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The Impact of Energy Price Changes on New Mexico State Revenue

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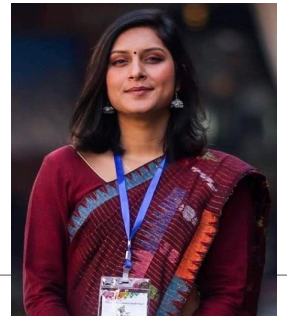

Research for a Better New Mexico, Academic Year 2024-2025

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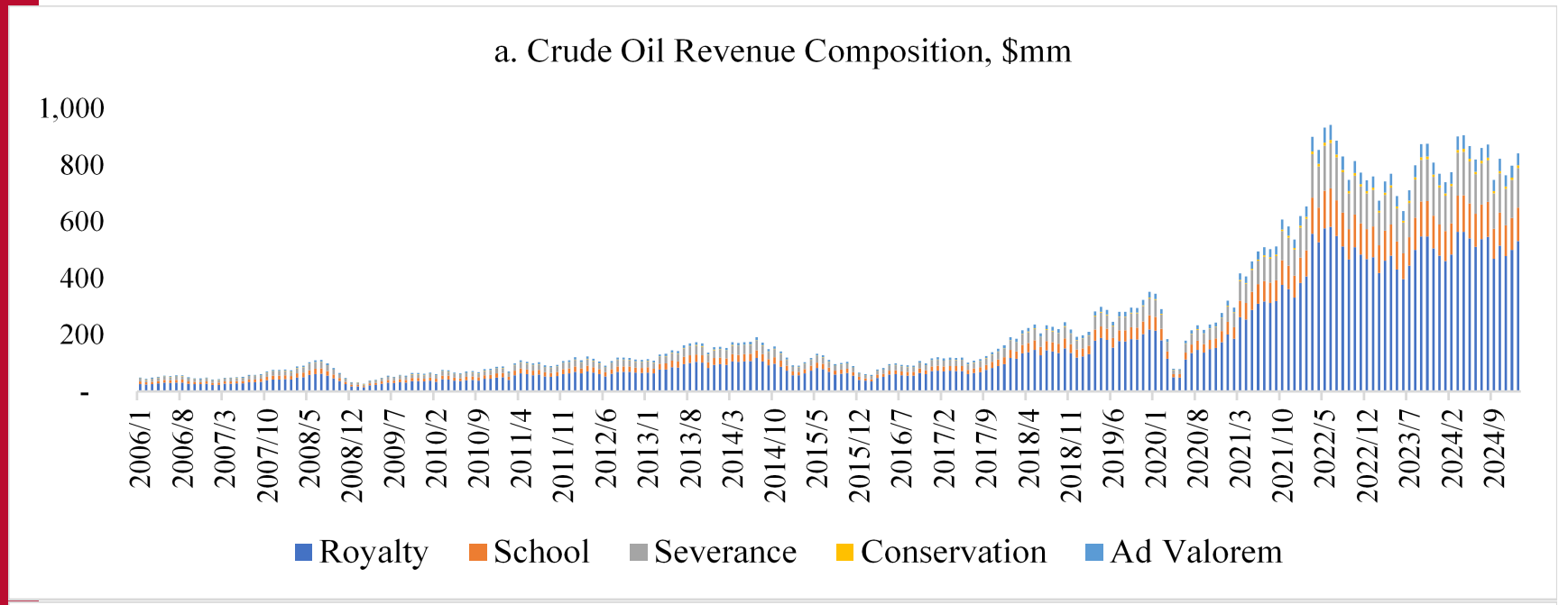
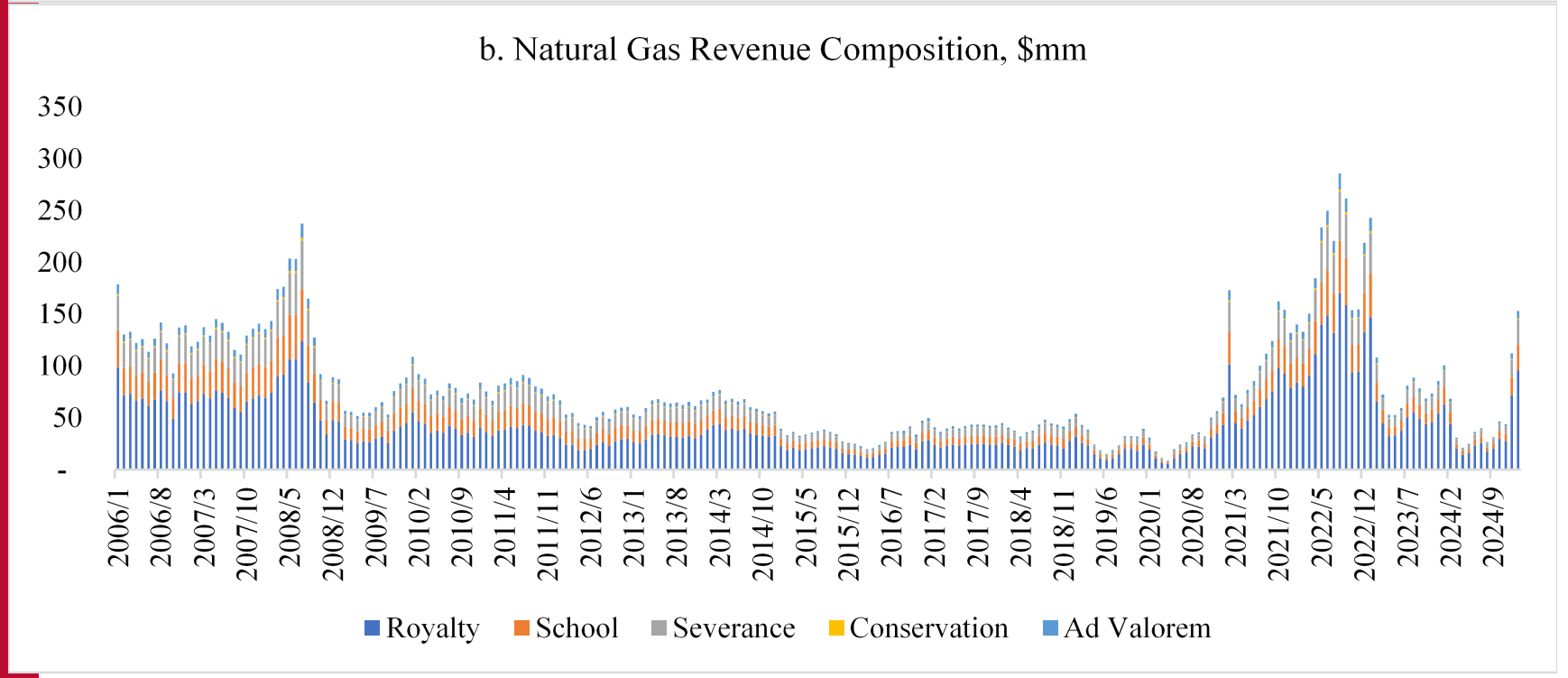
In 2024, NM produced

- 678 million barrels crude oil
- 2.5 billion MMbtu natural gas
- ~$10.5 billion revenue to the state in fiscal 2024
- Oil price ~ $70-$90/barrel, gas price ~ $1.5-$3.1/MMbtu

Monthly state revenue from oil and gas production





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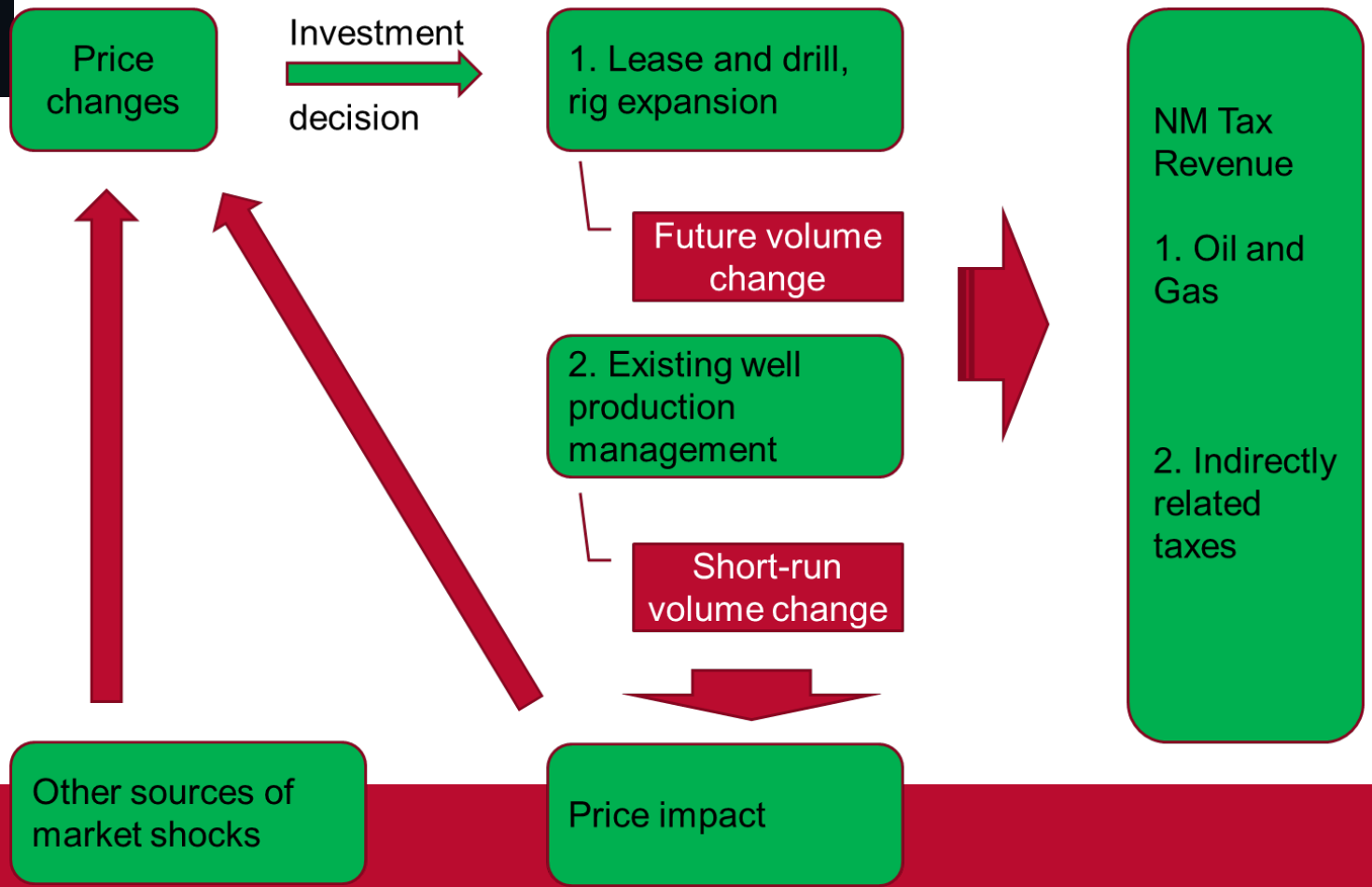
Lagged price impact to NM



Research Question

- For a 1% change in crude oil and natural gas price, what's the impact on NM state revenue
  - Dynamic impact in the 12 – 24 months horizon
  - Direct revenues from oil/gas production, monthly royalties and value-based taxes
    - emergency school tax (3.15% for crude oil and 4.00% for natural gas)
    - severance tax (3.75%)
    - conservation tax (0.19% for natural gas and 0.19% - 0.24% for crude oil)
    - ad valorem production tax (150% of assessed value times local tax rate averaging 1.3%)
  - Indirect revenues
    - Gross receipts and personal income taxes

How to model the dynamics

- Production volume and price are commonly modeled as a lag dependent VAR system

$$\log(volume_t) = a_0 + \sum_{j=1}^{k} a_{1j} \log(volume_{t-j}) + \sum_{j=1}^{k} a_{2j} \log(price_{t-j}) + e_{1t}$$

$$\log(price_t) = b_0 + \sum_{j=1}^{k} b_{1j} \log(volume_{t-j}) + \sum_{j=1}^{k} b_{2j} \log(price_{t-j}) + e_{2t}$$

- Summing both equations:

$$\log(volume_t \times price_t) = c_0 + \sum_{j=1}^{k} c_{1j} \log(volume_{t-j}) + \sum_{j=1}^{k} c_{2j} \log(price_{t-j}) + e_t$$

- Because $revenue_t = rate \times volume_t \times price_t$

$$\log(revenue_t) = c_0 + \log(rate) + \sum_{j=1}^{k} c_{1j} \log(volume_{t-j}) + \sum_{j=1}^{k} c_{2j} \log(price_{t-j}) + e_t$$

Data sources

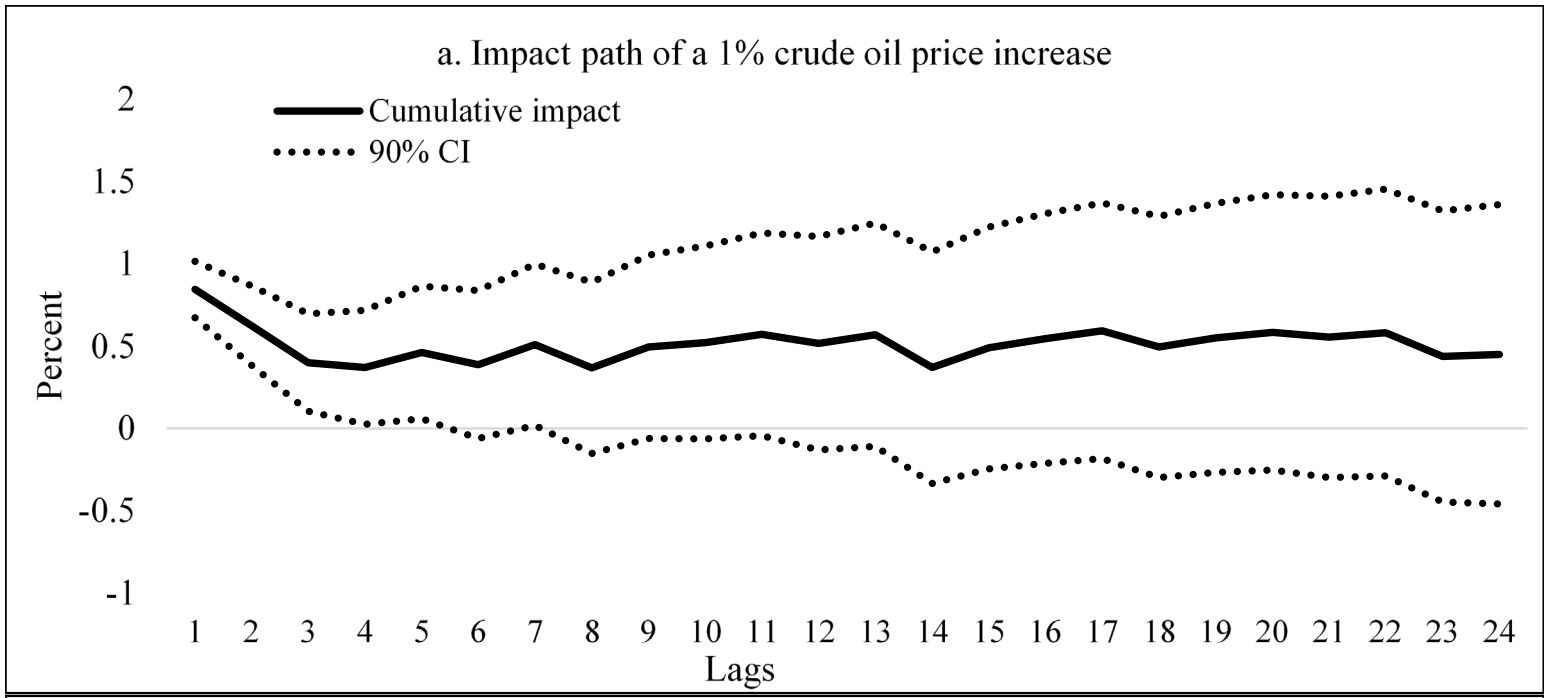
Monthly data

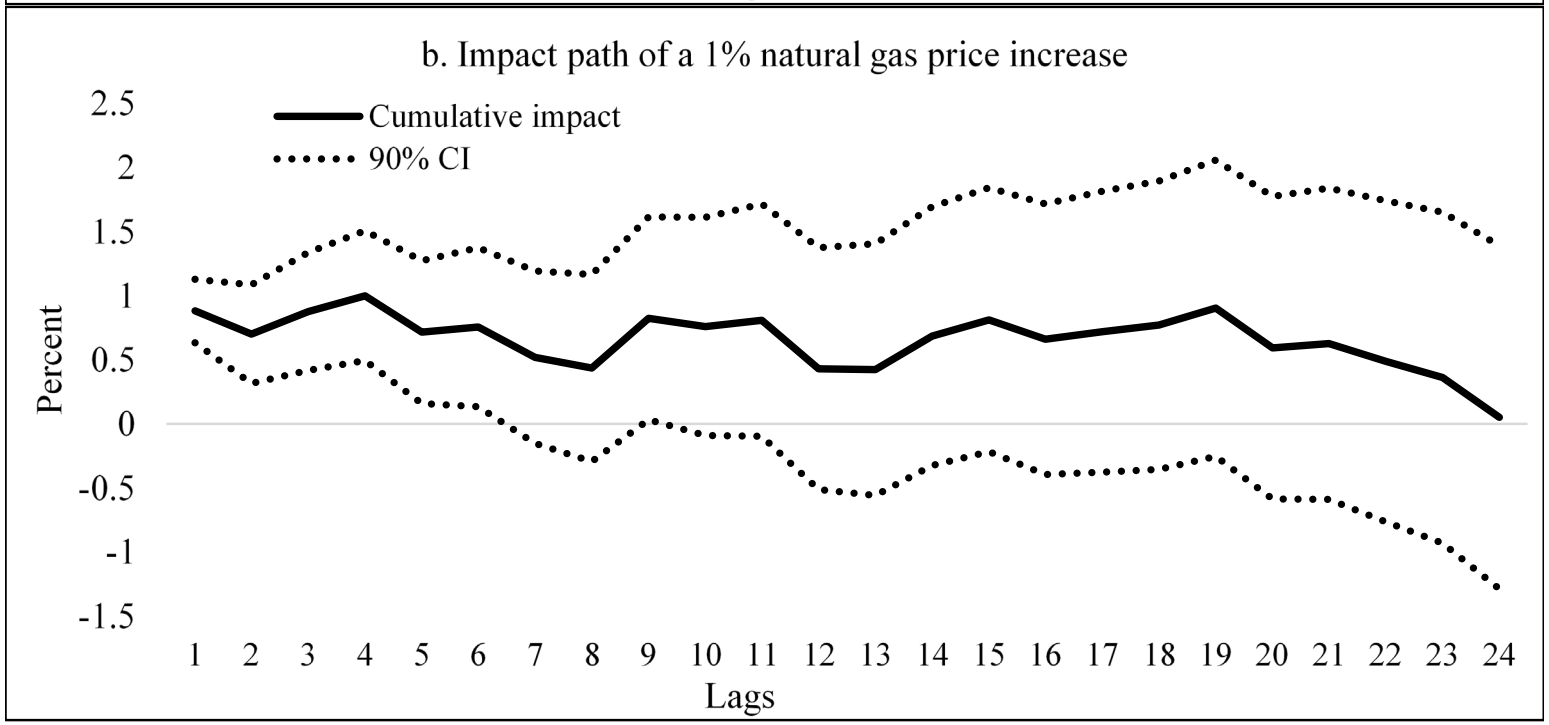
- TRD
  - Oil and gas production volume
  - Total revenues: royalties + taxes

- LFC
  - Major categories like gross receipts, and income taxes

- Other sources:
  - Futures prices of oil and natural gas,
  - CPI, inflation adjusted

Cumulative impact of a 1% price change on crude oil and natural gas revenue





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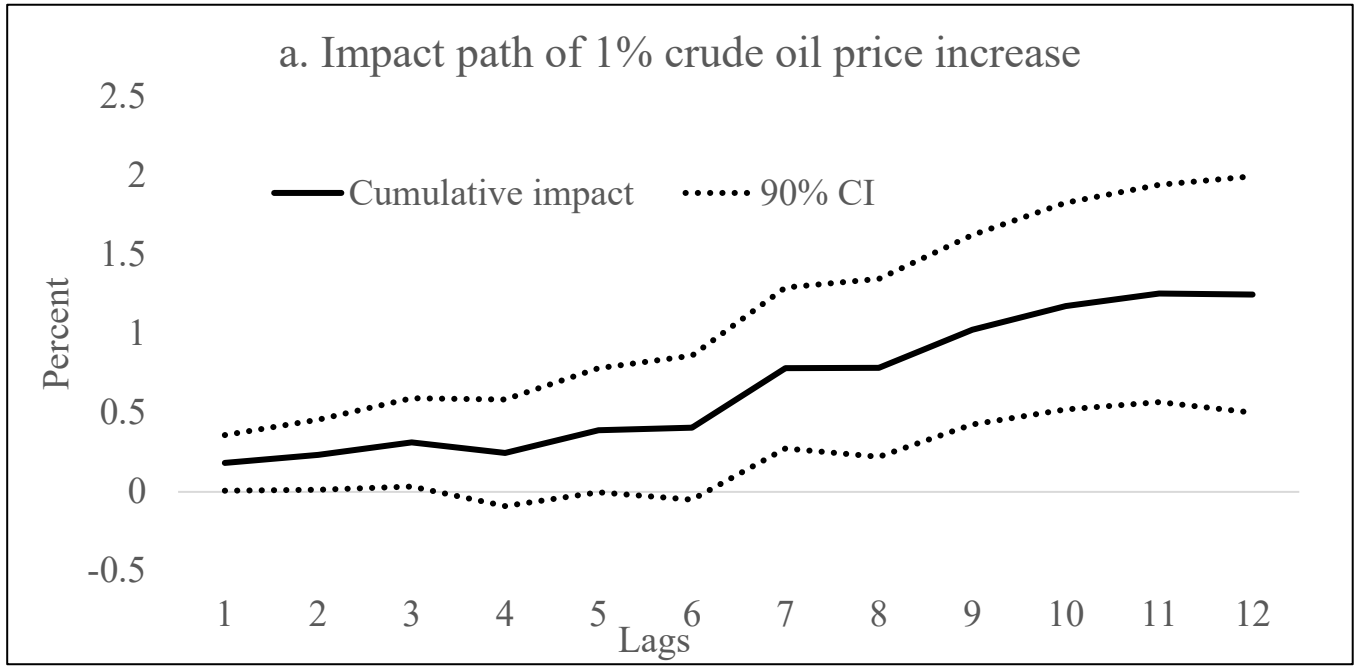
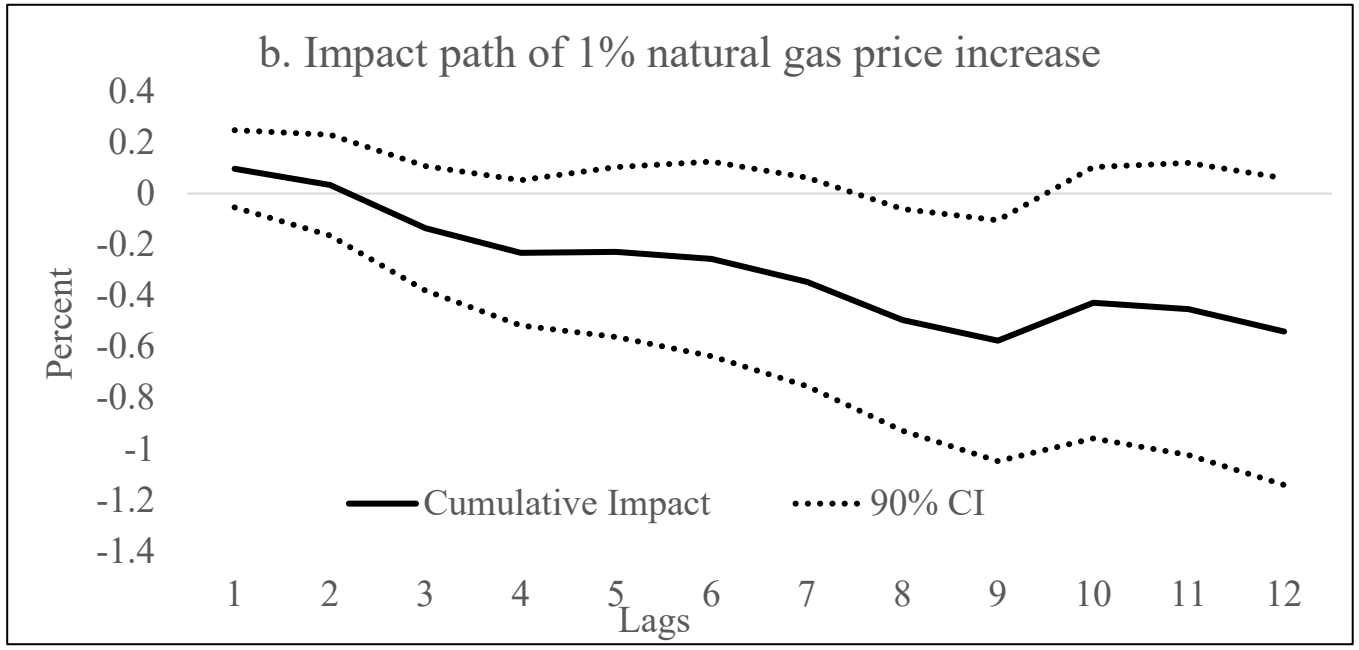
Cumulative impact of a 1% price change on gross receipts and personal income taxes





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An application on state revenue forecast

	Crude oil	*Natural Gas*
Baseline volume	750 million barrels	2.75 billion MMBtu
Baseline price	$63/barrel	$4/MMBtu
Revenue rate	19%	16%
Baseline revenue	$8.98 billion	$1.76 billion
Price change	+3%	+3%
Impact horizon		
1 month	+3 × 0.63%=1.89%	+3 × 0.70%=2.1%
	$8.98/12 × 1.89%=$0.014 billion	$1.76/12 × 2.1%=$0.003 billion
6 months	+3 × 0.39%=1.17%	+3 × 0.76%=2.28%
	$8.98/2 × 1.17%=$0.053 billion	$1.76/2 × 2.28%=$0.020 billion
12 months	+3 × 0.52%=1.56%	+3 × 0.43%=1.29%
	$8.98 × 1.56%=$0.140 billion	$1.76 × 1.29%=$0.023 billion

Thank you!

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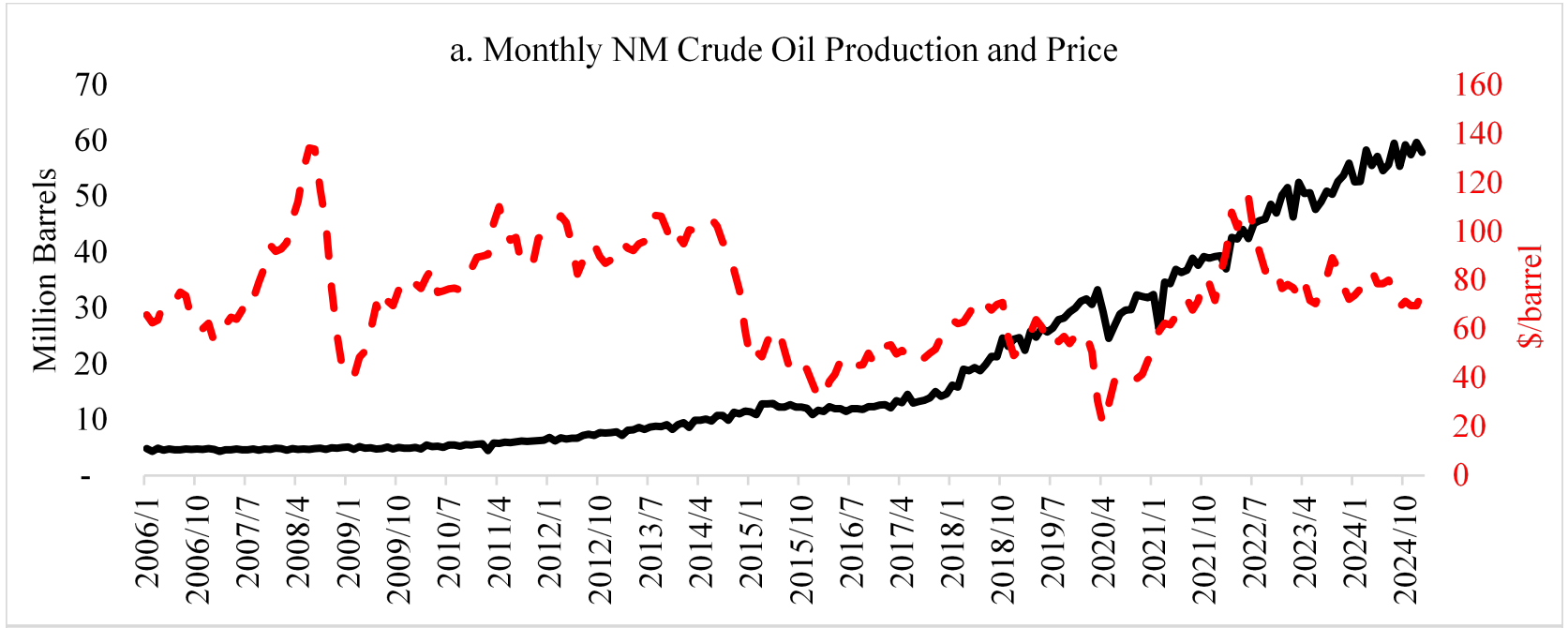
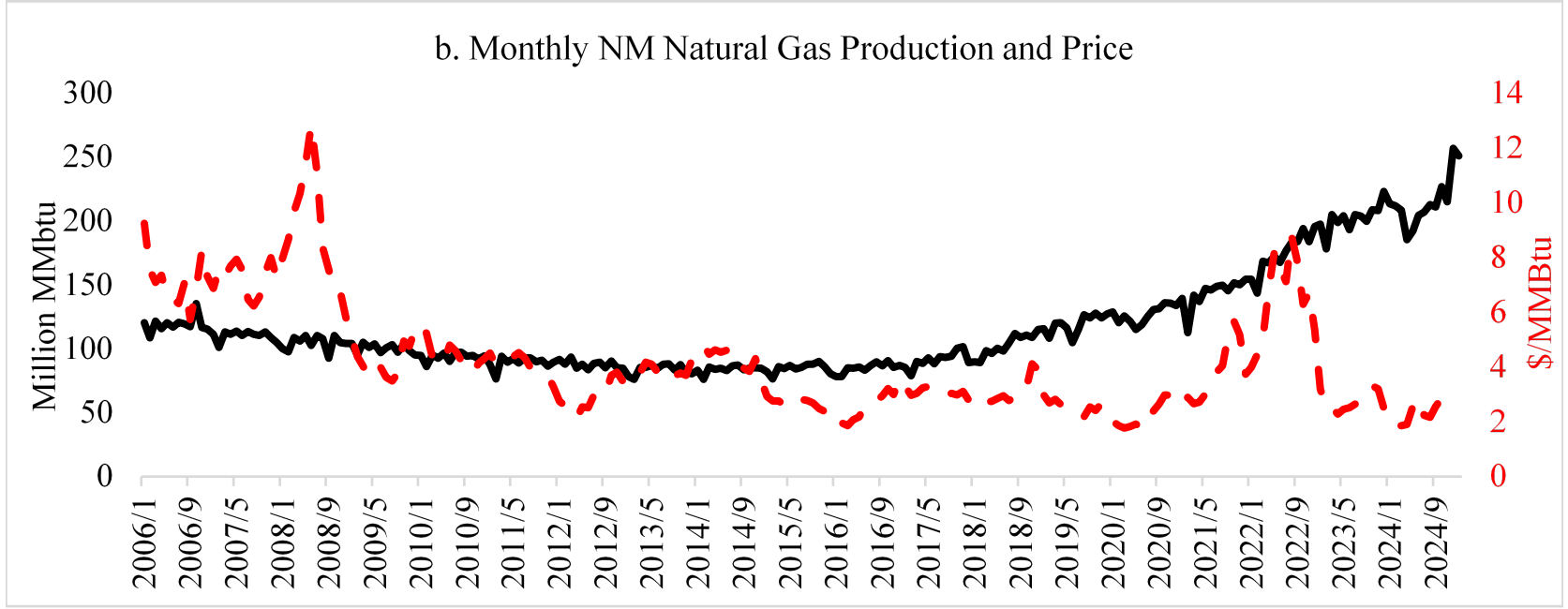
Supplemental charts

Monthly NM Crude Oil and Natural Gas Production and Price





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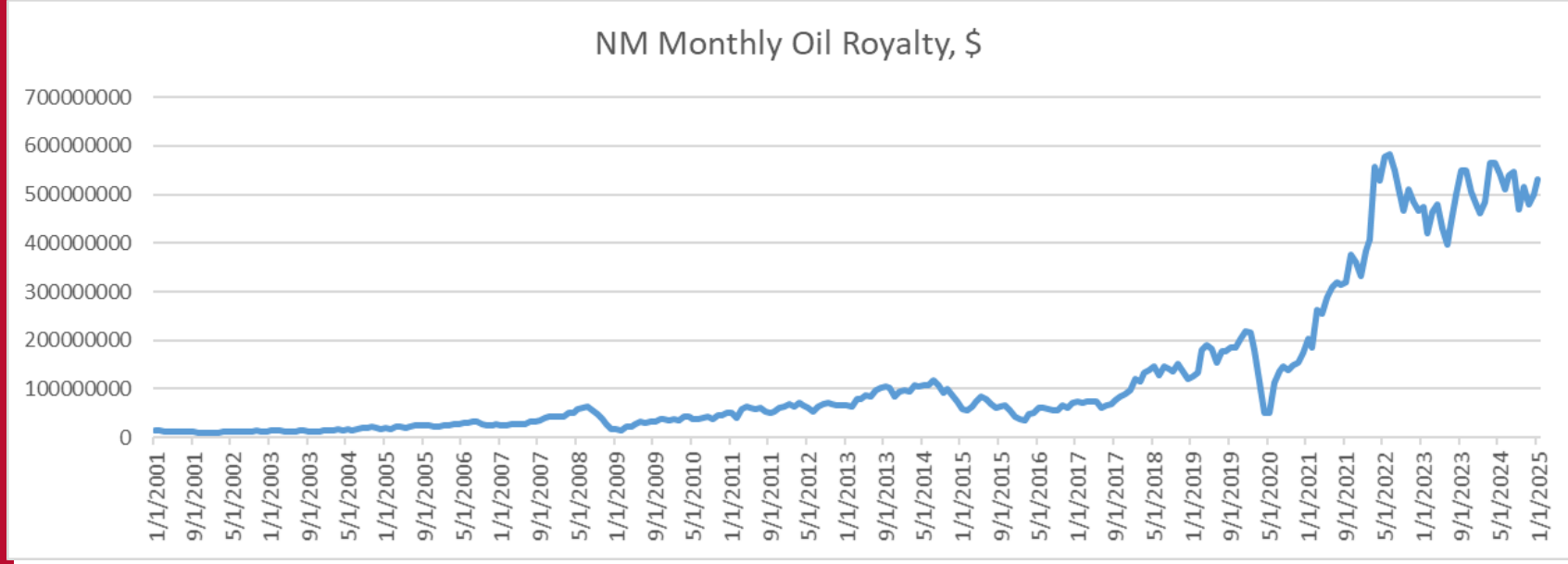
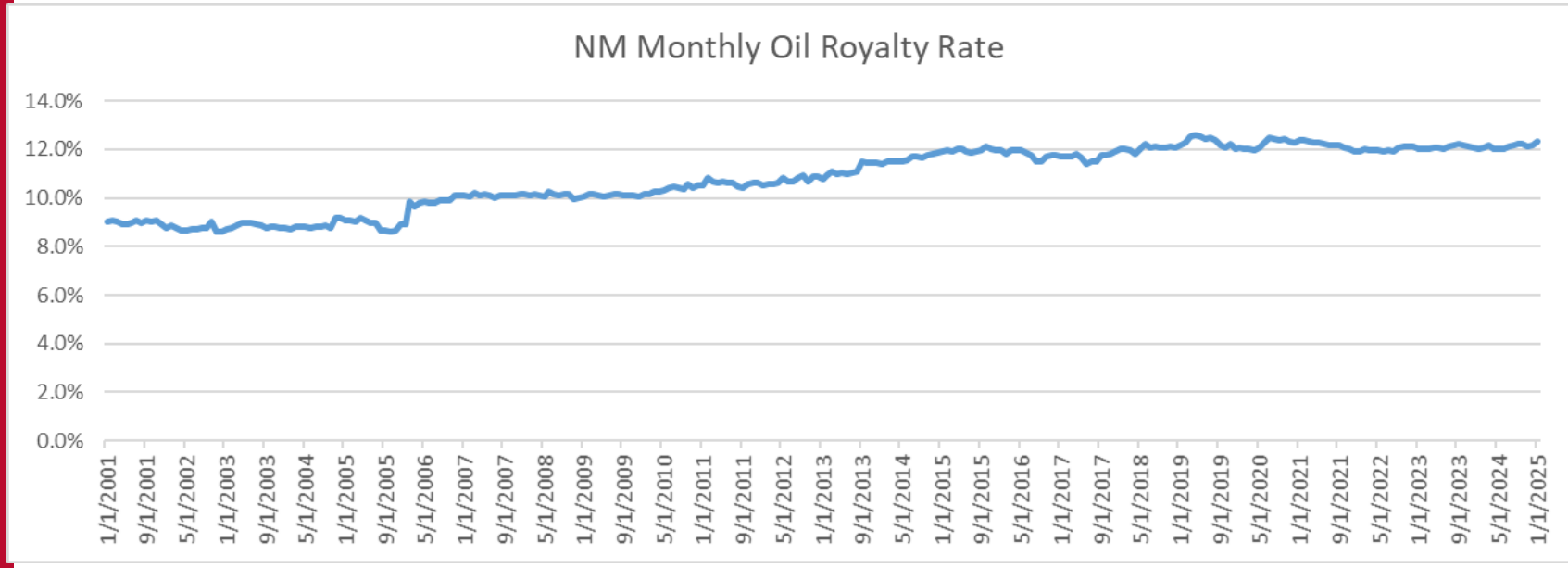
TRD volume and value data Oil





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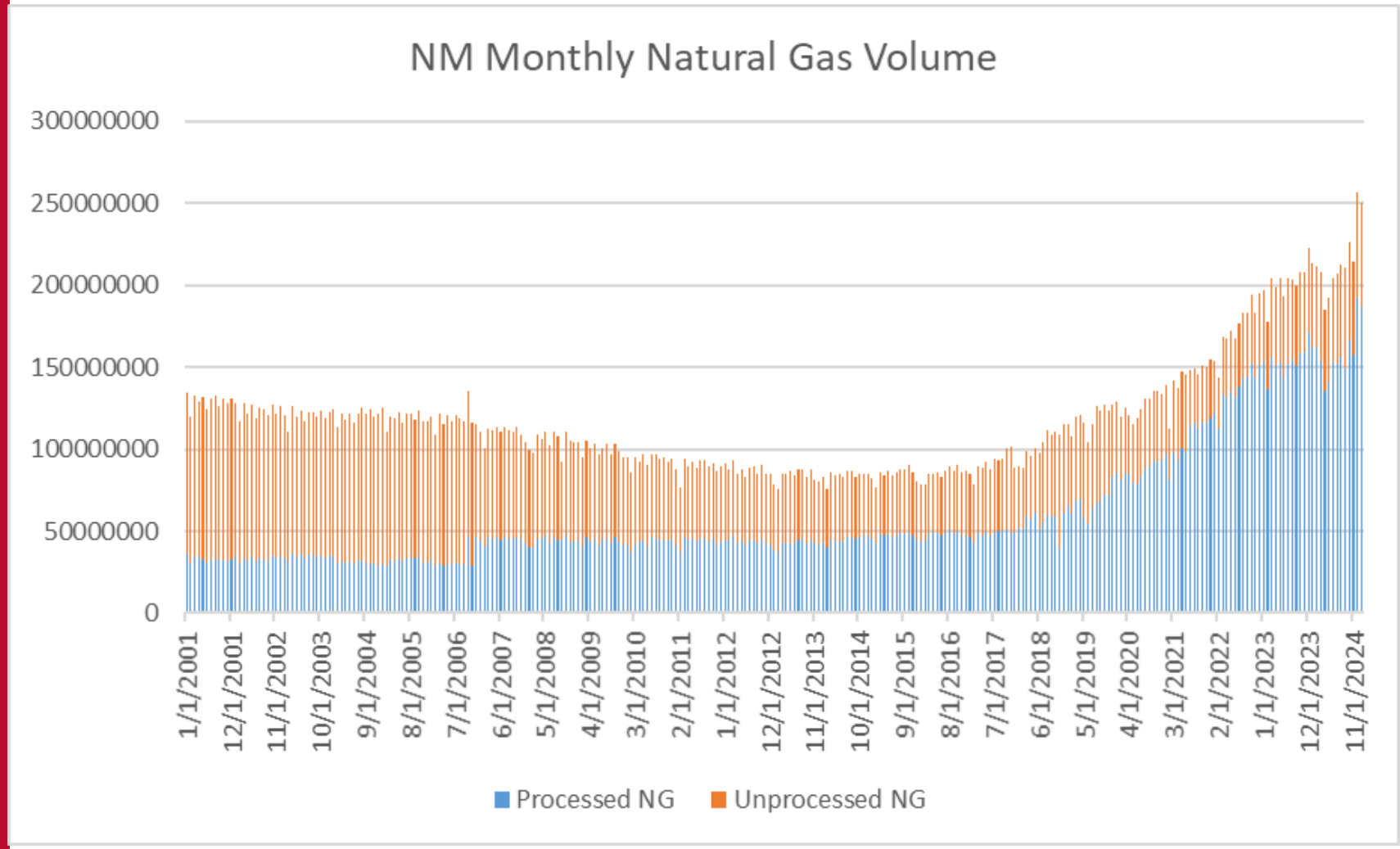
TRD volume and value data Natural Gas



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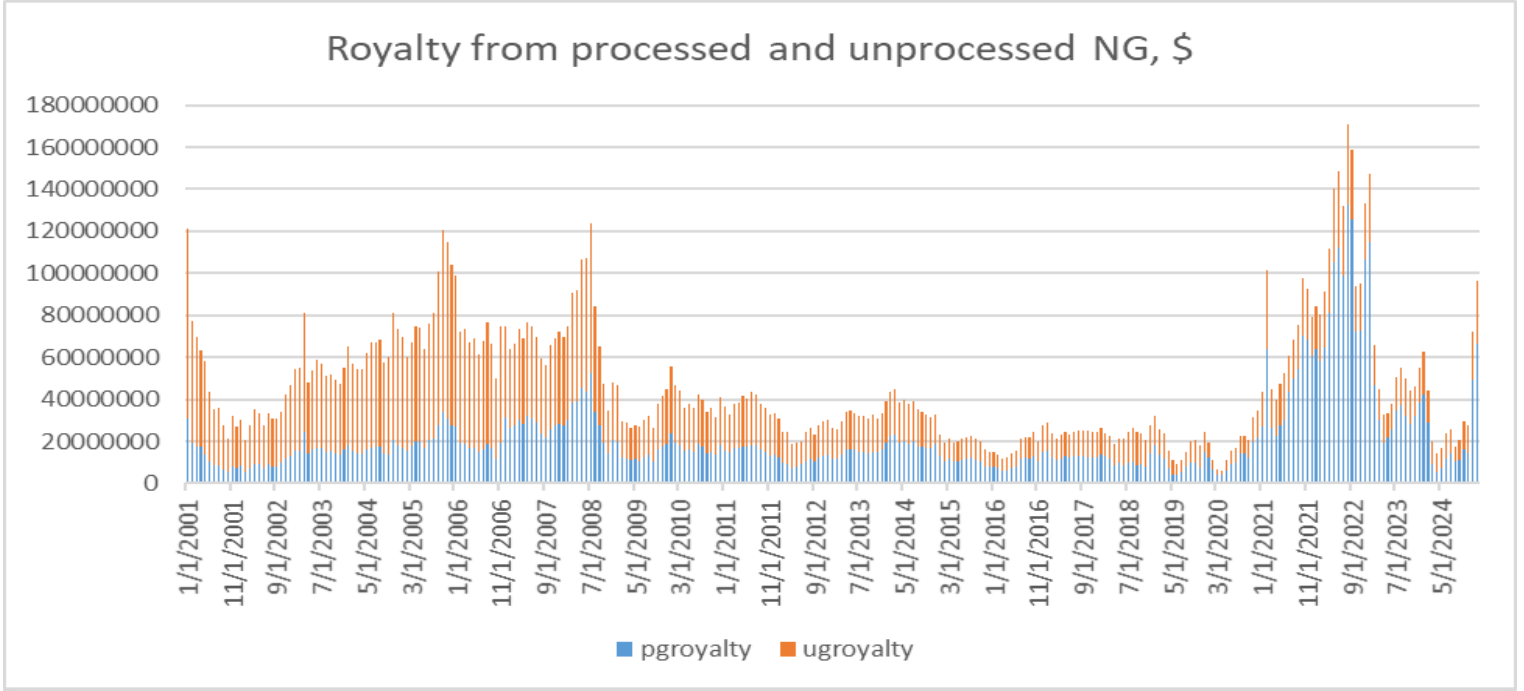
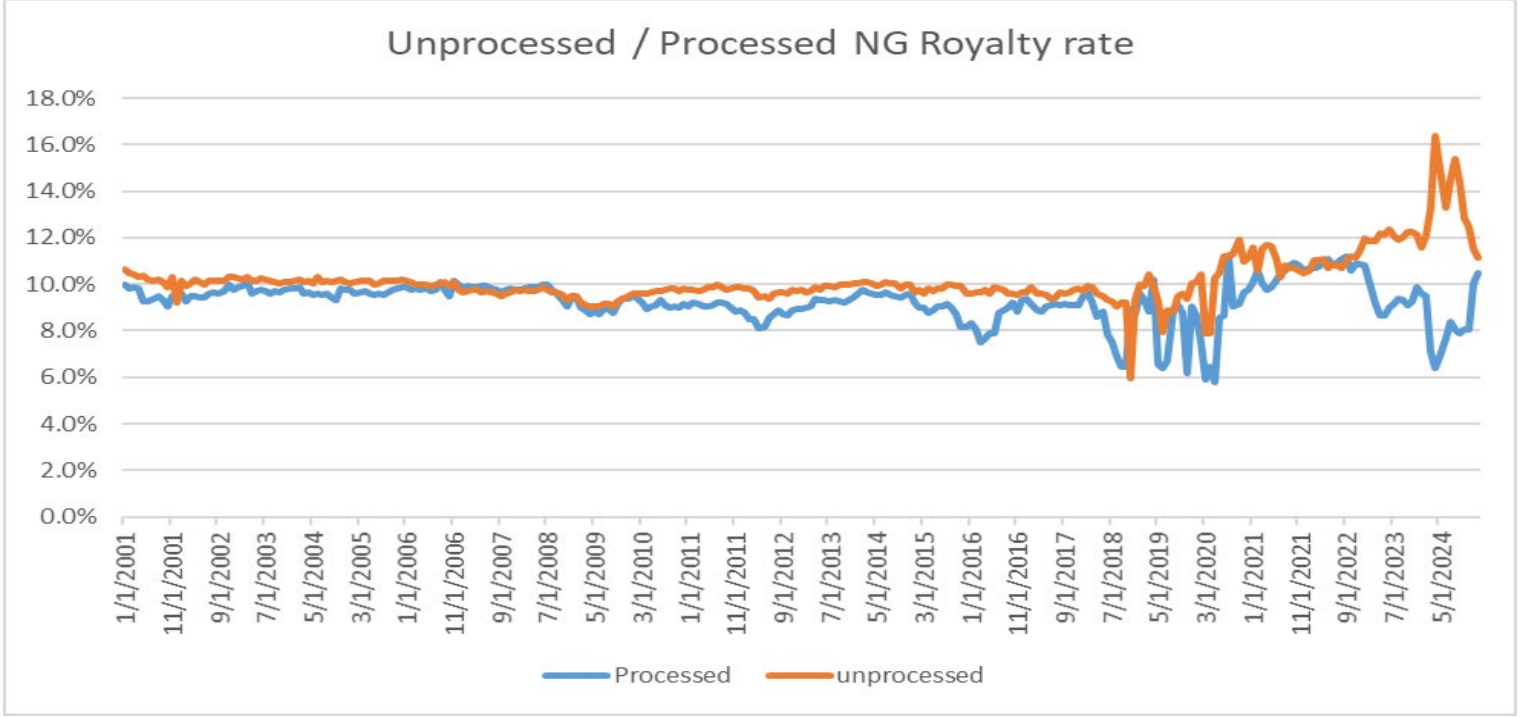
TRD volume/value data, NG royalty





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TRD value/volume data