

DIGITAL CURRENCY/ ANALOG ECONOMY: BITCOIN'S IMPACTS

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what does **REMI** say? sm

What is Cryptocurrency?





Photo: Shutterstock

 Cryptocurrency: A digital asset that serves as a medium of exchange

- Relies on cryptography for secure transactions and creation of additional units
- Established in 2009, Bitcoin is the first and best-known decentralized cryptocurrency
- Over the past several years, other cryptocurrencies have emerged as alternatives
 - Ethereum
 - Litecoin

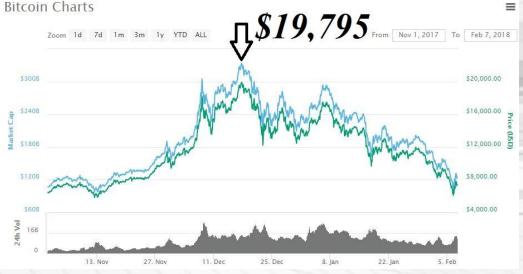
Share of Ownership of Bitcoin REMI

Bitcoin Balance	# of Addresses	% of Addresses	# of Bitcoins Owned	% of all Bitcoins
0 - 0.001	147,827,318	97.36%	977.728	0.01%
0.001 - 0.01	1,343,688	0.88%	5,048.904	0.03%
0.01 - 0.1	1,497,369	0.99%	43,719.982	0.28%
0.1 - 1	695,664	0.46%	232,471.638	1.49%
1 - 10	339,814	0.22%	944,171.963	6.04%
10 - 100	121,303	0.08%	4,104,283.667	26.27%
100 - 1,000	15,372	0.01%	3,515,068.854	22.50%
1,000 - 10,000	1,700	0.00%	3,516,536.296	22.51%
10,000 - 100,000	120	0.00%	3,115,655.063	19.94%
100,000 - 21,000,000	2	0.00%	144,462.818	0.92%
Total	151,842,350	100%	15,622,396.913	100%

Bitcoin's Rise (and Fall?)



- Bitcoin's price rose to nearly \$20,000 by Dec 2017
- □ The price fell, and is now just above \$10,000
- The surge, followed by the 50% decline, raises question: Is Bitcoin a bubble?



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Source: CoinStopLoss

U.S. Share of Bitcoin Market



\$174 Billion market cap of Bitcoin Worldwide (February 2018) ■US is 29.64% of this market as of December 2017 US Market Share: ~\$52 Billion

History of Bubbles



Asset bubble: Price exceeds historical norms and/or intrinsic value



Semper Augustus, most expensive tulip sold during bubble (anonymous watercolor, 17th century)

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- 1. Dutch Tulip Bubble (1636-1637): In the first recorded speculative bubble, futures for fashionable tulips soared and then collapsed
- 2. South Sea Bubble (1720s): Investors scooped up shares of Britain's South Sea Company, as directors hyped the riches of a faraway region
- 3. Poyais Scheme (1821-1837): Gen. Gregor MacGregor, Scottish adventurer, lured investors with his stories "Poyais", a fictional Central American territory
- 4. Stock Market Boom (1920s): Feverish speculation helped fuel stocks in the Roaring Twenties; a slowing economy triggered the Wall Street Crash of 1929 and ushered in the Great Depression
- 5. Dot-com Bubble (1990s): Early enthusiasm for early Internet companies drove up NASDAQ; index crashed in early 2000s
- 6. Housing Bubble (2000s): House prices skyrocketed, while subprime lending and condo flipping helped fuel the mania

Sources: Investopedia, Stanford Business School, Wikipedia

Value of Cryptocurrency



- While the price is volatile, the asset's popularity could still have effects on:
 - Commerce
 - Financial services
 - Economic development
 - Energy prices
 - Supply chain technology
 - And more...

Focus: Commerce, economic development, energy prices

Source: CardFellow

Cryptocurrency & Commerce REMI

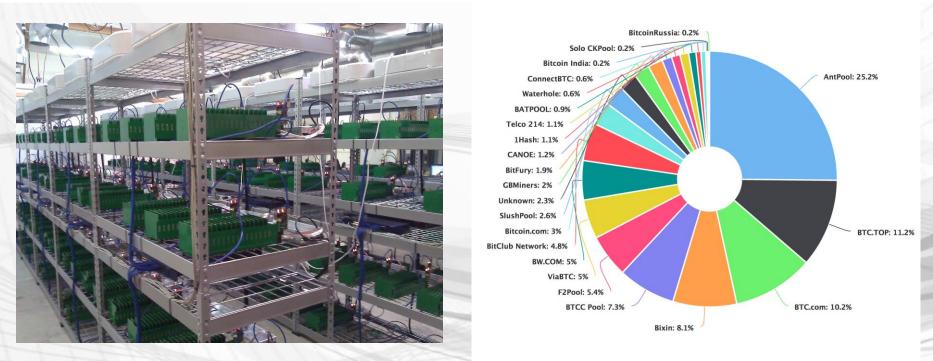
- □ Some major organizations accept Bitcoin, incl:
 - Overstock, Expedia, Microsoft, Tesla, OkCupid
- Cryptocurrency payment methods lower transaction fees
 - Average credit card processing cost for retailers:
 - 1.95% 2% on site; 2.30% 2.50% in online stores
 - Bitpay, Litepay have 0% transaction fees



Source: Lifewire, CNBC, Litepay, Bitpay

Bitcoin Mining



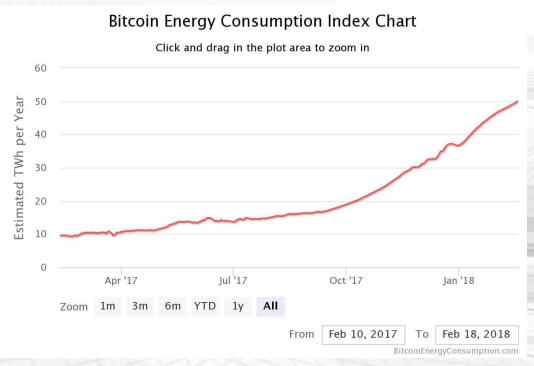


Centralized mining operation

Market share of mining pools

Cost: Energy Demand





Graphic: Digiconomist

- Computation required for Bitcoin demands massive amounts of electricity
- Digiconomist, a cryptocurrency blog, estimates consumption:
 - Energy demand rose sharply over past year
 - Bitcoin now surpasses Portugal, Singapore in energy use
 - Litecoin uses simpler computations, mining requires less energy

Regional Operation Impacts



Energy effects depend on region's capacity

- Cryptocurrency miners have flocked to Wenatchee, Washington due to cheap hydroelectric power
- Regions with more constrained capacity could see prices increase as a result of intensive mining

Regional Electricity Capacity

- Regions with low-cost energy attract cryptocurrency miners
 - Miners are flocking to central Washington State due to cheap hydroelectric power
 - Electricity in the area cost 2-4 cents per kilowatthour, compared to more than 10 cents nationwide
 - At least 30 mining operations moved into Chelan, Grant, and Douglas counties; more miners are interested
 - Mining operations offer costs and benefits
 - Entrepreneurs are setting up businesses in region
 - Four potential miners have asked Chelan County's utility for 100 megawatts each, possibly requiring \$40 million of new infrastructure per mine



Risks for Utilities and Consumers



- If utilities build capacity to meet Bitcoin demands, energy producers would be exposed to the volatility of cryptocurrencies
 - "We're getting requests for service that are just astounding. We do not intend to carry the risk of Bitcoin prices on our system." - Steve Wright, general manager of the Chelan County Public Utility District, in Wall Street Journal interview
- Miners could consume surplus electricity in low-cost regions, driving up prices for other consumers
- New cryptocurrency companies could go bust, after utilities spent millions on upgrading infrastructure

Source: Wall Street Journal

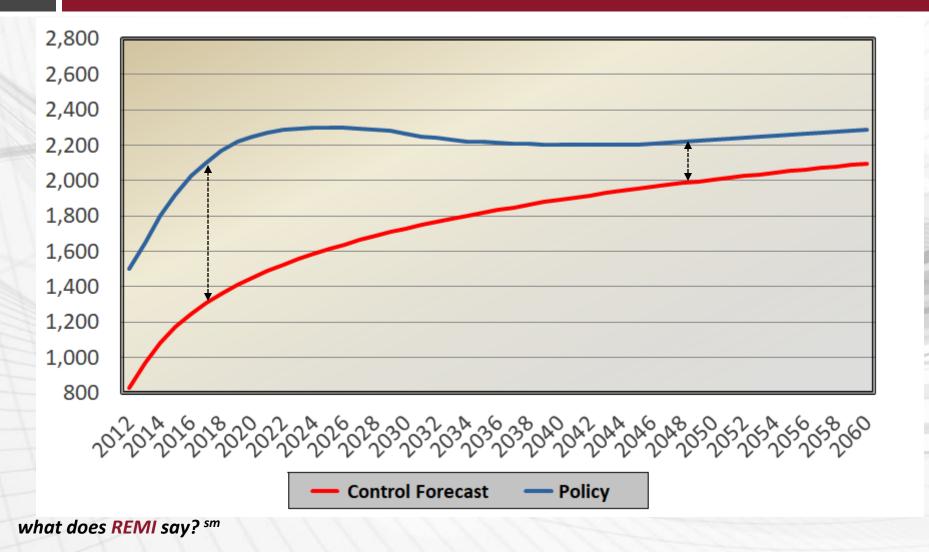
Modeling Scenarios



- Lower Transaction Fees
 - Decrease in Retail Trade Production Costs (U.S.)
- Bitcoin Mining Operation
 - Increase in Data Processing Employment, Decrease in Data Processing Value Added, Increase in Utilities Demand (W)
- Higher Electricity Costs
 - Increase in Electricity Costs for All Industries (W)
- REMI model: Washington + Rest of U.S., 2016-2026

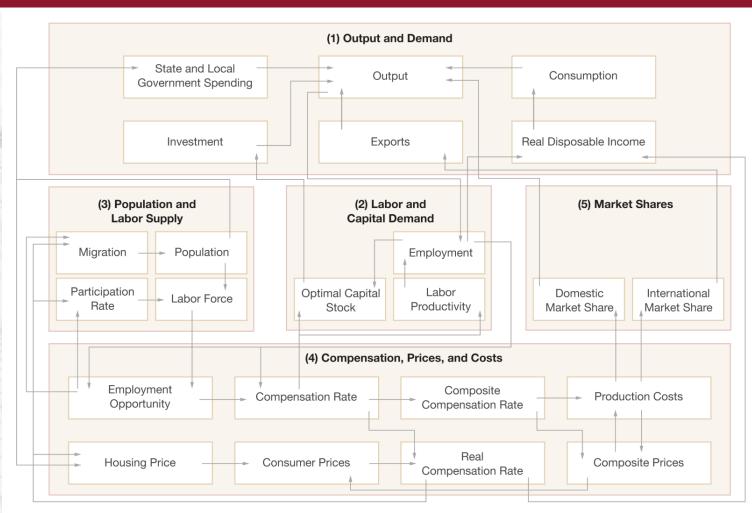
Model Framework





Model Structure







 Assume cryptocurrency allows for 2% decrease in transaction fees in U.S.

 Assume take-up rises steadily from 0% to 100% over 10 years

From 0% impact to 2% impact

 Model as percentage decrease in Production Costs in the Retail Trade sector in U.S.



□ 0-2% drop in Retail Trade Production Cost, linearly increasing take-up

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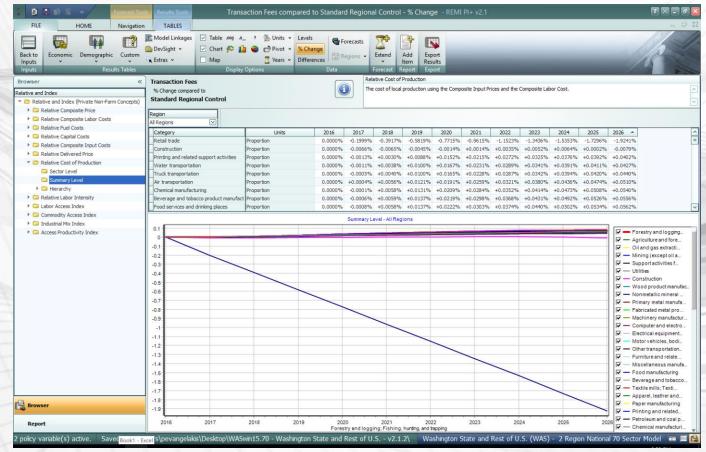


□ Change in production costs across all industries

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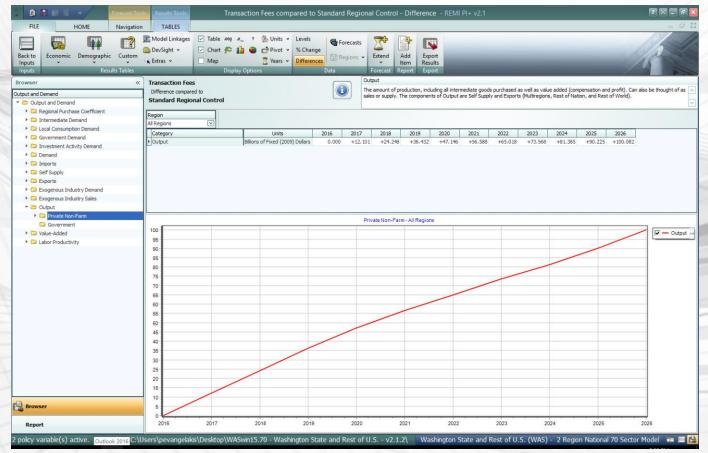


□ Change in production costs by industry





□ Change in output across all industries



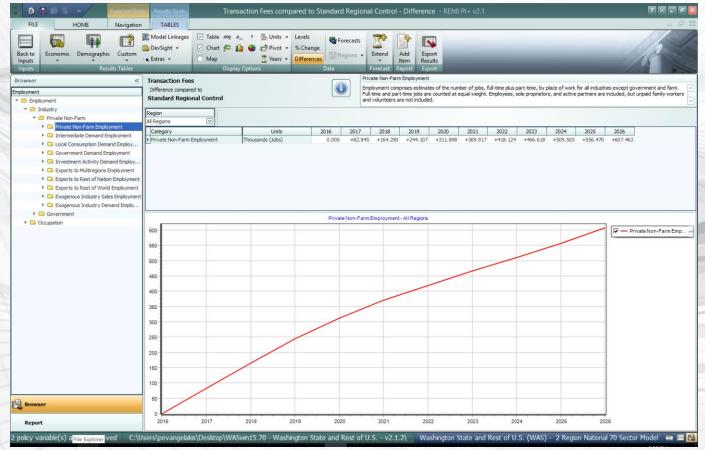


□ Change in output by industry

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Local Consumption Demand														
Government Demand	Category	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026 -	
Investment Activity Demand	Retail trade	Billions of Fixed (2009) Dollars	0.000	+1.570	+3.165	+4.837	+6.459	+8.098	+9.763	+11.531	+13.334	+15.317		
Demand	Construction	Billions of Fixed (2009) Dollars	0.000	+1.394	+3.110	+4.810	+6.251	+7.379	+8.207	+8.881	+9.416	+9.977		
▶ □ Imports	Wholesale trade	Billions of Fixed (2009) Dollars	0.000	+0.950	+1.931	+2.959	+3.935	+4.888	+5.821	+6.785	+7.722	+8.747		
Self Supply	Real estate	Billions of Fixed (2009) Dollars	0.000	+1.075	+2.060	+3.039	+3.864	+4.553	+5.127	+5.698	+6.201	+6.818		
Exports	Professional, scientific, and technical se Chemical manufacturing	Billions of Fixed (2009) Dollars Billions of Fixed (2009) Dollars	0.000	+0.591 +0.433	+1.224 +0.835	+1.880 +1.216	+2.475 +1.539	+3.011 +1.820	+3.496	+3.983 +2.360	+4.435 +2.616	+4.942		
Exogenous Industry Demand	Food manufacturing	Billions of Fixed (2009) Dollars Billions of Fixed (2009) Dollars	0.000	+0.433	+0.835	+0.799	+1.035	+1.820	+1.472	+2.380	+2.616	+2.900		
Exogenous Industry Sales	Administrative and support services	Billions of Fixed (2009) Dollars	0.000	+0.279	+0.553	+0.831	+1.075	+1.293	+1.490	+1.693	+1.881	+2.095		
* Coutput	Publishing industries, except Internet	Billions of Fixed (2009) Dollars	0.000	+0.158	+0.332	+0.530	+0.732	+0.941	+1.156	+1.384	+1.613	+1.868		
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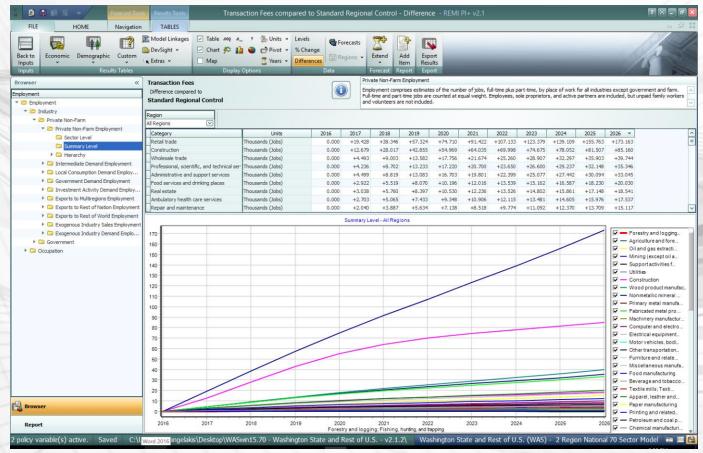


Change in employment across all industries





□ Change in employment by industry



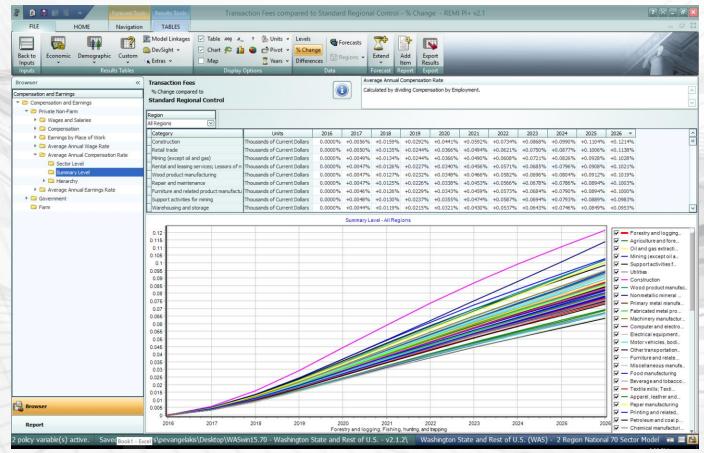


□ Change in compensation rate across all industries

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Change in compensation rate by industry





□ Change in total disposable personal income

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□ Change in labor costs across all industries

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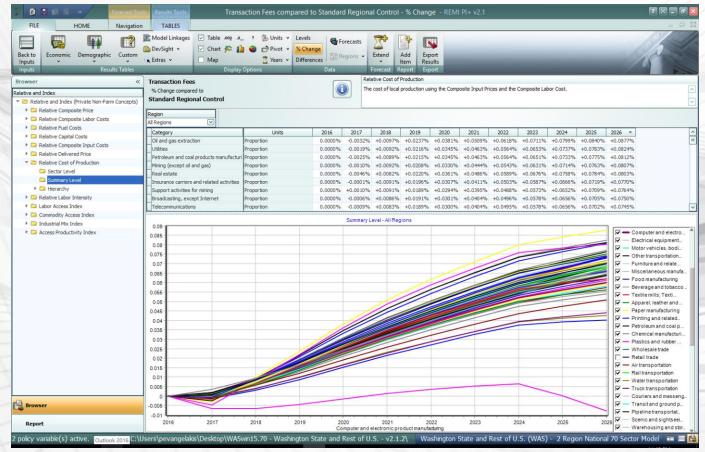


□ Change in labor costs by industry

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📁 Summary Level	Construction	Proportion	0.0000% +0.0056%	+0.0159% +0.0293%				+0.1211%	
Hierarchy	Retail trade	Proportion	0.0000% +0.0050%	+0.0135% +0.0244%	+0.0365% +0.0492				
Relative Fuel Costs	Mining (except oil and gas)	Proportion	0.0000% +0.0049%	+0.0134% +0.0245%					
Relative Capital Costs	Rental and leasing services; Lessors of		0.0000% +0.0047%						
Relative Composite Input Costs	Wood product manufacturing	Proportion	0.0000% +0.0047%	+0.0128% +0.0232%	+0.0348% +0.0467				
Relative Delivered Price	Furniture and related product manufact		0.0000% +0.0046%	+0.0126% +0.0229%	+0.0343% +0.0460	% +0.0573% +0.068			
Relative Cost of Production	Repair and maintenance	Proportion	0.0000% +0.0046%	+0.0125% +0.0226%	+0.0337% +0.0452	% +0.0564% +0.067	6% +0.0783% +0.0891%	+0.1000%	
Relative Labor Intensity	Support activities for mining	Proportion	0.0000% +0.0048%	+0.0130% +0.0237%	+0.0355% +0.0474	% +0.0587% +0.069	5% +0.0794% +0.0890%	+0.0984%	
Labor Access Index	Warehousing and storage	Proportion	0.0000% +0.0044%	+0.0119% +0.0215%	+0.0321% +0.0430	% +0.0537% +0.064	3% +0.0745% +0.0848%	+0.0952%	
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Industrial Mix Index			Summary L	evel - All Regions				ı	
	0.115 0.11 0.11 0.105 0.05 0.09 0.065 0.075 0.07 0.065 0.07 0.065 0.065 0.065 0.065 0.065 0.065 0.05 0.0							Image: Apriculture and fore. Image: Apriculture apriculture and fore. Image: Apriculture apriculture apriculture. Image: Apriculture apriculture. Image: Apriculture apriculture. Image: Apriculture apriculture. Image: Apriculture. Imad	
Browser	0.015							Apparel, leather and	
and and a second s	0.005							Printing and related.	
Report	2016 2017	2018 2019	2020	2021 20 jing; Fishing, hunting, and	2023 2023	2024	2025 20	D26 Petroleum and coal p Chemical manufactu	

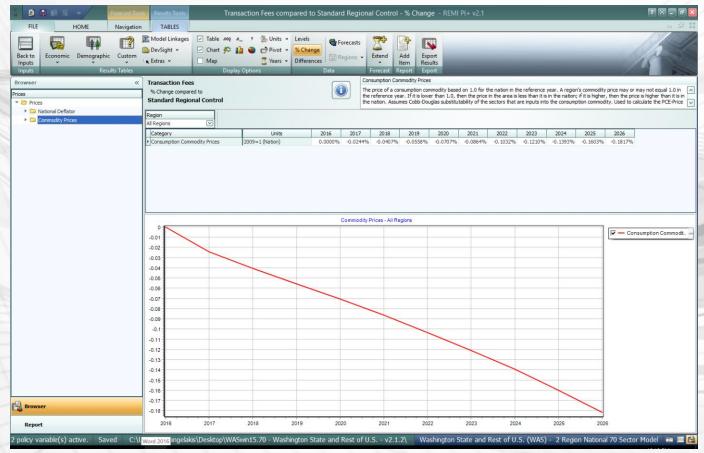


□ Change in production costs by industry (EXCLUDING Retail Trade)



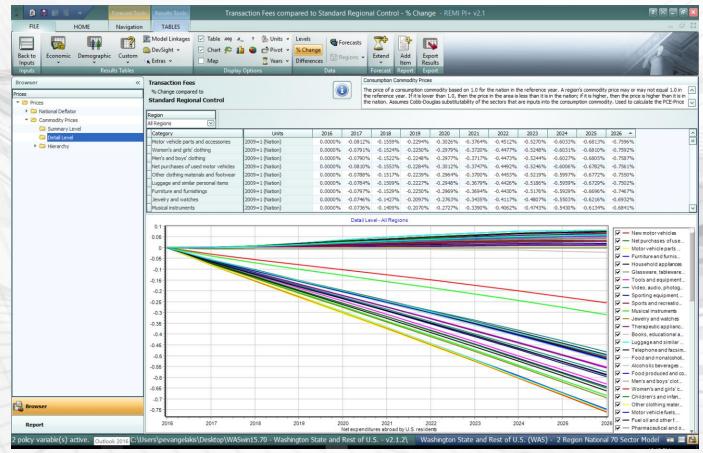


□ Change in prices across all consumption categories



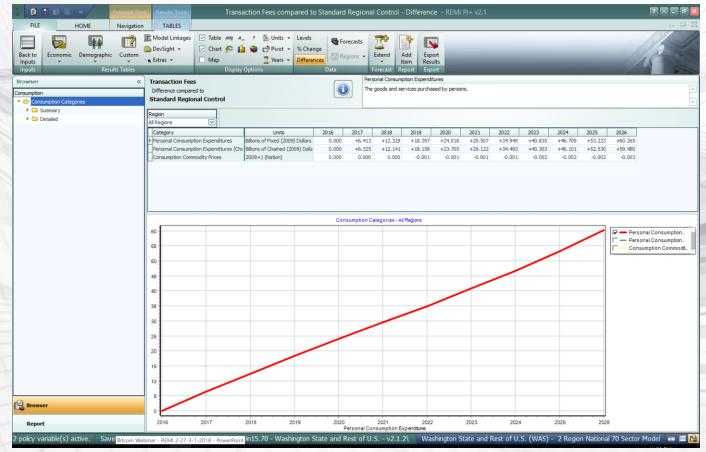


□ Change in prices by consumption category



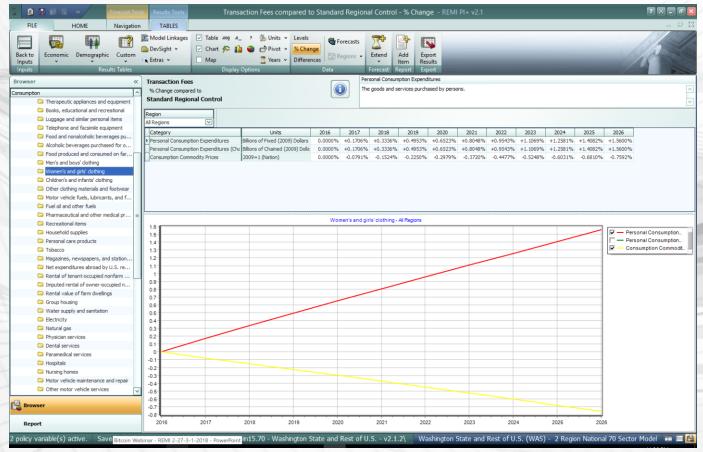


Change in total consumption





Change in consumption and price of women's clothing





Elasticity

-1.6500

Price elasticity of consumption for women's clothing

Options

Modify the consumer price elasticity for the policy variable

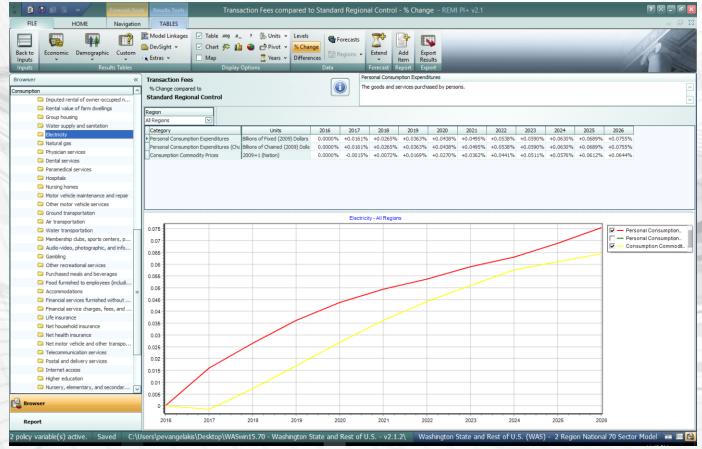
Commodity

Women's and girls' dothing

The consumer price change will enter the model with the specified elasticity which will cause an additional change in consumer spending to adjust for a higher or lower elasticity assumption, as appropriate. The price elasticity is the responsiveness of the consumption of the good to a change in its price.



Change in consumption and price of electricity



Lower Transaction Fees



Price elasticity of consumption for electricity

Options

Modify the consumer price elasticity for the policy variable

Commodity	Elasticity
Electricity	-0.6600

The consumer price change will enter the model with the specified elasticity which will cause an additional change in consumer spending to adjust for a higher or lower elasticity assumption, as appropriate. The price elasticity is the responsiveness of the consumption of the good to a change in its price.



- Case study: average Bitcoin mining operation
 - **56** Employees (incl. 6 in management)
 - Power Usage 7.5 kWh a day (11,000 homes worth)
 - \$328,500 annual cost at \$0.12 per kWh
 - \$260,500 above industry standard
 - Decrease in Value Added in Data Processing
 - Increase in Demand for Utilities

Focus on Washington State

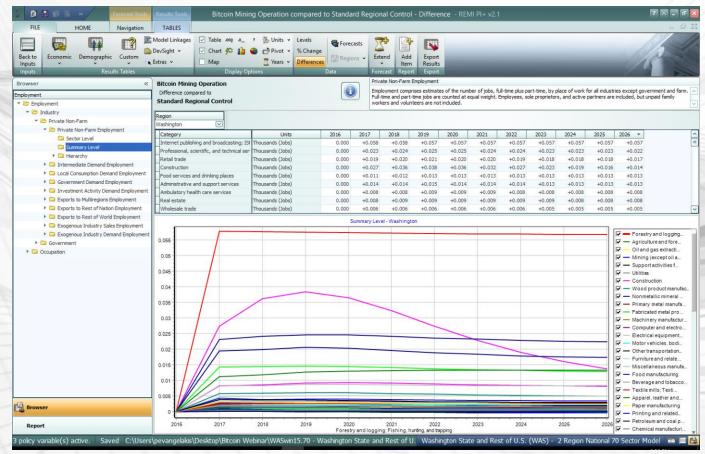


 56 employees & \$260,500 lower Value Added for Data Processing, higher Demand for Utilities in Washington State

F	Polic	icy V	ariable Inputs												
Activ	/e E	Edit (Group												
_	_		56 Employees in Data Processing												
Γ	Act	ctive	View Category	Detail	Region	n	Units	2016	2017	2018	2019	2020	2021	2022	2023
		\checkmark	C Employment	Industry (Exogenous Production): Internet publishing and	bro Washin	ington	Units	0	56	56	56	56	56	56	56
	<														
) E	☑ (🥖 I	increase in Demand for Utilities												
	Act	ctive	View Category	Detail	Region	n	Units	2016	2017	2018	2019	2020	2021	2022	2023
		\checkmark	C Exogenous Final Demand	Utilities	Washin	ington	2009 Fixed National \$ (M)	0	0.2605	0.2605	0.2605	0.2605	0.2605	0.2605	0.2605
	<		Ш												
⊡ [☑ (1	Decrease in Value Added												
	Act	ctive	View Category	Detail	Region	n	Units	2016	2017	2018	2019	2020	2021	2022	2023
		\checkmark	Value Added with no effect on Sales or Employment	Internet publishing and broadcasting; ISPs, search portals	, ar Washin	ington	2009 Fixed National \$ (M)	0	-0.2605	-0.2605	-0.2605	-0.2605	-0.2605	-0.2605	-0.2605
ľ	<														

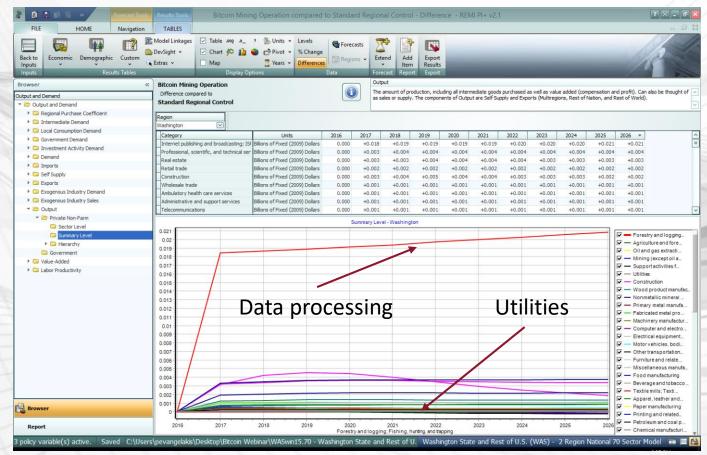


Change in employment by industry





Change in output by industry





□ Change in regional GDP

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	nographic Custom Results Tables	Model Linkage	Chart 🌮		🛛 Years 👻 Differ	nange	recasts gions v Exte	ltem	Export Results Export	-	-				-	1	5
rowser	nesons nuores	« Bitcoin Min	ing Operation	ping optio				Domestic Pro	and the second se								
oss Domestic Product Gross Domestic Product Comparison Product Comparison Product	roduct by Major Compo	Difference of Standard F				l	1 The r	narket value of	f goods and se	ervices prod	uced by labor	and property	y in the Unite	d States, reg	ardless of na	tionality.	
Real Gross Domestic Pr		n Washington	~														
Real Gross Value Adde	d by Sector, Fixed Dol	Category			Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	
					ons of Fixed (2009) Do			+0.026	+0.027	+0.027	+0.027	+0.027	+0.026	+0.026	+0.026	+0.026	
					ons of Chained (2009) ons of Fixed (2009) Do			+0.026	+0.027	+0.027	+0.027	+0.026	+0.026	+0.026	+0.025	+0.025	
						G	iross Domestic F	roduct - Wast	nington								
		0.027				G	iross Domestic F	roduct - Wasł	nington							🔽 — Real Gr	oss Domestic
		0.026				G	iross Domestic F	roduct - Wash	nington							F - Real Gr	oss Domestic
		0.026 0.025 0.024 0.023	_			G	ross Domestic F	roduct - Wash	nington							F - Real Gr	oss Domestic
		0.026 0.025 0.024 0.023 0.022 0.021				G	iross Domestic F	roduct - Wash	nington							F - Real Gr	oss Domestic
		0.026 0.025 0.024 0.023 0.022 0.021 0.021				G	ross Domestic F	roduct - Wash	nington							F - Real Gr	oss Domestic
		0.026 0.025 0.024 0.023 0.022 0.022 0.021 0.02 0.02 0.019 0.018				G	ross Domestic P	roduct - Wash	nington							F - Real Gr	oss Domestic
		0.026 0.025 0.024 0.023 0.022 0.021 0.02 0.019 0.018 0.017 0.016				G	ross Domestic F	roduct - Wash	hington							F - Real Gr	oss Domestic
		0.026 0.025 0.024 0.023 0.022 0.021 0.02 0.019 0.018 0.017 0.016 0.015				G	ross Domestic F	roduct - Wash	nington							F - Real Gr	oss Domestic
		0.026 0.025 0.024 0.023 0.022 0.021 0.022 0.021 0.019 0.018 0.017 0.016 0.016 0.015 0.014				G	ross Domestic F	roduct - Wash	hington							F - Real Gr	oss Domestic
		0.026 0.025 0.024 0.023 0.022 0.021 0.021 0.019 0.019 0.019 0.019 0.019 0.016 0.017 0.016 0.015 0.014 0.013 0.012 0.012				G	ross Domestic F	roduct - Wash	hington							F - Real Gr	oss Domestic
		0.026 0.025 0.024 0.023 0.022 0.021 0.022 0.019 0.019 0.018 0.018 0.016 0.016 0.015 0.014 0.013 0.012				C	ross Domestic F	roduct - Wash	hington							F - Real Gr	oss Domestic
		0.026 0.024 0.023 0.022 0.022 0.022 0.022 0.019 0.018 0.018 0.018 0.018 0.016 0.016 0.015 0.014 0.011 0.011 0.011 0.011 0.011				G	vross Domestic R	roduct - Wash	hington							F - Real Gr	oss Domestic
		0.026 0.025 0.024 0.023 0.022 0.022 0.021 0.021 0.019 0.019 0.019 0.019 0.019 0.019 0.019 0.011 0.011 0.0112 0.0112 0.0112 0.0112 0.001 0.000 0.000 0.000 0.000				G	rross Domestic F	roduct - Wash	Nington							F - Real Gr	oss Domestic
		0.028 0.025 0.024 0.023 0.022 0.021 0.019 0.019 0.019 0.019 0.019 0.019 0.019 0.019 0.019 0.019 0.019 0.019 0.019 0.019 0.015 0.014 0.012 0.011 0.012 0.011 0.012				C	rross Domestic F	roduct - Wash	nington							F - Real Gr	oss Domestic
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Browser		0.025 0.024 0.024 0.023 0.027 0.027 0.027 0.019 0.019 0.019 0.019 0.019 0.019 0.019 0.019 0.019 0.011 0.011 0.011 0.0112 0.0112 0.0112 0.001 0.000 0.000 0.000 0.000 0.000 0.000				2	ross Domestic F	roduct - Wash	nington							F - Real Gr	oss Domestic. oss Domestic. oss Value Add



□ Change in access to skilled labor

FILE HOME Navigation	TABLES													
Back to Inputs Inputs Results Tables	Model Linkages ✓ Table .∞oo DevSight ✓ ✓ Chart ∲ Linkages ✓ Display O	 Pivot v % Change Years v Difference 	El Peniner	-	Item	Export Results Export		-	-	-			10	11 AR
	Bitcoin Mining Operation			Contraction of the local division of the loc	cess Index	Contraction of the local division of the loc		_	_	_	_	_		
	% Change compared to										stics by occup	ation and in	dustry on labor productiv	ity. The
lative and Index Private Non-Farm Concepts)	Standard Regional Control			index is	relative to t	the nation, a	nd benchmarl	ked to the las	t history year					
Relative and index (Private North and Concepts)														
Relative Composite Labor Costs	Region													
Relative Fuel Costs	Washington 🕑													
Relative Capital Costs	Category	Units			2018	2019	2020	2021	2022	2023	2024	2025	2026 -	
Relative Composite Input Costs	Internet publishing and broadcasting; IS				+0.00%	+0.01%	+0.01%	+0.01%	+0.01%	+0.01%	+0.01%	+0.01%	+0.01%	
Relative Delivered Price	Broadcasting, except Internet Support activities for mining	2015=1 2015=1			+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	
Relative Cost of Production	Construction	2015=1			+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	
Relative Labor Intensity	Printing and related support activities	2015=1			+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	
* 🗁 Labor Access Index	Professional, scientific, and technical ser				+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%		
C Sector Level	Rental and leasing services; Lessors of r				+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	
📁 Summary Level	Telecommunications	2015=1	0.00% +	0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	
Hierarchy	Transit and ground passenger transport	2015=1	0.00% +	0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	
Commodity Access Index			Cumo	ary Level - 1	Machinata				*************		**************			
Access Productivity Index	0.009 0.008 0.007 0.007 0.007 0.006 0.006 0.006 0.006 0.006 0.004 0.004 0.003 0.004 0.004 0.004 0.005 0.006 0.												Perssty and 0p — Agriculture and Ø — Oil and gas extr Ø — Uil and gas extr Ø — Support activitit Ø — Support activitit Ø — Orstruction Ø <	fore acti oil a es f manufa meral fanufa. li pro ufactur electro. ment bodi ation elate manufa bbacco
Browser	0.000	2018 2019	2020		021	2022		2023	2024		2025		Apparel, leather Paper manufact Printing and rel Petroleum and co	uring ated



Assume 1% increase in Electricity Cost for All Industries

Focus on Washington State



1% Electricity Cost increase for All Industries in Washington State

	Po	olicy Variable Inputs													
Act	tive	Edit Group													
E 🔽 🖉 Increase in Energy Costs across all industries															
		Active View Category	Detail		Region	Units		2016	2017	2018	2019	2020	2021	2022	2023
	Π	Fuel Cost	Electricity, All Industries		Washington	Percent		0	1	1	1	1	1	1	1
	<		W												



□ Change in fuel costs by industry

FILE HOME Navigation	TABLES											
Regional Regional National National Simulation Control Simulation Control	Workbook Inputs Results Mod Views	el REMI	_	_	-	-	-	-	-		100	
		About		Relative Fuel Co	ste							
rowser	K Higher Electricity Costs % Change compared to					in the region re	lative to the natio	n. It is a Cobb-Do	uolas agorega	tion of elect	ricity, natural gas, and residua	ual fue
lative and Index	Standard Regional Control						Cost is determined		EMI model, and	i changed th	rough Policy Variable inputs.	
 Relative and Index (Private Non-Farm Concepts) Relative Composite Price 				nowever, the m	dei structure du	es allow for su	socoon among t	JC15.				
Relative Composite Labor Costs	Region											
Composite Labor Costs Costs	Washington 💌											
Sector Level	Category	Units	2016 2	017 2018	2019	2020	2021 2022	2023	2024	2025	2026	
Summary Level	 Forestry and logging; Fishing, hunting 			0.73% +0.73%	+0.73%		+0.73% +0.3			+0.73%	+0.73%	
 Building Level Hierarchy 	Agriculture and forestry support activ	and the second second		0.73% +0.73%	+0.73%		+0.73% +0.3			+0.73%	+0.73%	
Relative Capital Costs	Oil and gas extraction	Proportion		0.73% +0.73%	+0.73%		+0.73% +0.3			+0.73%	+0.73%	
Relative Composite Input Costs	Mining (except oil and gas)	Proportion		0.73% +0.73%	+0.73%		+0.73% +0.7			+0.73%	+0.73%	
Relative Composite Input Costs	Support activities for mining	Proportion		0.73% +0.73%	+0.73%		+0.73% +0.1			+0.73%	+0.73%	
Relative Cost of Production	Utilities Construction	Proportion		0.16% +0.16% 0.73% +0.73%			+0.16% +0.1			+0.16%	+0.16%	
Relative Labor Intensity	Wood product manufacturing	Proportion Proportion		0.73% +0.73% 0.39% +0.39%	+0.73%		+0.73% +0.1			+0.73%	+0.73% +0.39%	
Labor Access Index	Nonmetallic mineral product manufactu			0.39% +0.39%	+0.39%		+0.39% +0.3			+0.39%		
Commodity Access Index		an Proportion				+0.3376	10.33 /8 10.1	576 40.3576	+0.5576	10.0570	10.3370	
Generative Access index Figure 1			Sum	mary Level - Washin	gton							
Access Productivity Index	0.7 0.65 0.8 0.65 0.4 0.45 0.4 0.35 0.3 0.25 0.2 0.15 0.1										▼ Forestry and logging ▼ Agriculture and forx ▼ Agriculture and forx ▼ Support advises f. ▼ Support advises f. ▼ Support advises f. ▼ Wood product thank ▼ Primary metal manufacture and elector ▼ Fabricated metal pr ▼ Motor vehicles, boo ▼ Other transportatio ▼ Forniare and elector ▼ Other transportatio ▼ Forniare and relator ▼ Motor vehicles, boo ▼ Hotor vehicles, boo ▼ Motor vehicles, boo ▼ Hotor vehicles, boo ▼ Toxtil remits; rest	re ti a f nufac actur on actur on te nufa nufa nufa nufa nufa nufac con
	0.05								_		— Apparel, leather and Paper manufacturin — Printing and related	ng

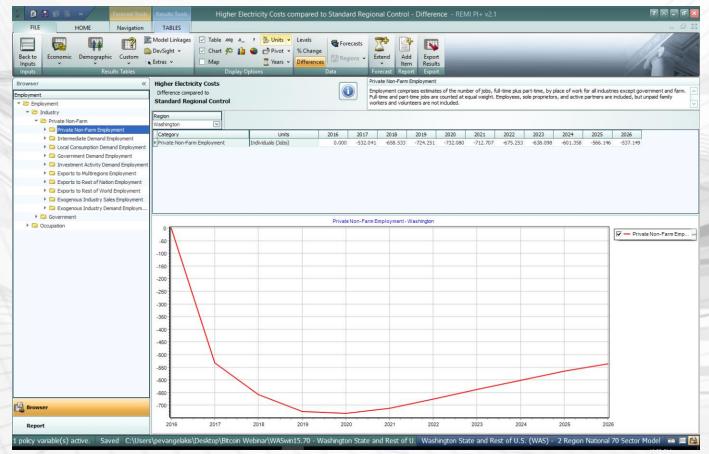


□ Change in production costs across all industries

	🕼 📓 👘 🔹 🖉 Forecast Tools	Results Tools Higher Electricity Costs c	compared to Standard Reg	gional Control - % Change - REN	/I PI+ v2.1	7 2 - 8
Bitwee data Higher Electricity Costs % Charge compared by % Ch	Back to Inputs	Model Linkages ∨ Table ∞oo o_) Kunis v DevSight × ∨ Chart ∲ 1 ● Pivot × KEtras × I Map Z Years ×	% Change Differences	Extend Add Export V Item Results	_	
Image: Service Comparie Lador Costs Image: Relative Cost	Browser « Relative and Index Cellstive and Index Relative and Index (Private Non-Farm Concepts) Relative Composite Price	Higher Electricity Costs % Change compared to Standard Regional Control		Relative Cost of Production	osite Input Prices and the Composite Labor Cost.	
	Image: Costs Relative Capital Costs Image: Capital Costs Image: Capital Costs Image: Capital Costs	Category Units				
		0.012 0.012 0.011 0.011 0.011	Relative Co	st of Production - Washington		Relative Cost of Pro
		0.009 0.008 0.007 0.007 0.007 0.006 0.007				
		0.005 0.004 0.004 0.003 0.002 0.002 0.002 0.002				
Report 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026	•	0.000	2010 2020	2021 2022	2003 2004 2025	2026

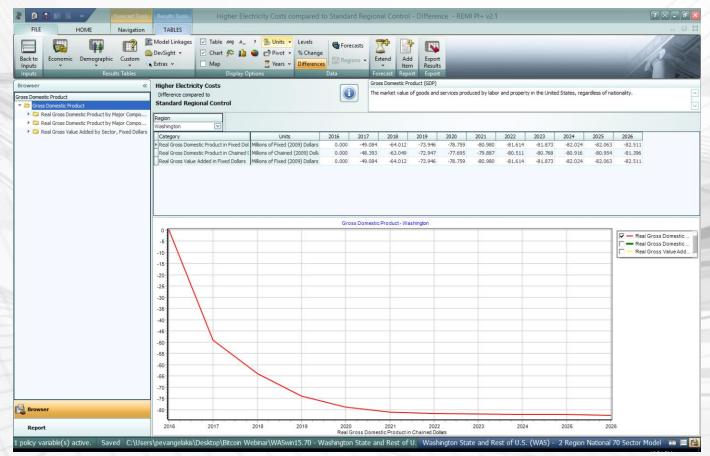


Change in employment across all industries





Change in regional GDP



Conclusion



- Whether or not Bitcoin is a bubble, cryptocurrency can have real impacts on the economy
- □ These include:
 - Lowering transaction fees for retail purchases
 - Creating jobs and potential agglomeration economies
 - Increasing electricity prices
 - Use of blockchain technology to improve supply chains
- Still plenty of room to innovate and generate additional impacts, still plenty to learn