An Investigation of Log Prices in the U.S. Pacific Northwest

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Jeff Reimer

Department of Applied Economics

Oregon State University

Log prices are exceptionally variable

- Between 2005 and 2020 nominal Douglas-fir mill log prices in southern Oregon
  - As low as 346 $/MBF
  - As high as 924 $/MBF

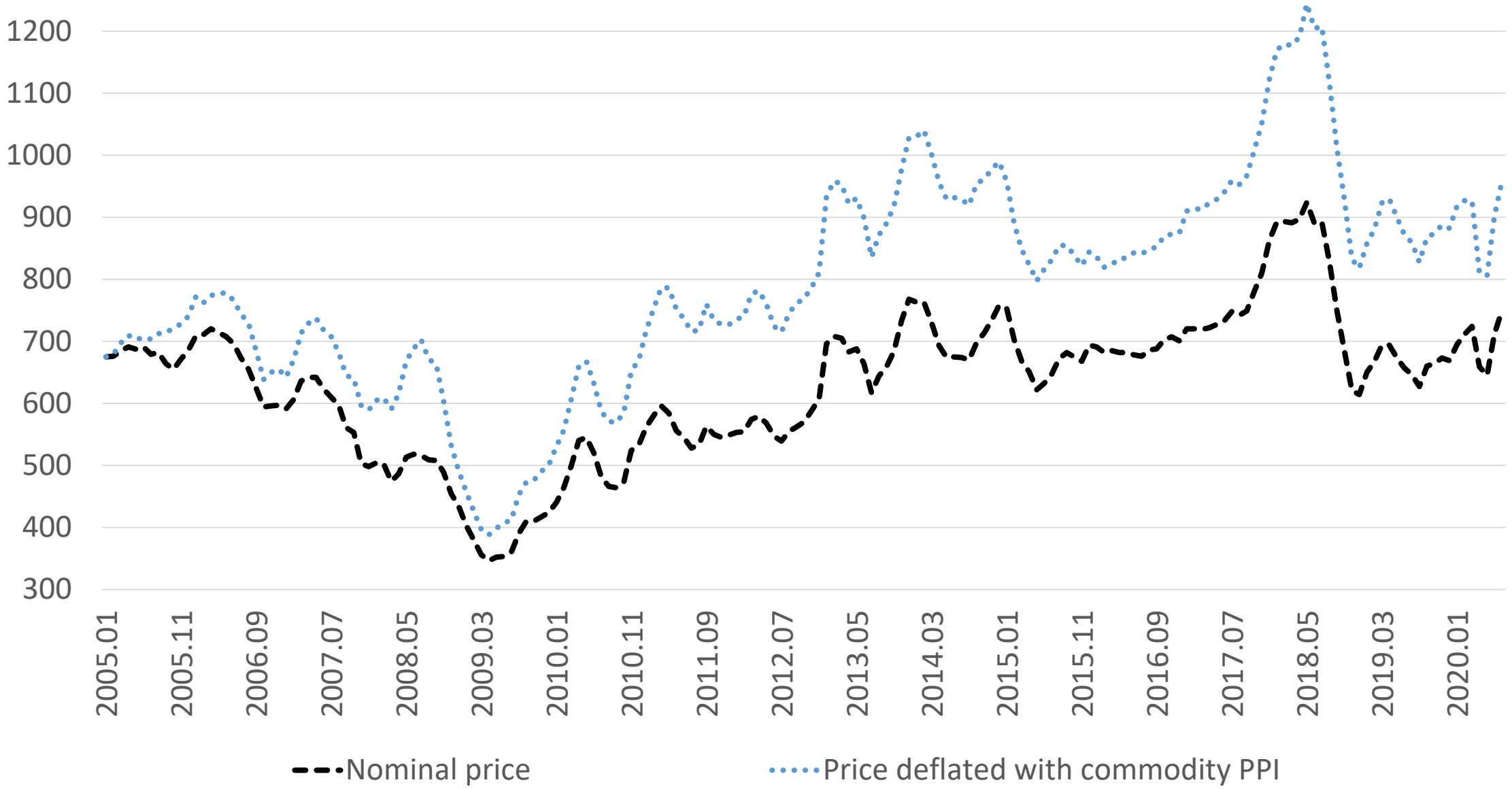
- “Feast or famine” for buyers as well as sellers

- Volatility increases uncertainty and stakes for those who must make decisions about the harvesting and marketing of logs, and the buying and selling of timberland

- If we have estimates of future price movements, we are less likely to make decision that results in lost profit opportunities

- It’s “just the market at work.” But perhaps prices are also heavily influenced by policies set in distant cities

Price of #2 Doug Fir mill logs ($/MBF) – RISI log lines

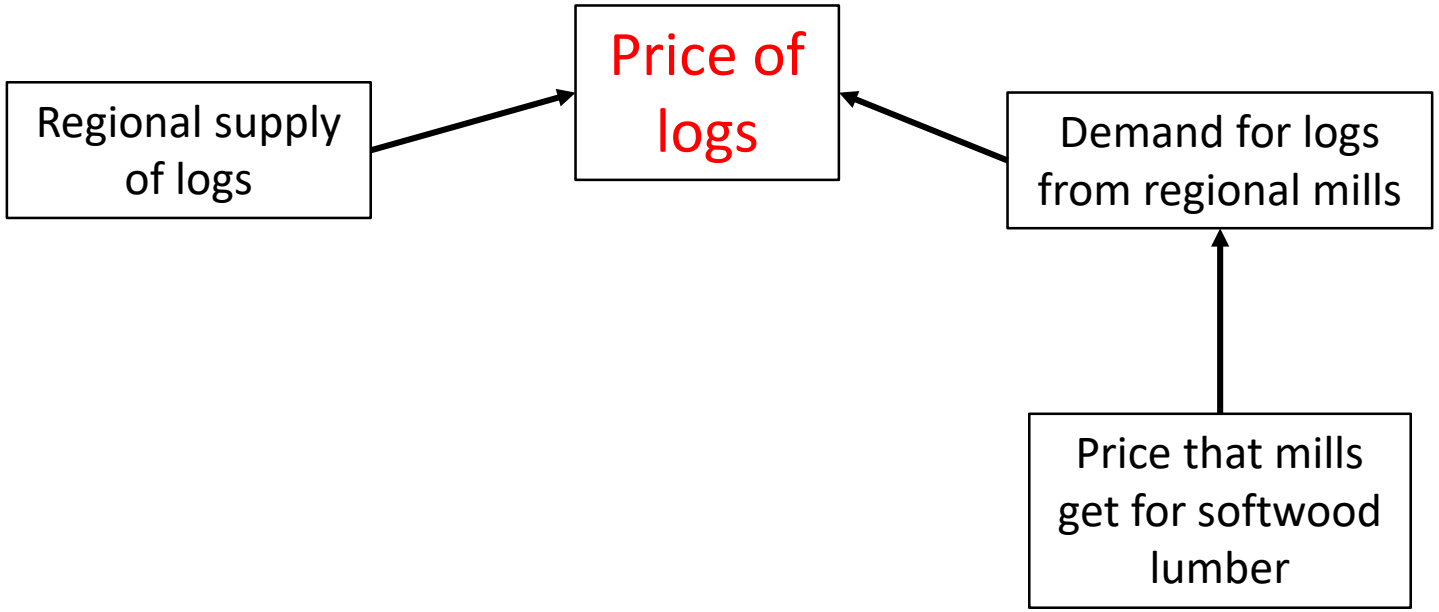


Goals of this study

- Explain log prices with readily observable variables
- Calculate elasticities of response (price of logs to determinants like housing demand)
- Illustrate how federal government actions may affect log prices

Price determination model

Price determination model



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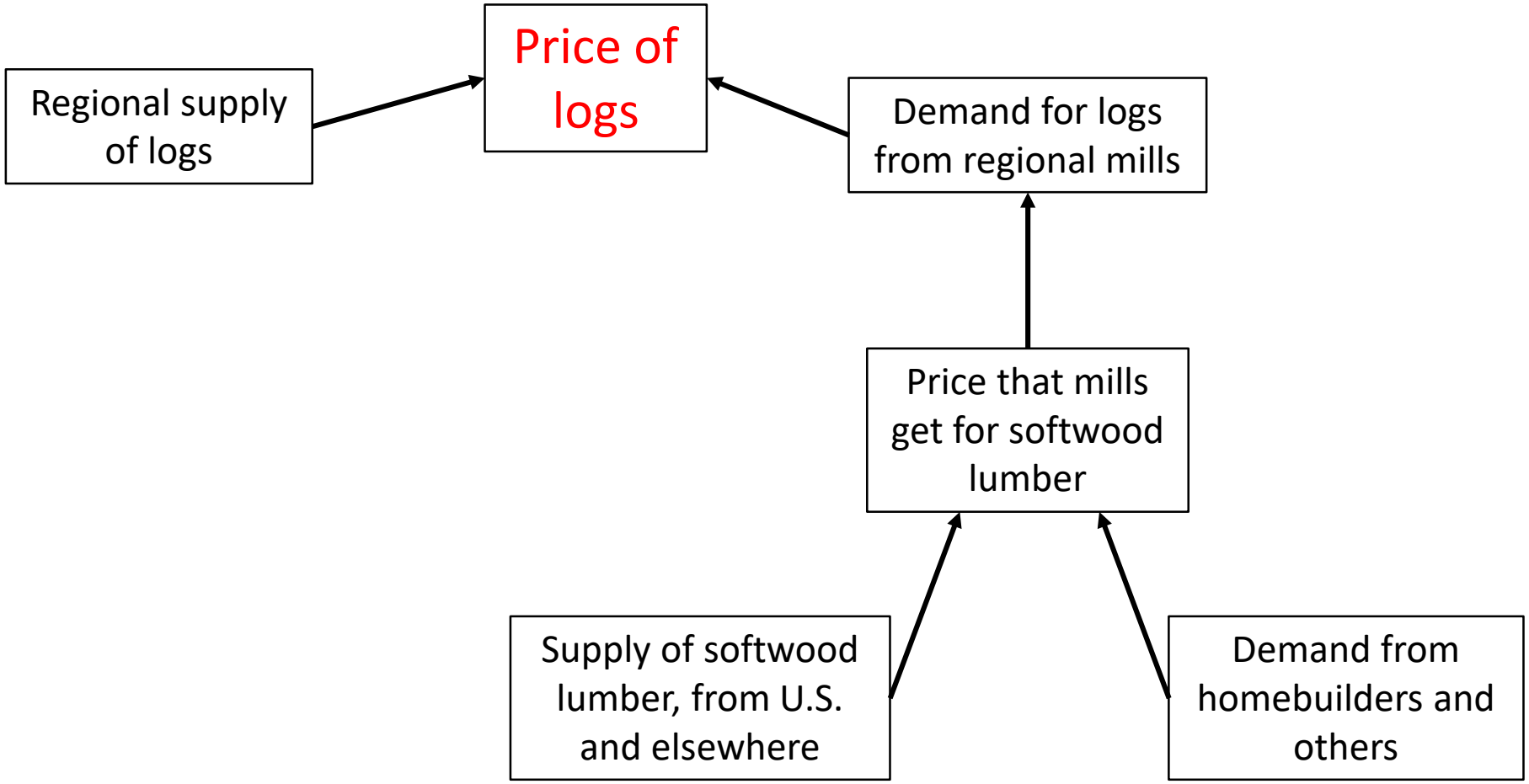

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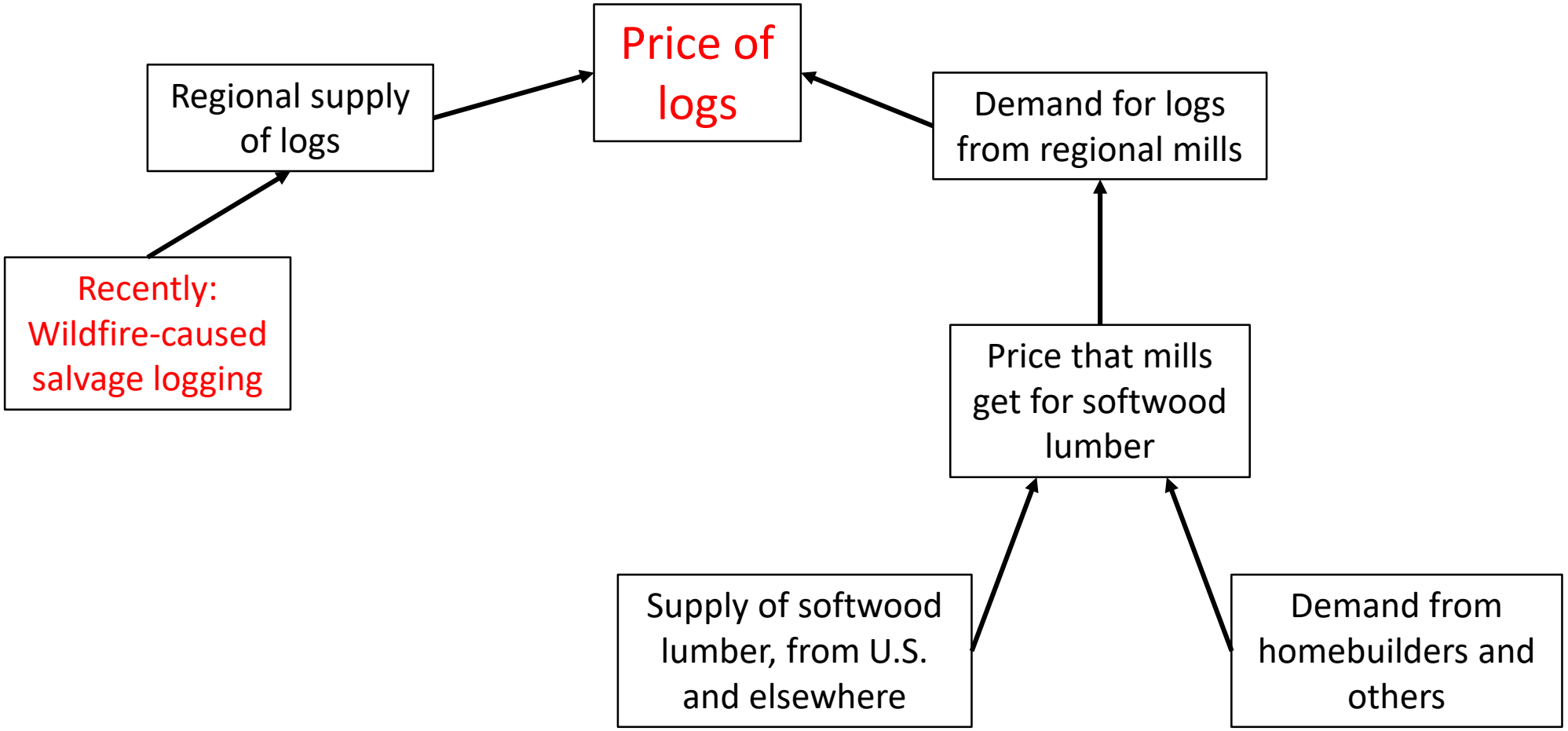


Variables (1/2)

Variable	Description	Mean	Min	Max
Price of logs	Douglas-fir #2 mill log average price in undeflated $ per thousand board feet (MBF)	630.8	346.0	924.0
Housing permits	U.S. Private Housing Starts and Building Permits, Annualized monthly. US Dept of Commerce.	1,160.6	513.0	2,263.0
Housing inventory - regional	Portland Oregon months of inventory, unsold homes (multiple listing service)	4.6	1.2	19.2
Housing inventory - national	Monthly Supply of Houses in the United States	6.4	3.6	12.2

Variables (2/2)

Variable	Description	Mean	Min	Max
Mortgage rate	30 year fixed rate mortgage (%)	4.7	3.0	6.8
Case Shiller - regional	S&P/Case-Shiller OR-Portland Home Price Index, Index Jan 2000=100, Monthly, Not Seasonally Adjusted	178.7	129.0	253.2
Case Shiller - national	S&P/Case-Shiller U.S. National Home Price Index, Index Jan 2000=100, Monthly, Not Seasonally Adjusted	171.7	134.0	221.6
Exchange rate ($US required to buy $100 Canadian)	Real Broad Effective Exchange Rate for Canada, Index 2010=100, Monthly (higher values imply a weak U.S. dollar, making Canadian imports more expensive)	91.3	76.4	106.8

Log price regression (ordinary least squares)

	Model 1	
	Coef.	p value
Housing permits (ln)	0.354	0.000
Intercept	3.954	0.000
Adj. R sq.	0.468	

Explaining the price of logs (ordinary least squares)

	Model 1	
	Coef.	p value
Housing permits (ln)	0.354	0.000
Intercept	3.954	0.000
Adj. R sq.	0.468	

10% rise in housing permits
= 3.54% rise in log prices

Model explains 46.8% of
the variation in log prices

Explaining the price of logs (ordinary least squares)

	Model 1			Model 2	
	Coef.	p value		Coef.	p value
Housing permits (ln)	0.354	0.000		0.103	0.001
Exchange rate (US $ needed to buy 100 Canadian $)				0.257	0.039
Housing inventory				-0.220	0.000
Intercept	3.954	0.000		4.834	0.000
Adj. R sq.	0.468			0.697	

Explaining the price of logs (ordinary least squares)

	Model 2	
	Coef.	p value
Housing permits (ln)	0.103	0.001
Exchange rate (US $ need to buy 100 Canadian $)	0.257	0.039
Housing inventory	-0.220	0.000
Intercept	4.834	0.000
Adj. R sq.	0.697	

10% weakening of dollar
= 2.57% rise in log prices
(because it is cheaper to source locally)

10% rise in inventory
= 2.2% fall in log prices

Explaining the price of logs (ordinary least squares)

	Model 3	
	Coef.	p value
Housing permits (#)	0.150	0.002
Exchange rate (US $ needed to buy 100 Canadian $)	0.669	0.000
Housing inventory (# months)	-0.177	0.000
Mortgage rate (%)	-0.160	0.015
Case-Shiller home price index	0.237	0.001
Intercept	1.607	0.084
Adj. R sq.	0.726	

10% rise in mortgage rate
= 1.6% fall in log prices

10% rise in home prices
= 2.37% fall in log prices

Explaining the price of logs (ordinary least squares)

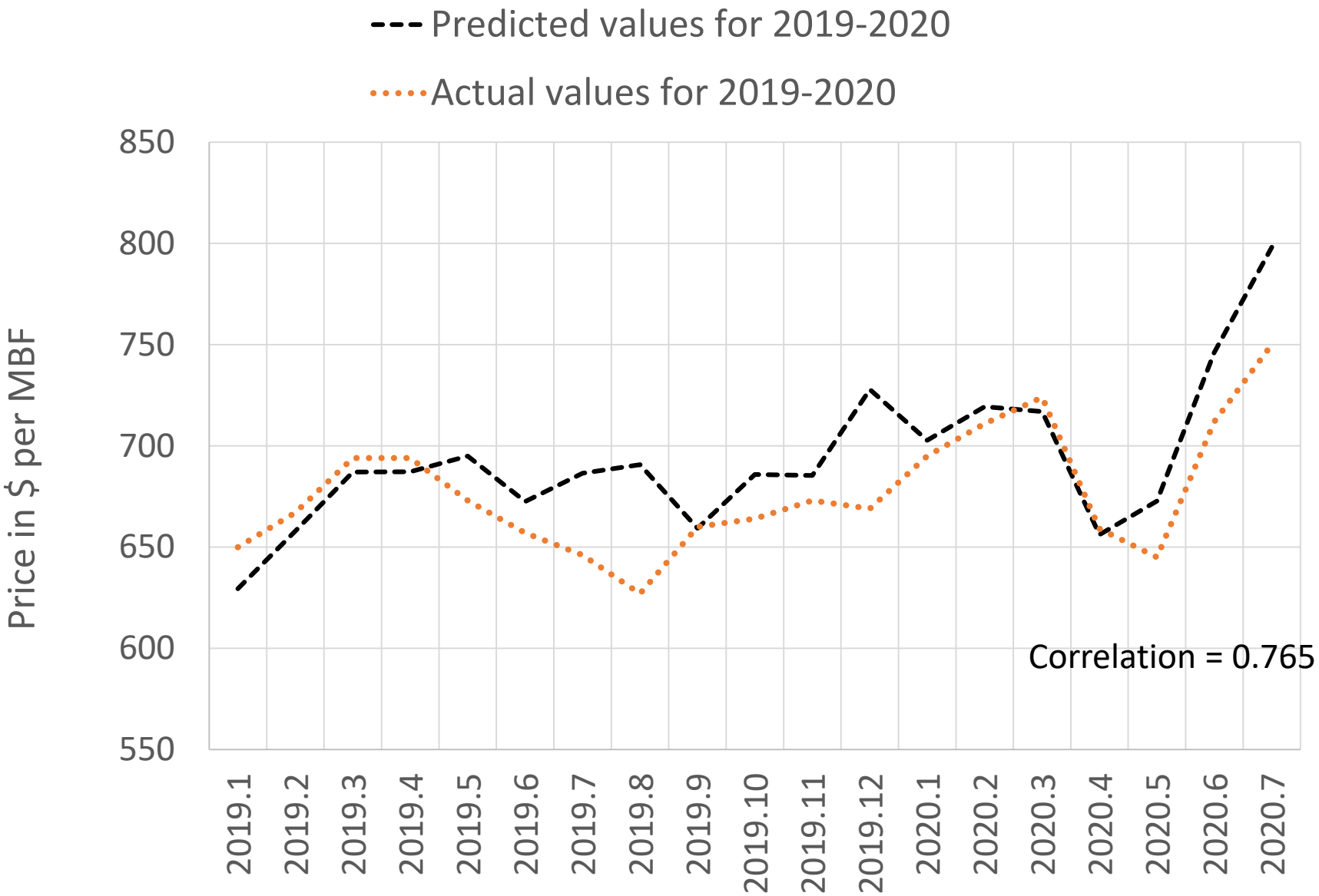
	Model 3			**Model 4**	
	Coef.	p value		Coef.	p value
Housing permits (#)	0.150	0.002		0.086	0.088
Exchange rate (US $ needed to buy 100 Canadian $)	0.669	0.000		0.871	0.000
Housing inventory (# months)	-0.177	0.000		-0.223	0.000
Mortgage rate (%)	-0.160	0.015		-0.094	0.163
Case-Shiller home price index	0.237	0.001		0.307	0.000
Winter quarter				0.057	0.009
Spring quarter				0.000	0.998
Summer quarter				-0.030	0.159
Intercept	1.607	0.084		0.736	0.427
Adj. R sq.	0.726			0.743	

Validation of model:
Within-sample forecast

How accurately can the model forecast known values?

1. Break data into two sections
   - 2005-2018
   - 2019-2020
2. Estimate model with data from 2005-2018
3. Plug right-hand-side variables from 2019-2020 into that model
4. Model will predict 2019-2020 log prices
5. How do predicted log prices compare with actual log prices for 2019-2020?

Within-sample forecast



Mortgage policy attribution experiment

- Government policies have unintentional but significant effects on log prices

- Aggressive, unregulated lending led to house price bubble, then popping
  - **Lack of govt oversight in financial markets = falling log prices**

- Monetary policy: set based on national unemployment rates and general economic conditions
- Has immediate effect on residential mortgage rates, which reflect cost to borrow money for a house
  - **Aggressive monetary policy = rising log prices**

Aggressive monetary policy: How much did it boost log prices from 2009 onwards?

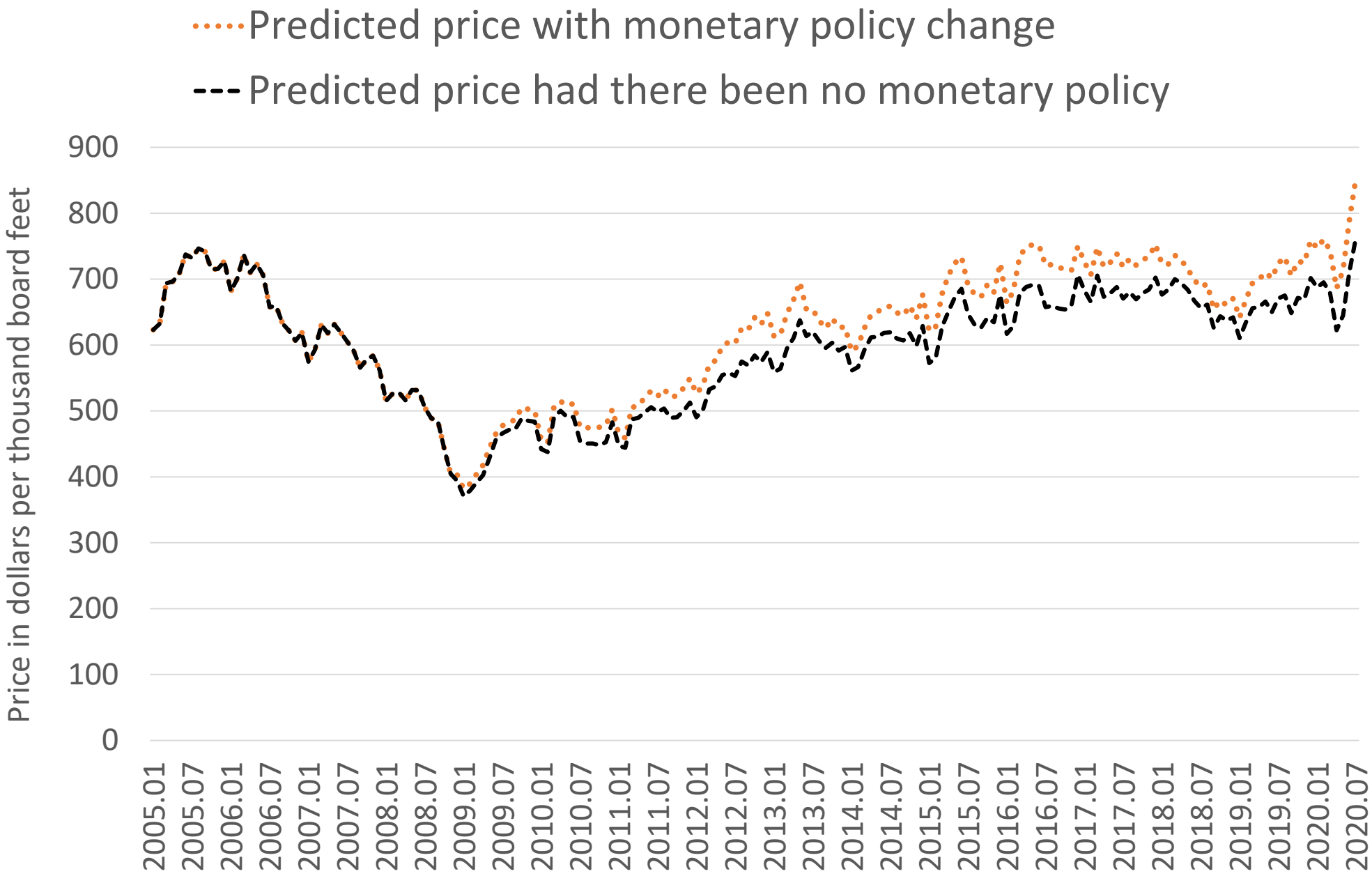
- December 2008: Fed dropped interest rates to save economy during Great Recession
  - Rate lowered from **4.35%**
  - Increases demand for new homes
  - Increases demand for lumber & logs

- What would have happened WITHOUT this intervention?
  - Rate maintained at **6.09%**
  - Limits demand for new homes
  - Limits demand for lumber & logs

How would log prices have been different if the Fed had not done certain actions?

Estimated effect of U.S. monetary policy on log prices

Actual mortgage rate	Hypothetical mortgage rate if policy not enacted	Predicted price with monetary policy change	Predicted price had there been no monetary policy	**% difference with mortgage policies as enacted**
4.35	6.09	647.7	618.2	**5.2**


Predicted price with monetary policy change
Predicted price had there been no monetary policy
Price in dollars per thousand board feet
900
800
700
600
500
400
300
200
100
0
2005.01
2005.07
2006.01
2006.07
2007.01
2007.07
2008.01
2008.07
2009.01
2009.07
2010.01
2010.07
2011.01
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2016.01
2016.07
2017.01
2017.07
2018.01
2018.07
2019.01
2019.07
2020.01
2020.07

Log price predictor in Excel: on my web site

Change values in blue to see how predicted price changes

These variables may be correlated: in the real world one value does not change in isolation.

	Feb 2021
U.S. housing permits	1421
U.S.-Canada exchange rate	80
Months of inventory, unsold homes	1.0
30 year fixed rate mortgage (%)	2.7
Case-Shiller home price index	236

Douglas fir No. 2 mill
$869
predicted price per MBF

Do NOT change this table unless you estimate a new regression

Source: Reimer (2021), Table 2, Model 3	Coefficients based on 2005-2020
Permits	0.150
ExchRat	0.669
Inventory	-0.177
Mortgage	-0.160
CaseShiller	0.237
Intercept	1.607
Adjusted R square	0.726

DISCLAIMER
This tool is for educational purposes only. Do no
Model coefficients are based on historical data ar

SOURCE
Reimer, J.J. (2021). An Investigation of Log Prices i
https://doi.org/10.1016/j.forpol.2021.102437

Recent issue: What is going on with lumber prices?

Timberland owner frustration (in Western Oregon):

- Extremely high lumber prices, but log prices not so high
- Why?
- In Western Oregon, an over-abundance of wildfire salvage timber hitting the market (?)

For more information
See Jeff Reimer OSU website

Research paper:

Reimer, J.J. (2021). An Investigation of Log Prices in the U.S. Pacific Northwest. *Forest Policy and Economics* 126 (May) https://doi.org/10.1016/j.forpol.2021.102437

Log price indicator worksheet