3}^+	-1.82(2.32)*			
ΔM_{t-4}^+	0.31(0.48)			
ΔM_{t-5}^+	-0.7(1.08)			
ΔM_{t-6}^+	0.69(1.02)			
ΔM_{t-7}^+	1.11(1.96)**			
ΔM_t^-	1.41(2.05)*	0.22(0.23)	4.22(3.93)*	-9.05(2.1)*
ΔM_{t-1}^-	-1.04(1.34)	2.51(2.14)*		
ΔM_{t-2}^-		-3.37(2.86)*		
ΔM_{t-3}^-		2.83(2.94)*		
ΔM_{t-4}^-				
ΔM_{t-5}^-				
ΔM_{t-6}^-				
ΔM_{t-7}^-				
ΔEX_t^+	-0.24(1.02)	-0.09(0.23)	-0.78(2.18)*	-4.79(2.9)*
ΔEX_{t-1}^+	0.26(0.73)	-0.29(0.53)	1.11(1.91)**	-1.07(0.45)
ΔEX_{t-2}^+	-1.02(2.71)*	1.34(2.36)*	-1.55(2.83)*	3.4(1.98)*
ΔEX_{t-3}^+	0.62(1.86)**	-0.69(1.79)**	0.37(0.74)	
ΔEX_{t-4}^+	0.71(2.13)*		-0.69(1.97)*	
ΔEX_{t-5}^+	-0.81(3.03)*			
ΔEX_{t-6}^+				
ΔEX_{t-7}^+				
ΔEX_t^-	-0.17(0.84)	0.1(0.35)	0.58(2.37)*	3.18(2.65)*
ΔEX_{t-1}^-	0.03(0.13)	-0.07(0.19)	-0.45(1.31)	
ΔEX_{t-2}^-	0.87(3.53)*	0.25(0.67)	0.69(2.02)*	
ΔEX_{t-3}^-	-0.02(0.09)	-0.48(1.21)	0.04(0.1)	
ΔEX_{t-4}^-	-0.33(1.32)	0.48(1.05)	1.07(2.48)*	
ΔEX_{t-5}^-		0.32(0.65)	-0.99(2.05)*	
ΔEX_{t-6}^-		-1.06(2.18)*	0.31(0.65)	
ΔEX_{t-7}^-		1.31(3.91)*	-1.13(2.95)*	

Panel B Long-Run

	Alaska	Alabama	Arkansas	Arizona
Constant	21.47(1.73)**	11.8(7.16)*	9.12(10.01)*	-25.23(0.14)
I_t^+	-77.76(0.9)	-10.83(3.23)*	7.24(0.86)	-24.84(0.19)
I_t^-	-43.31(0.46)	20.64(8.42)*	12.46(4.83)*	56.09(0.24)
M_t^+	-1.88(0.19)	-0.84(0.82)	-4.63(1.52)	65.29(0.19)
M_t^-	9.47(0.65)	-1.98(2.89)*	-2.83(3.78)*	24.11(0.18)
EX_t^+	9.76(0.74)	0.67(1.87)**	0.21(0.76)	-1.39(0.24)
EX_t^-	-6.12(0.88)	-0.4(1.48)	0.91(1.42)	0.24(0.05)
	California	**Colorado**	**Connecticut**	**Delaware**
Constant	-10.7(0.11)	-0.19(0.03)	7.46(3.14)*	6.75(3.36)*
I_t^+	-27.25(0.13)	-11.55(0.99)	-17.11(1.36)	0.24(0.06)
I_t^-	-13.68(0.08)	46.37(1.37)	53.76(1.98)*	18.95(1.77)**
M_t^+	-25.27(0.17)	13.98(1.03)	-1.33(0.44)	-8.03(1.98)**
M_t^-	-6.13(0.22)	-0.99(0.37)	-15.1(1.95)**	-8.91(2.64)*
EX_t^+	-17.83(0.18)	-0.23(0.2)	-0.97(1.18)	-0.54(0.72)
EX_t^-	-34.87(0.17)	0.54(0.39)	1.05(1.52)	-0.24(0.44)
	Florida	**Georgia**	**Hawaii**	**Iowa**
Constant	-406.93(0.01)	-1.89(0.45)	9.22(9.52)*	12.37(25.19)*
I_t^+	2238.39(0.01)	-25.86(1.78)**	-4.87(2.03)*	0.42(0.49)
I_t^-	-121.52(0.01)	53.07(2.47)*	32.02(7.68)*	18(11.72)*
M_t^+	-127.01(0.01)	25.86(2.08)*	0.65(1.23)	-2.09(4.13)*
M_t^-	-186.4(0.01)	4.84(1.21)	-1.4(2.18)*	-2.41(5.83)*
EX_t^+	32.29(0.01)	-2.82(2.54)*	0.24(1.07)	-0.34(2.97)*
EX_t^-	582.53(0.01)	-3.55(1.42)	-0.51(2.8)*	-0.85(4.73)*
	Idaho	**Illinois**	**Indiana**	**Kansas**
Constant	13.22(10.37)*	10.24(1.08)	10.44(9.12)*	-38.48(0.04)
I_t^+	-5.67(3.14)*	29.88(0.31)	-0.57(0.2)	-17.2(0.06)
I_t^-	41.12(9.68)*	-82.25(0.31)	17(3.82)*	-80.78(0.05)
M_t^+	-2.63(1.72)**	-31.46(0.38)	-3.18(2.55)*	96.25(0.05)
M_t^-	-4.3(4.67)*	-3.16(0.52)	-3.62(4.31)*	80.81(0.05)
EX_t^+	-0.03(0.12)	-13.57(0.41)	-0.6(1.64)	4.27(0.05)
EX_t^-	-1.49(2.79)*	-19.39(0.41)	-0.79(2.22)*	-1.91(0.05)
	Kentucky	**Louisiana**	**Massachusetts**	**Maryland**
Constant	8.18(31.96)*	27.62(0.63)	-7.55(0.35)	70.05(0.08)
I_t^+	-4.96(5.34)*	-77.09(0.49)	-38.46(0.59)	-155.65(0.07)
I_t^-	17.62(18.4)*	7.87(0.71)	45.01(0.62)	145.45(0.07)
M_t^+	1.04(3.84)*	-7.56(0.42)	44.81(0.65)	-66.34(0.07)
M_t^-	-1.94(11.1)*	-1.74(0.41)	21.81(0.58)	-61.04(0.07)
EX_t^+	-0.71(9.36)*	7.38(0.47)	0.23(0.1)	19.48(0.07)
EX_t^-	-0.6(5.9)*	-5.29(0.45)	-3.88(0.61)	7.39(0.07)

(Continued…)

(Panel B Continued)

	Maine	**Michigan**	**Minnesota**	**Missouri**
Constant	11.45(0.73)	10.82(16.04)*	5.64(2.98)*	6.71(5.77)*
I_t^+	-34.06(0.46)	-12.73(5.52)*	1.04(0.15)	-25.09(3.21)*
I_t^-	92.64(0.59)	16.04(5.61)*	14.81(1.67)**	22.35(6.21)*
M_t^+	2.16(0.17)	4.28(4.69)*	-1.78(0.47)	3.72(2.57)*
M_t^-	5.73(0.35)	-2.3(4.86)*	-0.81(0.54)	0.65(0.37)
EX_t^+	2.45(0.33)	-0.87(2.58)*	-1.61(1.89)**	-0.66(1.3)
EX_t^-	-8.65(0.49)	-0.88(1.85)**	-2.89(2.82)*	-4.38(1.74)**
	Mississippi	**Montana**	**North Carolina**	**North Dakota**
Constant	7.49(6.14)*	15.47(0.99)	7.91(11.72)*	0.99(0.86)
I_t^+	-8.72(1.83)**	-33.59(0.72)	0.57(0.53)	0.51(1.61)
I_t^-	20.25(4.52)*	15.9(0.5)	8.88(9.83)*	-4.06(2.52)*
M_t^+	2.51(3.08)*	7.17(0.79)	-0.71(0.65)	-2.69(3.37)*
M_t^-	-2.03(1.83)**	11.38(0.63)	-3.25(3.52)*	-1.54(3.84)*
EX_t^+	-0.19(0.61)	3.35(0.6)	-0.71(4.69)*	-0.09(0.53)
EX_t^-	-0.31(1.11)	-6.57(0.73)	0.28(1.43)	-0.08(0.64)
	Nebraska	**New Hampshire**	**New Jersey**	**New Mexico**
Constant	6.55(5.25)*	7(4.23)*	8.16(1.46)	-24.14(0.53)
I_t^+	-6.35(1.16)	-2.76(0.71)	65.26(0.61)	141.85(0.63)
I_t^-	-5.22(0.43)	17.5(1.46)	-132.7(0.55)	-87.66(0.55)
M_t^+	-0.57(0.29)	-2.25(0.79)	-23.81(0.61)	-9.14(0.47)
M_t^-	-3.35(3.02)*	-1.48(1.13)	-8.47(0.86)	-1.2(0.31)
EX_t^+	-1(3.92)*	-1.17(1.94)**	-6.87(0.7)	-13.03(0.67)
EX_t^-	-0.43(0.53)	-2.76(2.08)*	3.88(0.56)	8.05(0.7)
	Nevada	**New York**	**Ohio**	**Oklahoma**
Constant	6.56(19.68)*	1.84(0.84)	4.8(0.53)	7.64(24.59)*
I_t^+	-5.81(11.68)*	2.82(0.38)	15.56(0.34)	-2.43(4.43)*
I_t^-	20.34(25.67)*	12.81(1.67)**	-38.36(0.31)	5.59(11.98)*
M_t^+	3.19(9.47)*	2.2(0.8)	-18.86(0.41)	-0.6(1.63)
M_t^-	-1.63(6.69)*	-2.92(1.44)	-6.17(0.52)	-2.03(6.45)*
EX_t^+	-0.39(4.86)*	-2.93(2.56)*	-7.43(0.47)	-0.06(0.74)
EX_t^-	-0.79(5.47)*	-2.44(1.97)*	-9.26(0.47)	-0.01(0.14)
	Oregon	**Pennsylvania**	**Rhode Island**	**South Carolina**
Constant	21.47(1.73)**	7.53(2.36)*	6.66(2.45)*	11(3.65)*
I_t^+	-77.76(0.9)	12.59(0.54)	-12.3(0.52)	-7.7(1.66)**
I_t^-	-43.31(0.46)	9.54(2.16)*	23.29(0.92)	20.91(4.85)*
M_t^+	-1.88(0.19)	-3.41(0.55)	-1.3(0.26)	-3.69(0.87)
M_t^-	9.47(0.65)	-2.95(0.9)	-3.79(0.5)	-7.13(1.69)**
EX_t^+	9.76(0.74)	-1.72(0.82)	-1.32(0.64)	-0.72(2.01)*
EX_t^-	-6.12(0.88)	-0.46(1.02)	-2.67(0.58)	-0.27(0.95)

(Continued…)

(Panel B Continued)

	South Dakota	Tennessee	Texas	Utah
Constant	-2.13(0.19)	4.66(0.6)	10.49(2.2)*	5.83(17.73)*
I_t^+	-26.42(0.91)	5.47(0.18)	-3.68(1.05)	-7.03(7.79)*
I_t^-	-31.23(0.64)	-20.7(0.18)	7.49(1.12)	9.88(13.51)*
M_t^+	14.89(1.15)	-13.11(0.29)	-4.6(0.57)	3.15(7.78)*
M_t^-	7.17(0.6)	-13.02(0.42)	-1.66(0.99)	-1.84(6.06)*
EX_t^+	3.73(0.65)	-5.07(0.47)	-0.67(1.35)	-0.45(4.87)*
EX_t^-	2.79(0.9)	-3.33(0.46)	-3.03(0.78)	-0.24(2.74)*
	Virginia	**Vermont**	**Washington**	**Wisconsin**
Constant	5.3(1.7)*	5.04(0.61)	7.86(1.54)	7.26(8.32)*
I_t^+	15.59(1.2)	6.66(0.23)	-22.7(1)	-5.27(1.23)
I_t^-	-24.44(0.59)	11.86(0.25)	58.29(1.17)	22.73(4.73)*
M_t^+	-9.58(0.86)	14.89(0.5)	-6.13(0.64)	0.79(0.36)
M_t^-	0.48(0.1)	-4.69(0.51)	-0.76(0.16)	-1.9(2.26)*
EX_t^+	-3.1(1.39)	3.18(0.47)	5.89(0.95)	-0.25(0.73)
EX_t^-	-3.94(0.87)	12.86(0.51)	-4.85(0.95)	-0.73(1.65)
	West Virginia	**Wyoming**	**District of Columbia**	
Constant	4.78(0.12)	13.53(1.1)	-2.23(0.31)	
I_t^+	-61.88(0.33)	-32.44(0.72)	43.16(4.73)*	
I_t^-	-121.39(0.26)	4.5(0.89)	-19.75(0.99)	
M_t^+	-47.86(0.28)	-3.01(0.47)	-9.55(2.38)*	
M_t^-	-22.66(0.32)	-4.56(0.82)	-1.28(0.42)	
EX_t^+	-6.99(0.27)	6.92(0.72)	-4.63(2.71)*	
EX_t^-	-16.44(0.28)	1.73(0.88)	-0.07(0.07)	

Panel C: Diagnostic

	Alaska	**Alabama**	**Arkansas**	**Arizona**
F	2.82	5.47*	4.09**	5.07*
ECM_{t-1}	-0.21(0.84)	-0.43(3.3)	-0.64(2.6)	0.05(0.17)
LM	5.49*	2.92**	1.89	6.94*
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.88	0.7	0.74	0.65
Wald Test:				
Wald-Short	14.68*	0.67	36.88*	0.85
Wald-Long	0.76	0.3	2.79**	7.60*
	California	**Colorado**	**Connecticut**	**Delaware**
F	2.13	2.34	6.35*	3.73
ECM_{t-1}	-0.02(0.17)	0.18(0.89)	-0.2(2.06)	-0.3(2.29)
LM	0	4.85*	0.05	0.01
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.71	0.76	0.77	0.65
Wald Test:				
Wald-Short	11.35*	1.4	1.34	6.09*
Wald-Long	51.01*	12.55*	30.60*	34.48*
	Florida	**Georgia**	**Hawaii**	**Iowa**
F	3.19	6.53*	5.92*	14.22*
ECM_{t-1}	0(0.01)	0.19(1.62)	-2.04(5.01)*	-1.56(5.95)*
LM	7.7*	1.62	3.95*	6.39*
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.58	0.79	0.62	0.94
Wald Test:				
Wald-Short	18.19*	2.88**	27.34*	79.36*
Wald-Long	20.12*	39.86*	0.09	0
	Idaho	**Illinois**	**Indiana**	**Kansas**
F	5.48*	10.05*	5.3*	3.99**
ECM_{t-1}	-0.61(3.66)**	-0.05(0.41)	-0.51(4.47)*	0.03(0.05)
LM	16.99*	0	7.68*	3.37**
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.86	0.81	0.85	0.6
Wald Test:				
Wald-Short	21.30*	90.85*	31.79*	7.63*
Wald-Long	0.25	0.04	0.02	15.18*
	Kentucky	**Louisiana**	**Massachusetts**	**Maryland**
F	11.48*	6.27*	3.07	3.35
ECM_{t-1}	-1.48(8.31)*	-0.08(0.49)	0.11(0.61)	-0.01(0.07)
LM	0.71	0.07	0.66	0.09
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.79	0.66	0.64	0.48
Wald Test:				
Wald-Short	0.38	42.66*	1.57	0.48
Wald-Long	1.31	9.14*	33.80*	25.08*

(Continued…)

(Panel C Continued)

	Maine	Michigan	Minnesota	Missouri
F	2.41	3.05	3.44	3.39
ECM_{t-1}	-0.08(0.51)	0.88(3.25)	-0.37(2.21)	-0.51(1.64)
LM	1.15	0	1.3	3.2**
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.95	0.92	0.91	0.72
Wald Test:				
Wald-Short	32.73*	0.79	15.16*	23.23*
Wald-Long	2.7	3.98*	7.58*	2.95**
	Mississippi	**Montana**	**North Carolina**	**North Dakota**
F	1.92	3.63	5.51*	8.46*
ECM_{t-1}	-0.37(2.38)	-0.13(0.75)	-0.71(3.19)	-2.15(7.27)*
LM	0.26	1.87	11.19*	1.03
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.65	0.75	0.72	0.94
Wald Test:				
Wald-Short	1.31	17.46*	21.31*	40.76*
Wald-Long	0.53	2.7	24.45*	6.91*
	Nebraska	**New Hampshire**	**New Jersey**	**New Mexico**
F	4.35**	5.68*	3.33	4.1**
ECM_{t-1}	-0.6(1.26)	-0.29(2.68)	-0.11(0.66)	0.17(0.63)
LM	6.11*	7.26*	1.15	2.97**
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.87	0.86	0.73	0.68
Wald Test:				
Wald-Short	34.16*	23.82*	0.99	26.61*
Wald-Long	18.65*	5.41*	11.10*	1.72
	Nevada	**New York**	**Ohio**	**Oklahoma**
F	3.67	9.27*	6.23*	7.82*
ECM_{t-1}	-2.46(4.82)*	-0.4(3.06)	-0.07(0.47)	-1.82(5.34)*
LM	9.29	0.27	2.06	0.83
QS (QS^2)	0	S(S)	S(S)	S(S)
Adjusted R^2	0.65	0.83	0.88	0.69
Wald Test:				
Wald-Short	32.74*	101.50*	29.18*	12.90*
Wald-Long	5.74*	11.80*	3.38**	3.83**
	Oregon	**Pennsylvania**	**Rhode Island**	**South Carolina**
F	2.82	3.9**	4.18*	4.52*
ECM_{t-1}	-0.21(0.84)	-0.3(0.8)	-0.35(0.54)	-0.29(1.53)
LM	5.49*	0.13	5.1*	4.08*
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.88	0.88	0.77	0.68
Wald Test:				
Wald-Short	14.68*	1.46	21.18*	0.6
Wald-Long	0.76	1.75	0.01	15.62*

(Continued…)

(Panel C Continued)

	South Dakota	Tennessee	Texas	Utah
F	5.99*	7.59*	3.71	7.37*
ECM_{t-1}	0.23(0.75)	-0.1(0.39)	-0.17(0.79)	-1.39(6.32)*
LM	0.35	0.02	20.32*	1.03
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.83	0.63	0.73	0.79
Wald Test:				
Wald-Short	505.03*	34.57*	0.86	3.21**
Wald-Long	2.97**	21.34*	29.30*	24.34*
	Virginia	**Vermont**	**Washington**	**Wisconsin**
F	3.99*	6.24*	6.63*	1.81
ECM_{t-1}	-0.14(0.88)	0.16(0.49)	-0.13(1.15)	-0.38(2.59)
LM	2	5.65*	5.64*	0.84
QS (QS^2)	S(S)	S(S)	S(S)	S(S)
Adjusted R^2	0.78	0.81	0.77	0.94
Wald Test:				
Wald-Short	1675.67*	27.19*	485.62*	5.40*
Wald-Long	17.95*	0	27.57*	6.55*
	West Virginia	**Wyoming**	**District of Columbia**	
F	2.46	11.62*	5.27*	
ECM_{t-1}	-0.04(0.3)	-0.2(0.73)	-0.57(6.01)*	
LM	0.18	7.07*	0.41	
QS (QS^2)	S(S)	S(S)	S(S)	
Adjusted R^2	0.65	0.87	0.78	
Wald Test:				
Wald-Short	25.73*	0.67	0.52	
Wald-Long	0.03	0.79	2.47	

Notes:

a. Numbers inside the parentheses are absolute values of the t-ratios and * (**) indicates significance at the 5% (10%) confidence level.

b. At the 5% (10%) significance level, when there are three exogenous variables (k=3), the critical value of the F test is 4.35 (3.77). This comes from Pesaran *et al*. (2001, Table CI-Case III, page 300).

c. At the 5% (10%) significance level, when there are six exogenous variables (k=6), the critical value of the t-test for significance of ECM_{t-1} is -4.38(-4.04). This comes from Pesaran et al. (2001, Table CII-Case III, page 303).

d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom since we are testing for 1st order serial correlation. Its critical value at the 5% (10%) level is 3.84 (2.71).

e. Both Wald tests are distributed as $\chi 2$ with one degree of freedom. The critical value at the 5% (10%) level is 3.84 (2.71).

than that attached to ΔEX_{t-k}^{-} in the results for 36 states, which supports short-run cumulative or impact asymmetric effects of changes in the value of the dollar. In these 36 states, the Wald test reported as Wald-Short in Panel C of Table 2 is highly significant, thus rejecting the equality of the two sums.

In how many states do the short-run asymmetric effects last into the long run? The answer is provided in Panel B where either the EX^{+} or the EX^{-} variable carries a meaningful and significant coefficient in the 15 states of Alabama, Georgia, Hawaii, Iowa, Idaho, Indiana, Kentucky, North Carolina, Nebraska, New Hampshire, Nevada, New York, South Carolina, Utah, and DC. Once again, the increase in the number of states from three (in the linear model) to 15 (in the nonlinear model) must be attributed to the nonlinear adjustment of the real effective value of the dollar.[8] More precisely, the partial sum of positive changes in the value of the dollar, EX^{+}, carries a significantly negative coefficient in Georgia, Iowa, Kentucky, North Carolina, Nebraska, New Hampshire, Nevada, New York, South Carolina, Utah, and DC, thus implying that a strong dollar will hurt housing production in these states.[9] On the other hand, the partial sum of the negative changes in the value of the dollar, i.e., EX^{-}, carries a significantly negative coefficient in Georgia, Hawaii, Iowa, Idaho, Indiana, Kentucky, New Hampshire, Nevada, New York, and Utah, thus supporting the expansionary effects of dollar depreciation on housing output in these states. Furthermore, the Wald test reported as Wald-Long rejects the equality of normalized coefficients attached to EX^{+} and EX^{-} in 32 states, thus providing support for the long-run asymmetric effects of exchange rate changes on housing output.[10]

4. Summary and Conclusion

Some of the literature in international economics includes studies that try to assess the impact of currency depreciation on domestic output. Depreciation is said to increase aggregate demand by stimulating its net export component. On the other hand, depreciation raises the cost of imported inputs which curtails aggregate supply. Depending on the relative strength of the two effects, domestic output could move in either direction. Newly constructed houses are part of domestic output and the same argument could be extended to the housing market.

Therefore, our goal in this paper is to not only establish a link between the foreign exchange market and housing market, but also determine if dollar

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[8] Note that by meaningful estimate we mean an estimate that is supported by one of the tests for asymmetric cointegration, i.e., the F or ECM_{t-1} tests reported in Panel C.

[9] Only in Alabama does EX^{+} carry a positive coefficient, thus implying that a strong dollar will boost housing output in this state.

[10] Other diagnostic statistics are similar to those of the linear model and do not need to be repeated here.

depreciation has expansionary or contractionary effects on the housing volume in the U.S. We try to answer these questions by using data from each of the 50 states and DC. Our results could be summarized by saying that when a traditional linear ARDL model is estimated for each state, short-run effects of the changes in the overall value of the dollar are found on the housing volume in 41 states. However, the short-run effects last into the long run in only three states.

However, the response of housing volume to changes in the value of the dollar could be asymmetric due to downward price rigidity, so we separate dollar appreciation from dollar depreciation and introduce a nonlinear adjustment of the real effective value of the dollar and estimate a nonlinear ARDL model. We find that exchange rate changes do have short-run asymmetric effects on housing volume in all of the states. However, the short-run asymmetric effects last into the long-run asymmetric effects in 32 states. Further analysis reveals that while dollar depreciation boosts housing volume in the long run in Georgia, Hawaii, Iowa, Idaho, Indiana, Kentucky, New Hampshire, Nevada, New York, and Utah, dollar appreciation hurts housing volume in Georgia, Iowa, Kentucky, North Carolina, Nebraska, New Hampshire, Nevada, New York, South Carolina, Utah, and DC. These results are masked by the linear model and can only be found by using the nonlinear model. Clearly, the different findings from different states could be attributed to a number of idiosyncratic characteristics of a state, such as institutions, real estate policies, regulations, agriculture versus technology orientation, etc.

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Appendix

Data Definition and Sources

All data are quarterly over the period of 1994I-2016III. The main reason that we start with 1994I is due to the availability of the most comprehensive measure of the real effective exchange rate of the dollar beginning in that year.

Variables

HP: House Permits: the number of new housing units authorized by building permits. Data are available monthly, year- to-date, and annually at the national, state, selected metropolitan area, county and place levels. The data are from the Building Permits Survey. The following is from the United States Census Bureau - New Residential Construction website.

"PURPOSE
The United States Code, Title 13, authorizes this survey, provides for voluntary responses, and provides an exception to confidentiality for public records.

COVERAGE
All places issuing building permits for privately-owned residential structures. Over 98 percent of all privately-owned residential buildings constructed are in permit-issuing places.

SPECIAL FEATURES
Provides designated principal economic indicator and the only source of current and consistent small area data on new authorizations for residential construction.

METHODS
A monthly survey of 9,000 selected permit-issuing places, and an annual census of an additional 11,000 permit places that are not in the monthly sample. The monthly sample of permit-issuing places was selected using a stratified systematic sample procedure. All permit places located in selected large metropolitan areas were selected with certainty. The remaining places were stratified by state. Places that exceed a cutoff value, which varies by state, were selected with certainty. Remaining places were sampled at a rate of 1 in 10.

Monthly estimates represent all permit-issuing places nationwide. If a survey report is not received, missing data on permits for new construction are imputed except for places that are also selected for the Survey of Construction (SOC). For these places, SOC permit data are used.

USERS
The Conference Board uses the data for developing its index of leading economic indicators. The Federal Reserve Board uses the data to analyze

national and regional economic conditions. The Department of Housing and Urban Development uses the data to evaluate housing programs. Financial institutions use these statistics to estimate mortgage demand. Private businesses use them for market planning, material use, and investment analysis (United States Census Bureau, n.d.)."

***I*:** Income. Income data is the Total Personal Income published by the U.S. Bureau of Economic Analysis. The following is from the Bureau of Economic Analysis – Regional Quarterly Report website.

"Personal income is the income received by all persons from all sources. It is the sum of net earnings by place of residence, property income, and personal current transfer receipts" (Bureau of Economic Analysis, 2018).

M: Mortgage Rate. The definition of the mortgage rate is a 30-year conventional mortgage rate based on the Board of Governors of the Federal Reserve System (US), which is the daily contract interest rate on commitments for fixed-rate first mortgages. The source is the Primary Mortgage Market Survey data provided by Freddie Mac. It is retrieved from the Federal Reserve Bank of St. Louis.

EX = Measure of real effective exchange rate of the dollar. This index is defined as a broad measure of the real effective exchange rate that includes 61 trading partners and constructed by the Bank for International Settlements (http://www.bis.org/statistics/eer.htm).