

Navigating through Uncertainty: Firm Behaviors and Macroeconomic Outcomes

Tosapol Apaitan
Pym Manopimoke

Chaitat Jirophat
Archawa Paweenawat

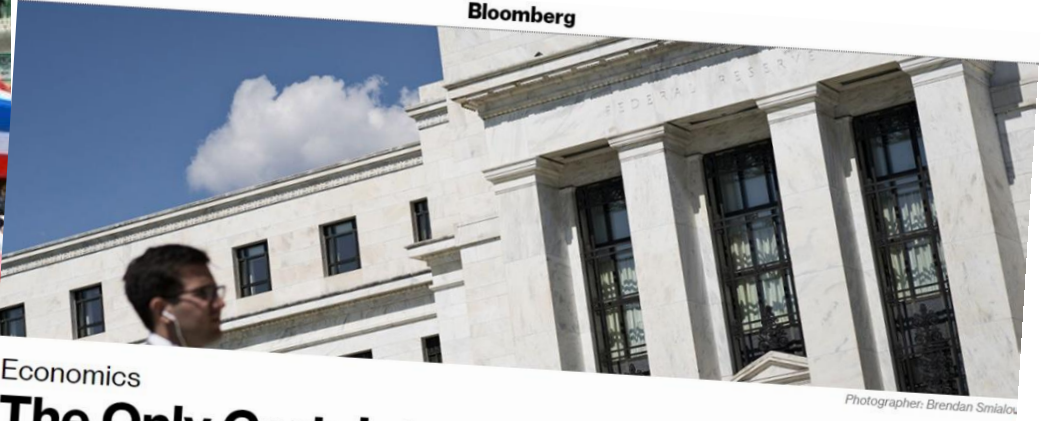
Pongsak Luangaram
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BOT Symposium 2020



PUEY UNGPHAKORN INSTITUTE
FOR ECONOMIC RESEARCH

Uncertainties Abound



Economics
The Only Certainty for World's Central Bankers Is Uncertainty



What We Do

1. **Measurement and analysis** of different *types* of uncertainty
2. **Macroeconomic impacts** of uncertainties
3. **Firm-level** investment, revenue growth and trade **responses** to uncertainties
4. **Policy implications** and recommendations

How to Measure Uncertainty?

Main Approaches



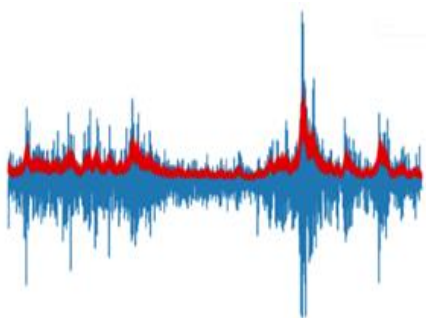
1. Market-based

- USTHB fx option implied volatility
- SET historical volatility



2. Survey-based

- Consumer confidence index
- Business sentiment index



3. Model-based

- Apply FAVAR model with stochastic volatility to 200+ macroeconomic and financial time series



4. Text-based

- Apply Boolean search, topic modeling (LDA) to articles in 4 Thai language newspapers

5. Broad-based

- Principal component of 1, 2, 3

Main Approaches



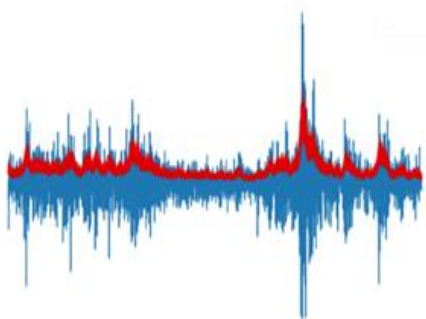
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Group 1: National Account Data (Quarterly Series)		Group 4: Housing (Monthly Series)		Group 7: Bonds and Exchange Rate Measures (Monthly Series)		Group 9: Stock Market Indices (Monthly Series)	
1	Real Gross Domestic Product	58	Fee: Juristic Act and Right Registration Fee for Immovable Property (Millions of Baht)	118	MRR: minimum retail rate (Min)	184	SET Index: Stock Exchange of Thailand Index
2	Consumption	59	Land licen: Land Development Licences - Bangkok Metropolis	119	MRR: minimum retail rate (Max)	185	SET Food Index
3	Government Consumption	60	Construction Area: Construction Areas Permitted (1000 sqm.)	120	Government bonds (Total)	186	SET Bank Index
4	Investment	61	Land Trans: Land and building Transactions Nationwide (Millions of Baht)	121	Treasury bills (Total)	187	SET Energy Index
5	Exports of goods and services	62	building licen: Building license	122	Promissory notes (Total)	188	SET 50: SET 50 Index
6	Imports of goods and services	63	bld licen-bkk: Building license in Bangkok	123	State enterprise bonds (total)	Group 10: Trade (Monthly Series)	
Group 2: Output and Income (Monthly Series)		64	bld licen-others: Building license in other provinces	124	BOT-bond : Bank of Thailand bonds	189	Ex-volume: Export volume
7	PI:Personal Income	65	New house: New Housing Project in Bangkok Metropolis and Vicinity (unit)	125	Government debt securities held by nonfinancial market mutual funds	190	Im-volume: Import volume
8	MPI: Manufacturing Production Index	66	housing proj: New Housing in Bangkok Metropolis and Vicinity (unit)	126	Outstanding government debt security	191	Im-cons: Import - Consumer Goods: Volume
9	MPI10: Manufacture of food products	67	apartment: New apartment in Bangkok Metropolis and Vicinity (unit)	127	Total deposits outstanding of Commercial Banks	192	Im-rawmat: Import - Raw Materials: Volume
10	MPI12: Manufacture of tobacco products	68	self built housing: New selfbuilt housing in Bangkok Metropolis and Vicinity (unit)	128	Deposits turnover ratio of Commercial Banks	193	Im-cap: Import - Capital Goods: Volume
11	MPI13: Manufacture of textiles	69	credit outstanding: Property Credit Outstanding (Millions of Baht)	129	Government bonds Short-term 1 year	194	Ex-agri: Export - Agricultural Products: Volume
12	MPI14: Manufacture of wearing apparel	70	re credit: Real Estate Development Credit	130	Government bonds Medium-term 1-5 years	195	Ex-fish: Export - Fishery Products: Volume
13	MPI15: Manufacture of leather and related products	71	personal housing credit:Personal Housing Credit	131	Government bonds Long-term 5 year up	196	Ex-mfgs: Export - mfgs: Volume
14	MPI19: Manufacture of coke and refined petroleum products	Group 5: Consumption, Orders, and Inventories (Monthly Series)		132	Government promissory notes	197	Import goods excluding gold
15	MPI20: Manufacture of chemicals and chemical products	72	bsi: Business survey index	133	State enterprise bonds Short-term 1 year	198	Occupancy Rate
16	MPI22: Manufacture of rubber and plastic products	73	bsi_perf: Business survey index Performance	134	State enterprise bonds Medium-term 1-5 years	199	Tourists
17	MPI23: Manufacture of other non-metallic mineral products	74	bsi_order: Business survey index Total Order Book	135	State enterprise bonds Long-term 5 year up	Group 11: Financial Variables (Monthly Series)	
18	MPI24: Manufacture of basic metals	75	bsi_invest: Business survey index Investment	136	State enterprise promissory notes Short-term 1 year	200	DJog(DIV): Dividend series based on
19	MPI25: Manufacture of fabricated metal products, except machiner equipment	76	bsi_employment: Business survey index Employment	137	New issuances of domestic securities	201	DJog(P): Price series based on
20	MPI26: Manufacture of computer and electronic products	77	bsi_cost : Business survey index Production Costs (Invert)	138	New issuances of domestic public sector securities	202	D_DivReinvest: Dividend under reinvestment based on
21	MPI29: Manufacture of motor vehicles, trailers and semi-trailers	78	bsi_3 month: Expected Business survey index over 3 month horizon	139	New issuances of domestic private sector securities	203	D_Preinvest: Price under reinvestment based on
22	CAPU10: Capital utilization of food products	79	Retail Sales Index	140	Authorized Capital of Newly Registered Companies	204	d-p: Dividend to price ratio based on
23	CAPU13: Capital utilization of textiles	80	Retail: Motor: Retail sales of motor vehicles and automotive fuel	Group 7: Bonds and Exchange Rate Measures (Monthly Series)		205	AutoReturn: Automotive industry portfolio
24	CAPU14: Capital utilization of wearing apparel	81	Retail: Nondu: Retail sales of non-durable goods	141	NEER: Nominal effective exchange rate	206	FoodReturn: Food industry portfolio
25	CAPU15: Capital utilization of leather and related products	82	Retail: Du: Retail sales of durable goods	142	REER: Real effective exchange rate	207	FashionReturn: Fashion industry portfolio
26	CAPU17: Capital utilization of paper and paper products	83	Retail: Store: Retail sales of department stores, supermarkets, and general stores	143	inter_overnight: Interbank overnight lending rates	208	HomeReturn: Home industry portfolio
27	CAPU19: Capital utilization of coke and refined petroleum product	84	Wholesales Index	144	repo1day: Bilateral repurchase rate (1 day)	209	PersonReturn: Personal goods industry portfolio
28	CAPU20: Capital utilization of chemicals and chemical products	85	whole sale: non du: Wholesales of non-durable goods	145	repo7days: Bilateral repurchase rate (7 days)	210	FinanceReturn: Finance industry portfolio
29	CAPU22: Capital utilization of rubber and plastic products	86	whole sale: du: Wholesales of durable goods	146	repo14days: Bilateral repurchase rate (14 days)	211	InsuranceReturn: Insurance industry portfolio
30	CAPU23: Capital utilization of other non-metallic mineral products	87	whole sale: int : Wholesales of intermediate goods	147	Thai Baht implied interest rate (1 month)	212	PetroReturn: Petroleum industry portfolio
31	CAPU24: Capital utilization of basic metals	88	VAT - Gross Value Added Tax at 2000 prices (Million baht)	148	Thai Baht implied interest rate (3 months)	213	PKGReturn: Packaging industry portfolio
32	CAPU25: Capital utilization of fabricated metal products, except machinery and equipment	89	Sales: Automotives: Domestic automobiles sales	149	Thai Baht implied interest rate (6 months)	214	PropertyReturn: Property industry portfolio
33	CAPU26: Capital utilization of computer and electronic products	90	Sales: Clothes: Retail sale of clothing, footwear and leather articles	150	tThai Baht implied interest rate (12 months)	215	ENERGReturn: Energy industry portfolio
34	CAPU29: Capital utilization of motor vehicles, trailers and semi-trs	91	Sales: Food: Retail sale of food in specialized store	151	Government bond yield (1 year)	216	CommReturn: Commerce industry portfolio
Group 3: Labor Markets (Monthly Series)		92	Sales: Bev: Retail sale of beverages in specialized store	152	Government bond yield (2 years)	217	HELTHReturn : Healthcare industry portfolio
35	Help Wanted	93	Sales: Tobacco: Retail sale of tobacco products in specialized stores	153	Government bond yield (3 years)	218	MEDIAReturn : Media industry portfolio
36	Help wanted/unemp	94	Sales: Electronics appliances: Retail sale of electrical household appliances in specialized stores	154	Government bond yield (5 years)	219	TourismReturn: Toursim industry portfolio
37	Emp (Total): Employed Total (Thousand)	95	PPI: Private Investment Index	155	Government bond yield (7 years)	220	TranReturn: Transportation industry portfolio
38	Emp_nonag: Civilian Labor Force: Employed, Nonagricultural Indus	96	Sales: Construction: Construction material sales index	156	Government bond yield (10 years)	221	ETRONReturn: Electronics industry portfolio
39	Unemployment Rate: Unemployment Rate: All workers	97	Import: Capital: Imports of capital goods at 2010 prices	157	Government bond yield (12 years)		
40	U_dr1m: Unemployment with duration less than 1 month	98	Sales: Machine: Domestic machinery sales at 2010 prices	158	Government bond yield (14 years)		
41	U_dr3m : Unemployment with duration between 1-2.9 months	99	PCI : Personal Consumption Index	Group 8: Prices (Monthly Series)			
42	U_dr6m: Unemployment with duration between 3-5.9 months	100	Sales: Passenger Cars: Sales of passenger cars (units)	159	CPI : Consumer price index		
43	U_dr9m: Unemployment with duration between 6-8.9 months	101	Sales: Motorcycle Sales: Sales of motorcycles (units)	160	CPI-food: Consumer price index food and non-alcoholic beverages		
44	U_dr12m: Unemployment with duration between 9-11.9 months	102	Sales: Commercial Cars: Sales of commercial cars (units)	161	CPI-apparel: Consumer price index apparel and footwear		
45	U_drmore12m: Unemployment with duration more than 1 year	103	Gas Index: Sales of benzene, gasohol and diesel index	162	CPI-housing: Consumer price index housing and furnishing		
46	Emp total-agri :Total employment in agricultural sector	104	Electricity: Household electricity consumption index	163	CPI-med: Consumer price index medical and personal care		
47	Emp privatemanu: Private employment in manufacturing sector	105	Import: Clothes: Import of textiles index	164	CPI-trans: Consumer price index transportation and communication		
48	Emp total-cons:Total employment in construction	106	Domestic Car Sales: Domestic automobiles sales (units)	165	CPI-recre: Consumer price index recreation and education		
49	Emp total.trade: Total Employment in Trade	Group 6: Money and Credit (Monthly Series)		166	CPI-tobacco: Consumer price index tobacco and alcoholic beverages		
50	Emp total.hotelrest:Total employment in hotel and restaurants	107	M1: Narrow money	167	CPI-tobacco: Consumer price index tobacco and alcoholic beverages		
51	Emp private-fin:Private employments in financial sector	108	M2: Broad money	168	CPI-rawfood: Consumer price index raw food		
52	Private avg hour: Average working hours per weeks of private emplo	109	Currency: Currency held by the public	169	CPI-energy: Consumer price index energy		
53	Private earn_hr: Average earning per hour of private employees	110	Banknotes in Circulation	170	CPI-ex food energy: Consumer price index excluding food and energy		
54	Avg hr-private manu:Average working hours per weeks of private manufacturing workers	111	Deposit	171	CPI-ex food energy rent: Consumer price index excluding energy and rent		
55	Avg wage-trade: Average earning per hour for private trade workers	112	Narrow Money	172	PPI : Producer price index		
56	Avg wage-fin : Average earning per hour for private financial worker	113	Currency Held by Depository Corp. - Commercial Banks	173	PPLagri: Producer price index agricultural products		
57	Avg wage-manu: Average earning per hour for private manufacturing workers	114	Transferable Deposits at Depository Corp. - Commercial Banks	174	PPLmining: Producer price index mining products		
		115	Quasi-money	175	PPLmanu: Producer price index manufactured products		
		116	MLR: minimum loan rate (Min)	176	price_cons: Price of construction materials index		
		117	MLR minimum loan rate (Max)	177	price_wood: Price of construction materials_wood		
				178	price_cement: Price of manufacturing goods_mixed cement 50 kgs.		
				179	price_metal: Price of construction materials_metal		
				180	price_diesel: Price of manufacturing goods_diesel		
				181	price_fueloil: Price of manufacturing goods_fuel oil		
				182	price_sugar: Price of manufacturing goods_white sugar (1 kg.)		
				183	price_rice: Wholesale price of 100% rice in Bangkok Metropolis		
					price_rubber: Wholesale price of ribbed smoked sheet rubber in Bangkok Metropolis		

Main Approaches



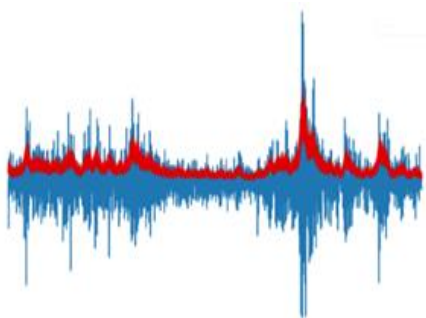
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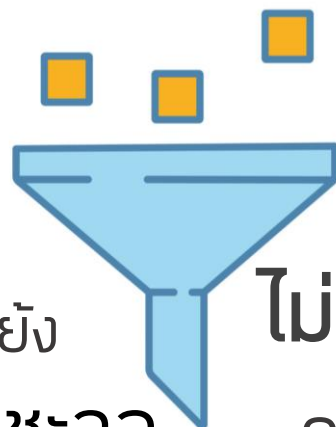
Text-Based Method



สืบสวน

ล่าช้า
ไม่ชัดเจน

ขัดแย้ง
เลื่อน



เสี่ยง

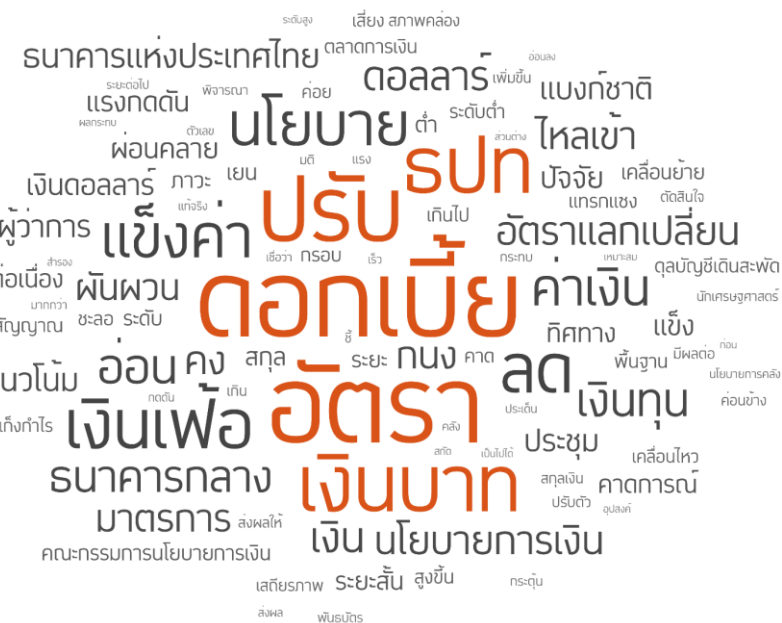
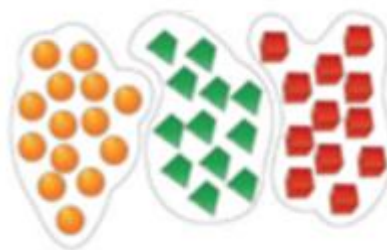
วิกฤต

ไม่แน่นอน

ชะงัก

คลุมเครือ

Topics



Main Approaches



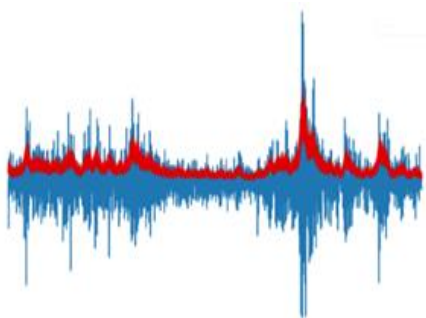
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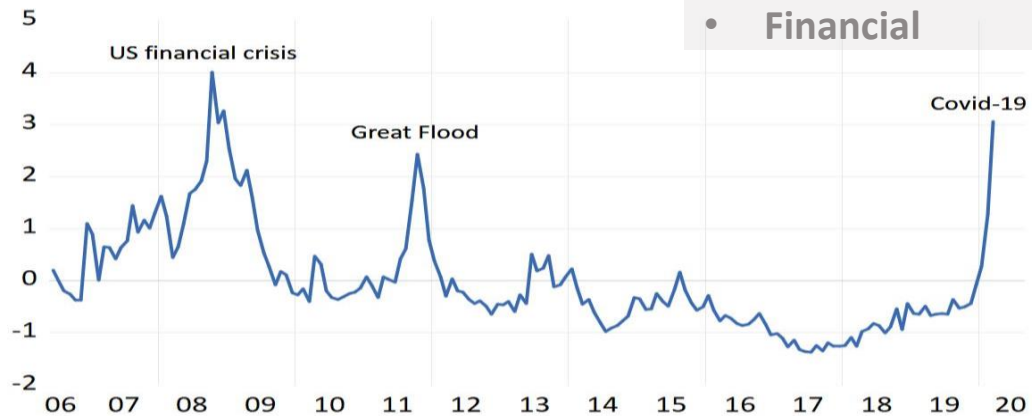
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Types of Uncertainty

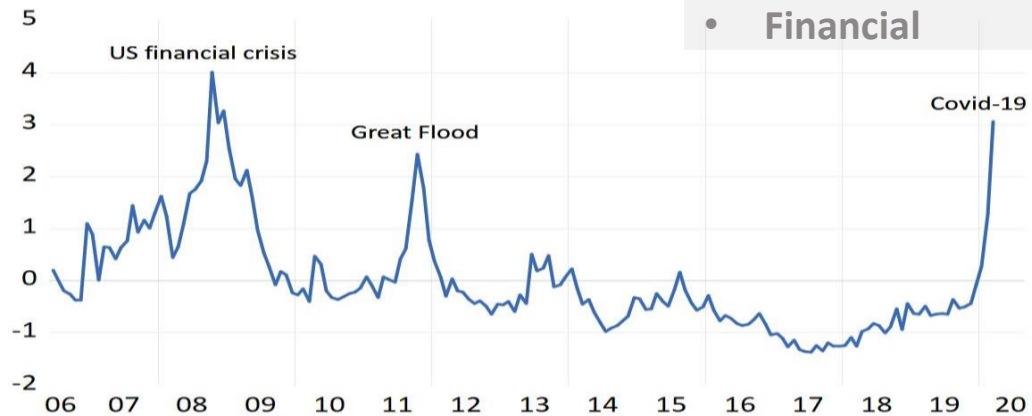
Economic Condition

- Macroeconomic
- Financial



Economic Condition

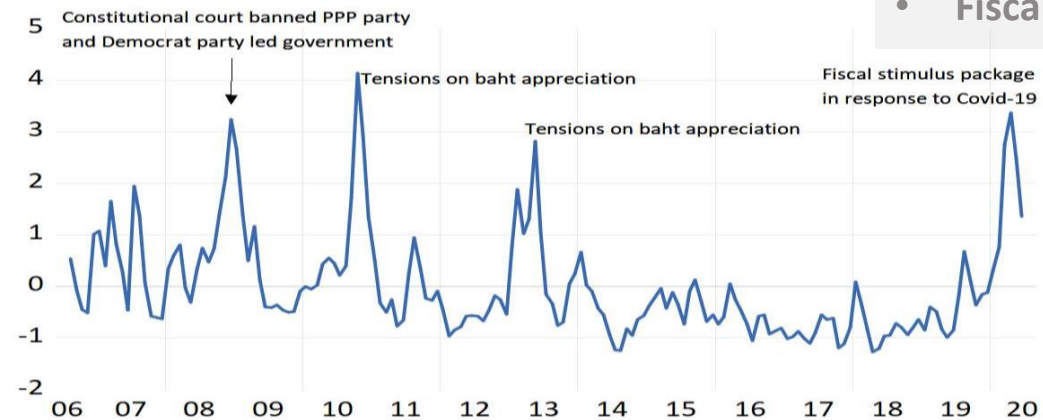
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Types of Uncertainty

Economic Policy

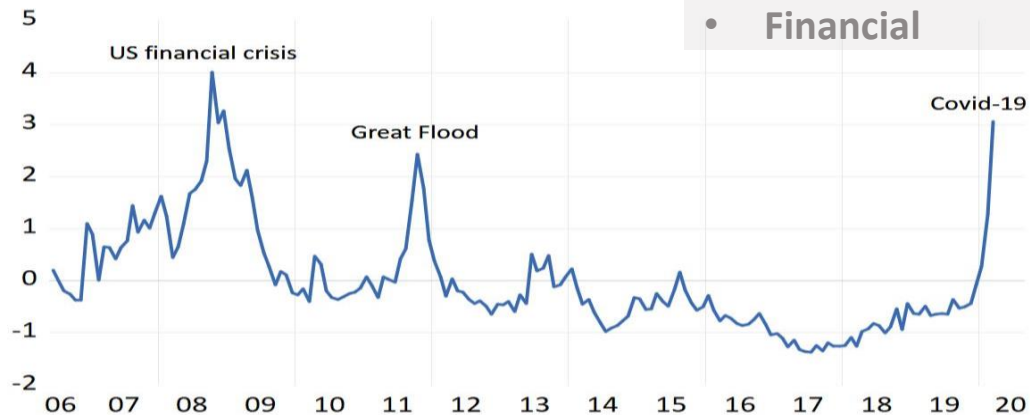
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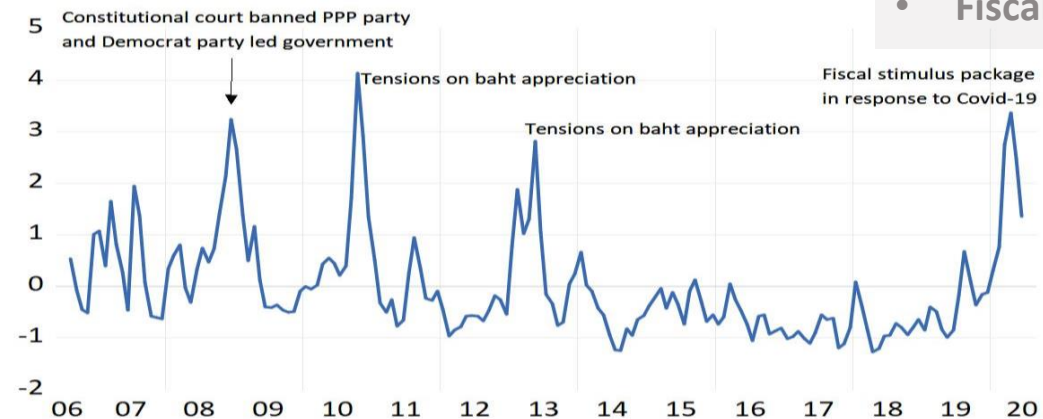
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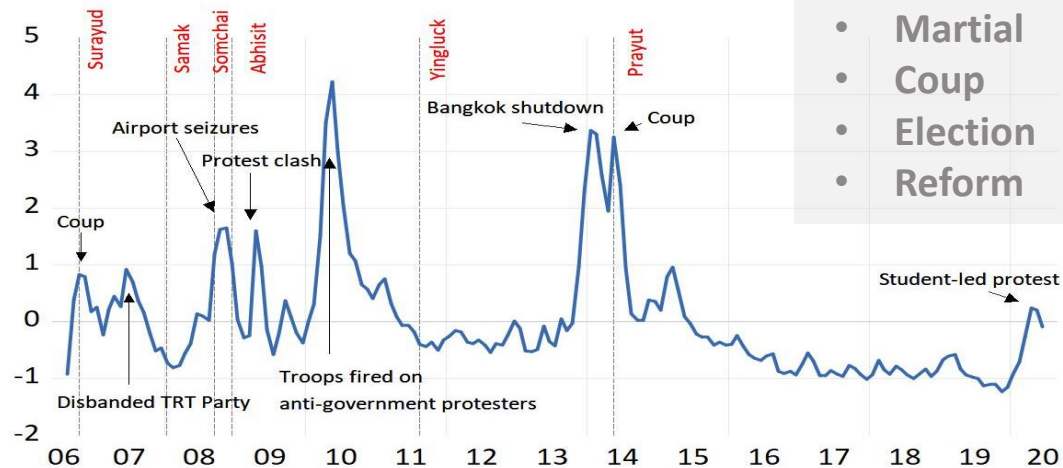
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Politics

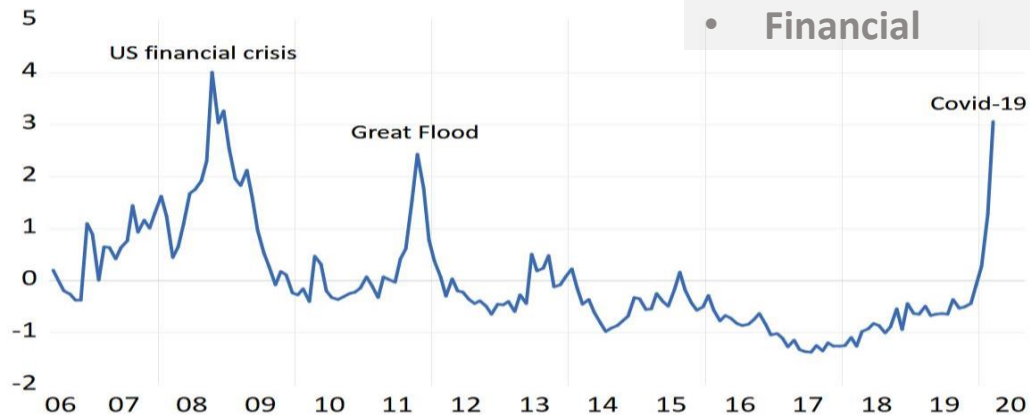
- Protest
- Martial
- Coup
- Election
- Reform



Types of Uncertainty

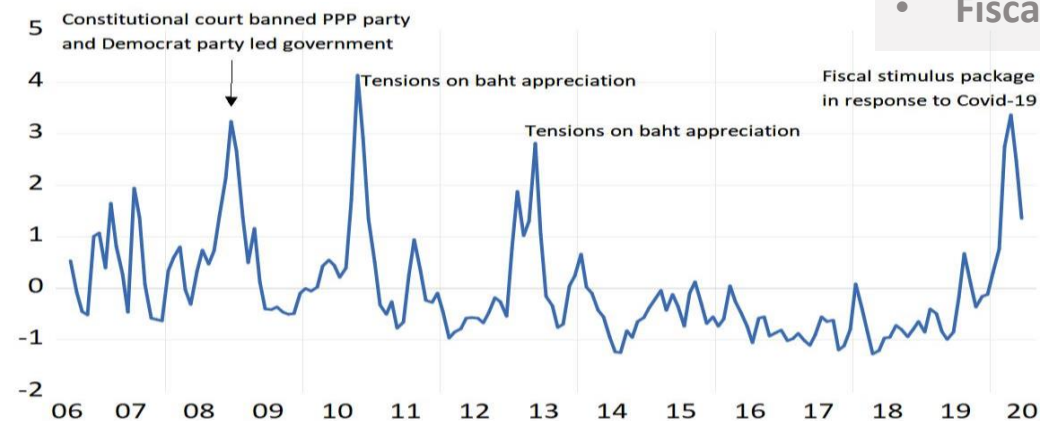
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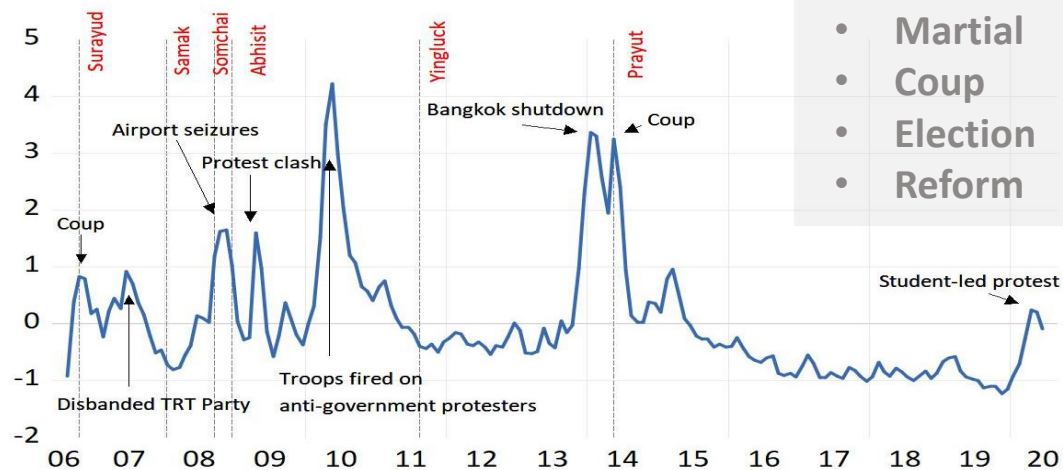
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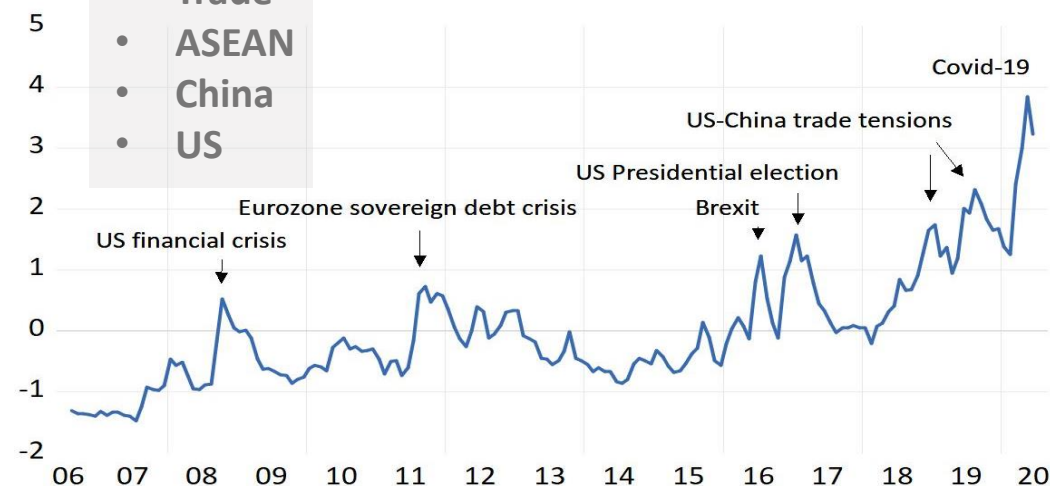
Politics

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Global

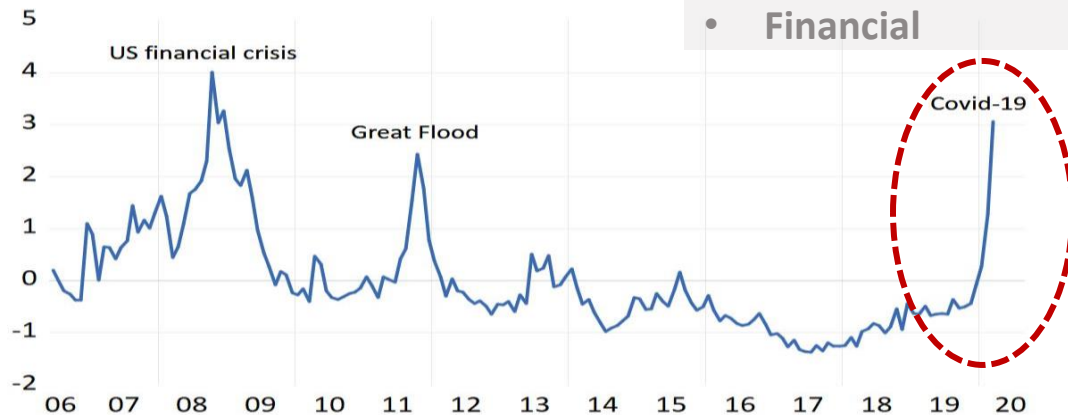
- Trade
- ASEAN
- China
- US



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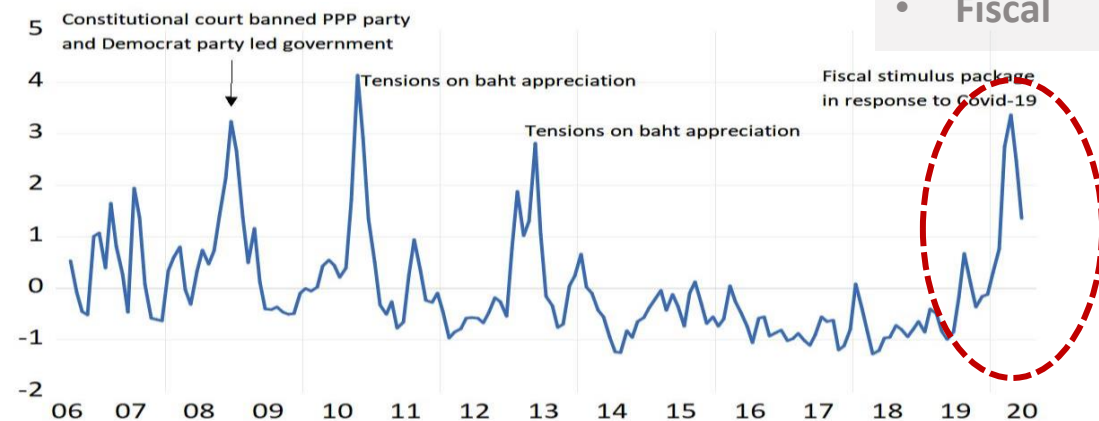
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- Financial



Economic Policy

- Monetary
- Fiscal



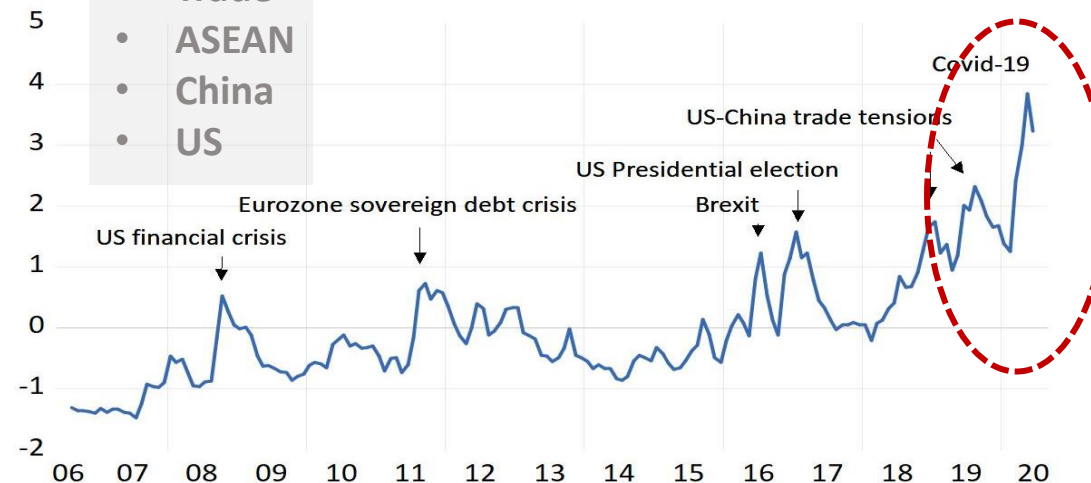
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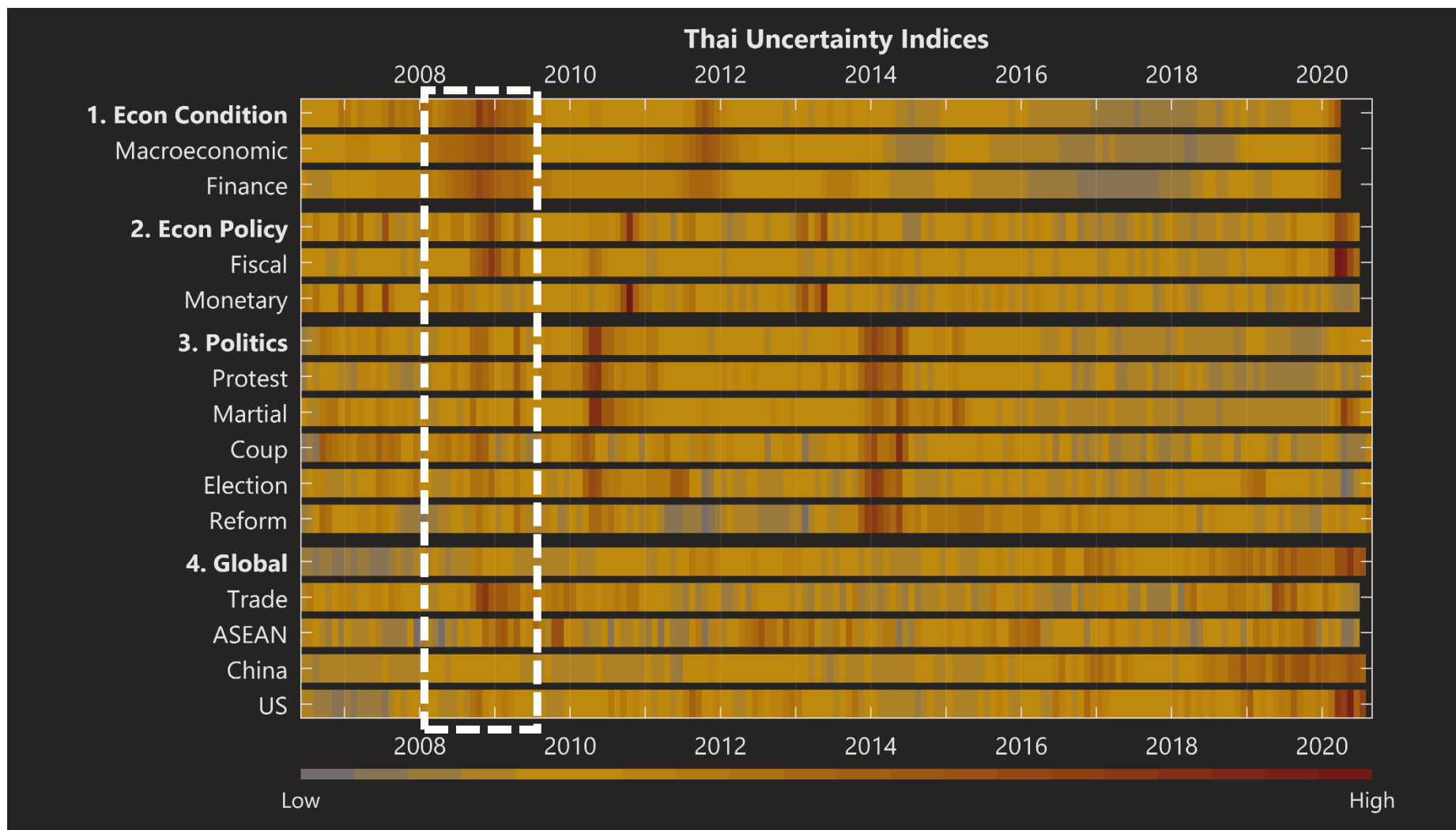


Global

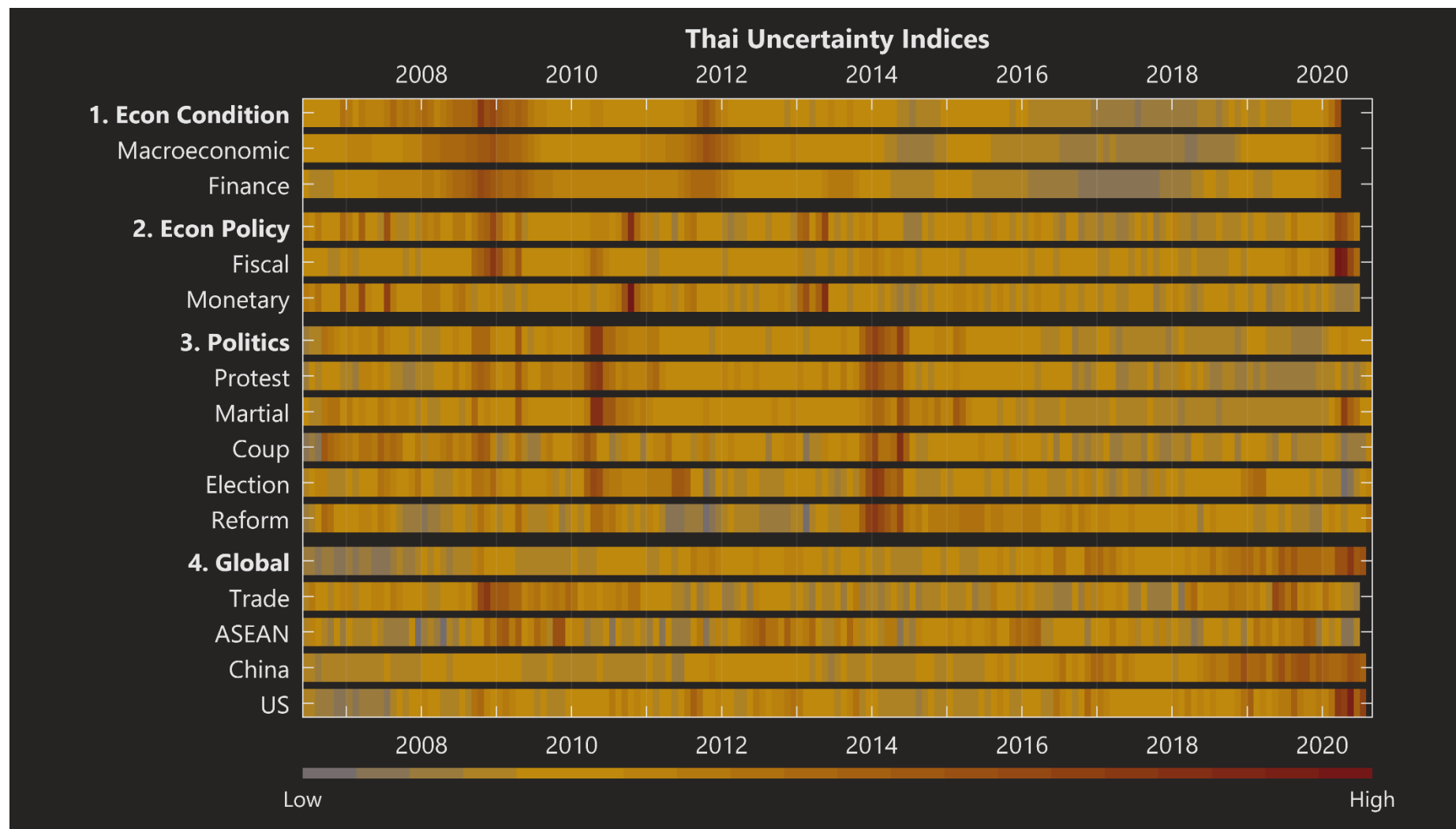
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Of Different Species



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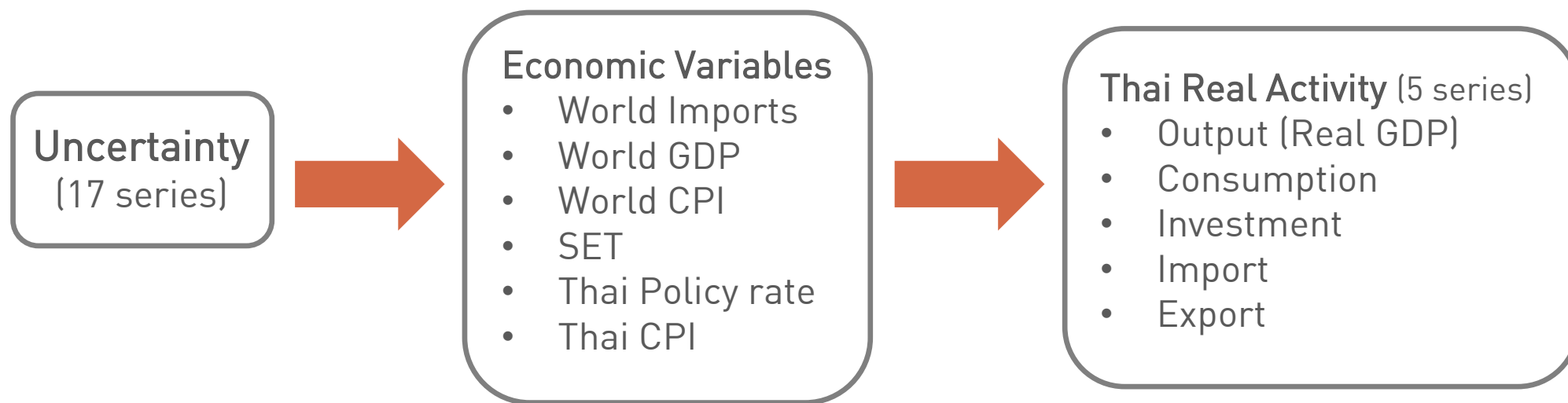


Macroeconomic Impacts of Uncertainty Shocks

Modeling Framework

Estimate 85 Structural Vector Autoregressive Models (SVARs)

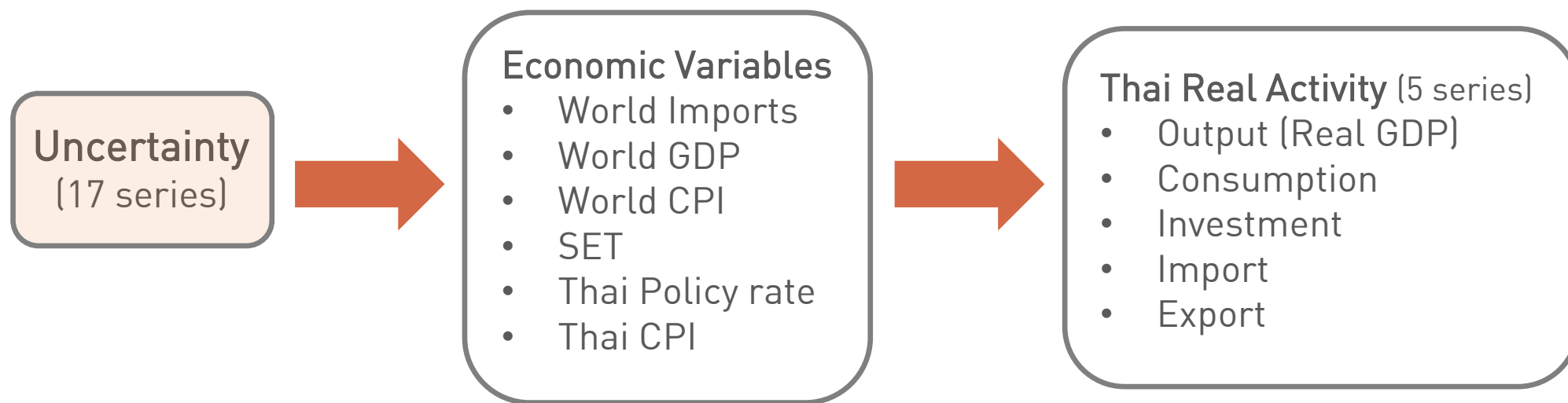
Sample: 2002Q2 – 2019Q4



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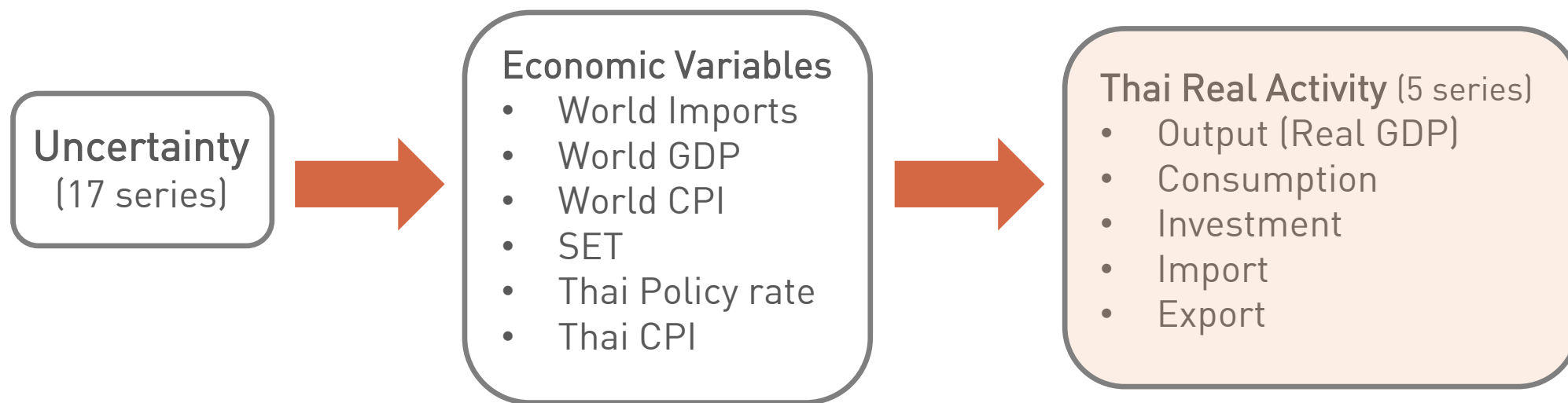
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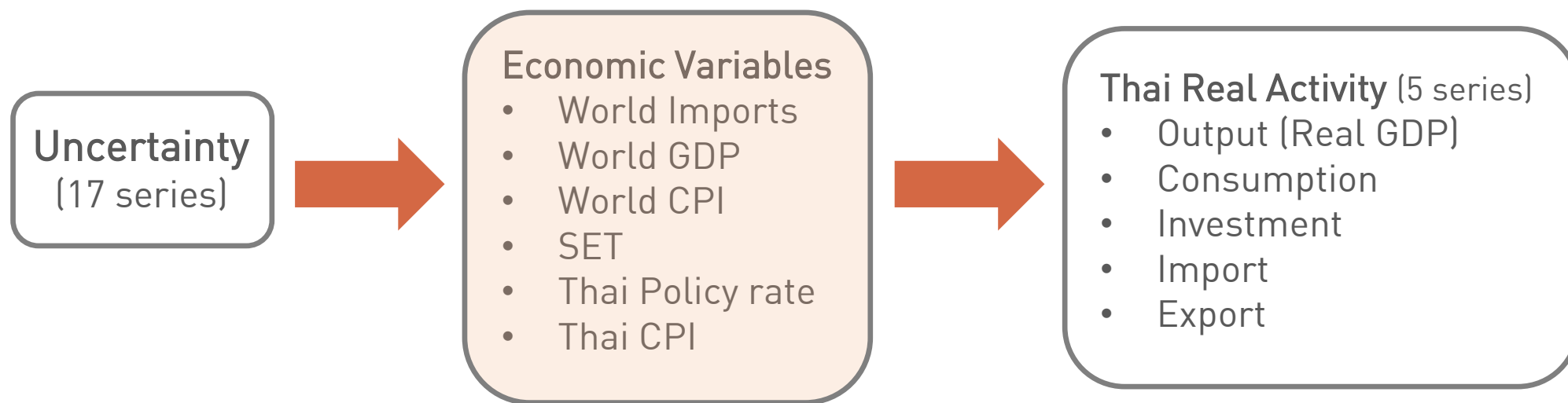
Sample: 2002Q2 – 2019Q4



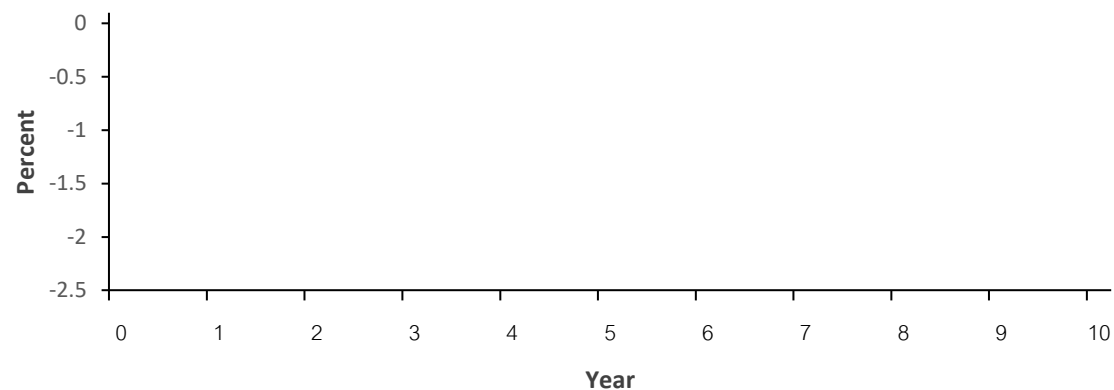
Modeling Framework

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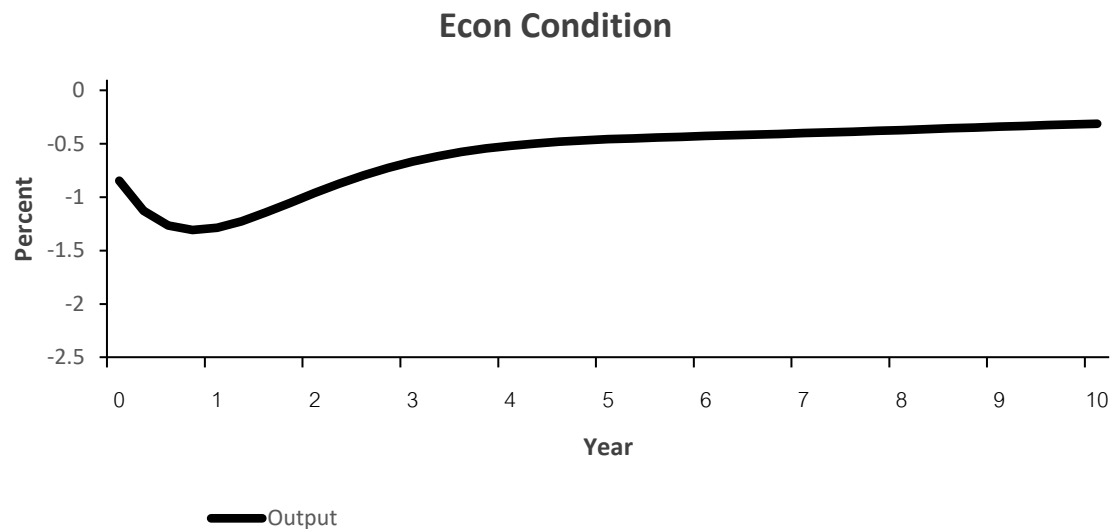
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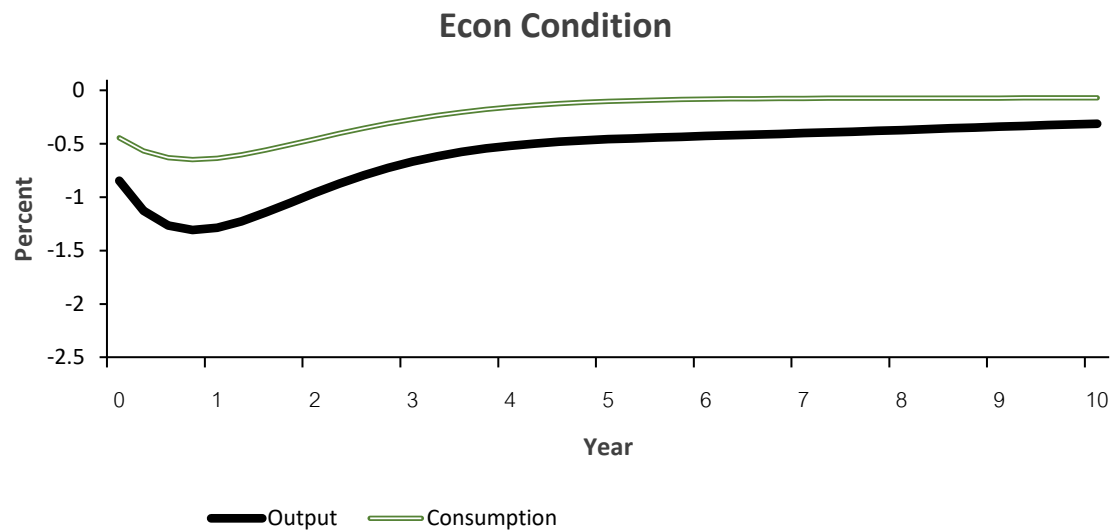
Macroeconomic Impacts



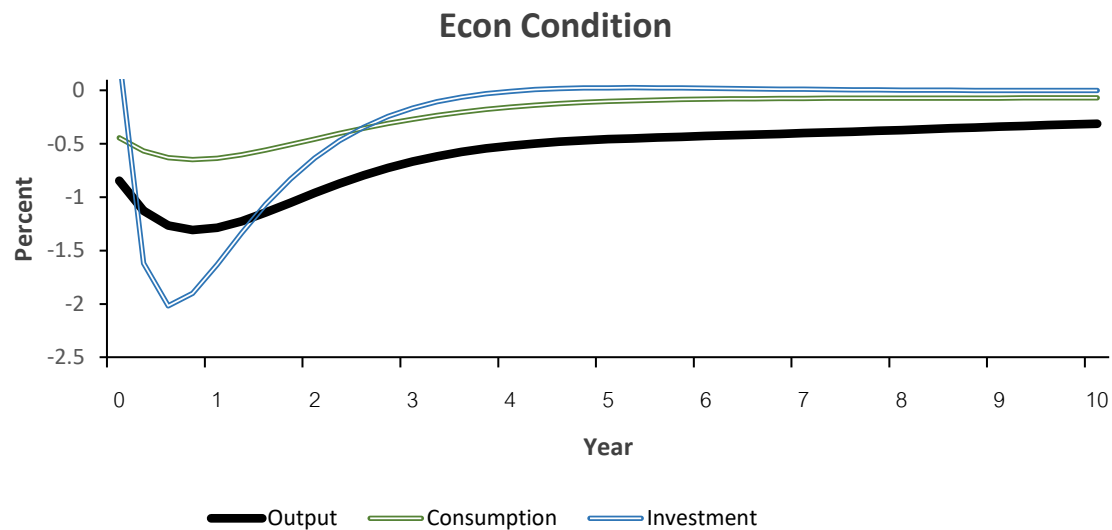
Macroeconomic Impacts



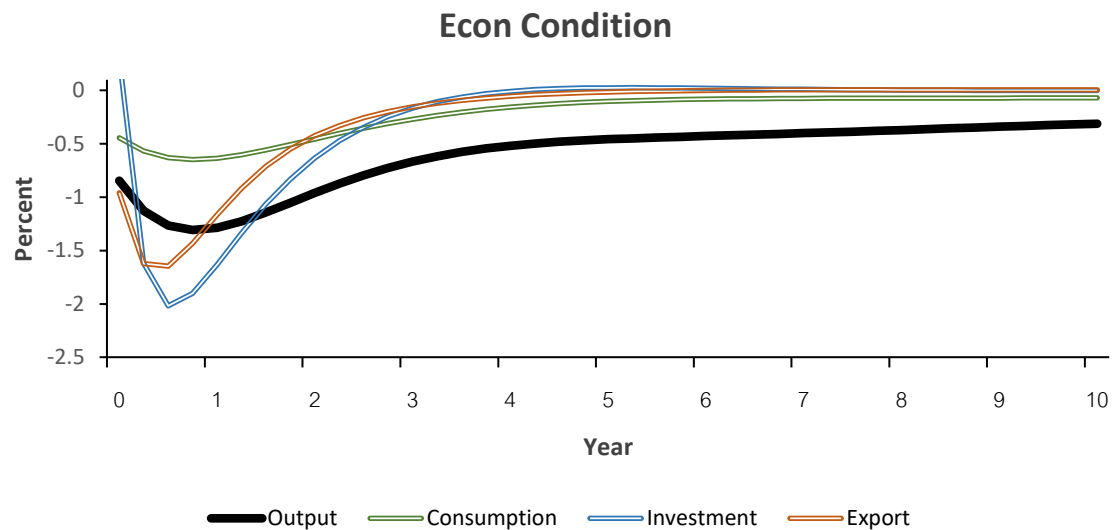
Macroeconomic Impacts



Macroeconomic Impacts

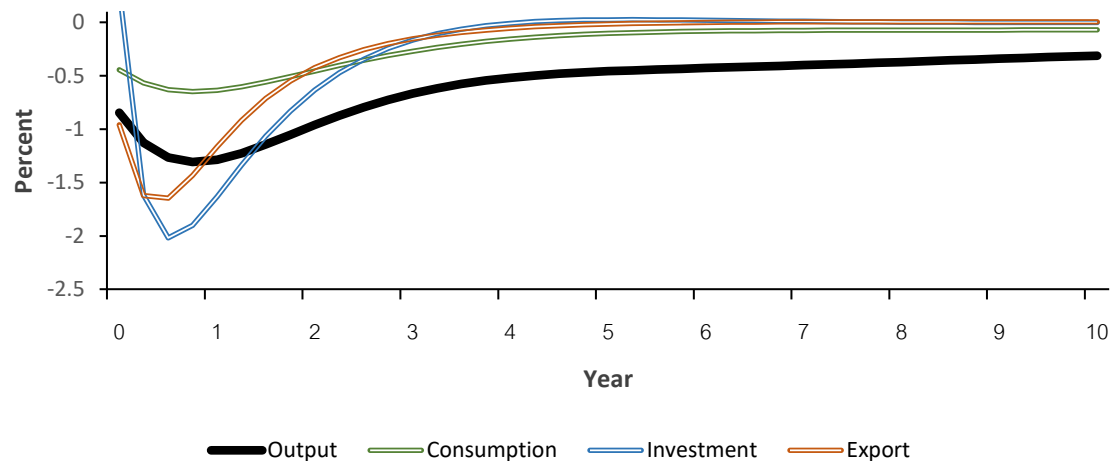


Macroeconomic Impacts

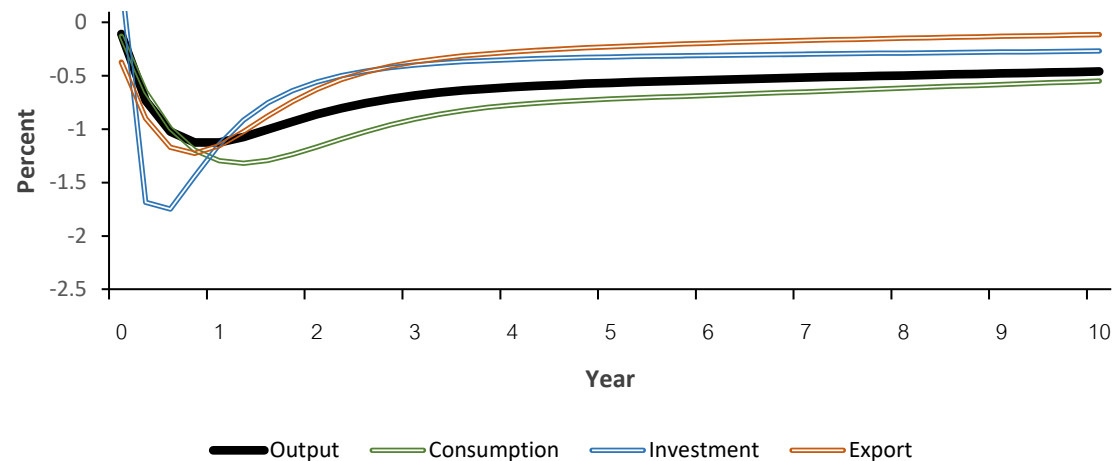


Macroeconomic Impacts

Econ Condition

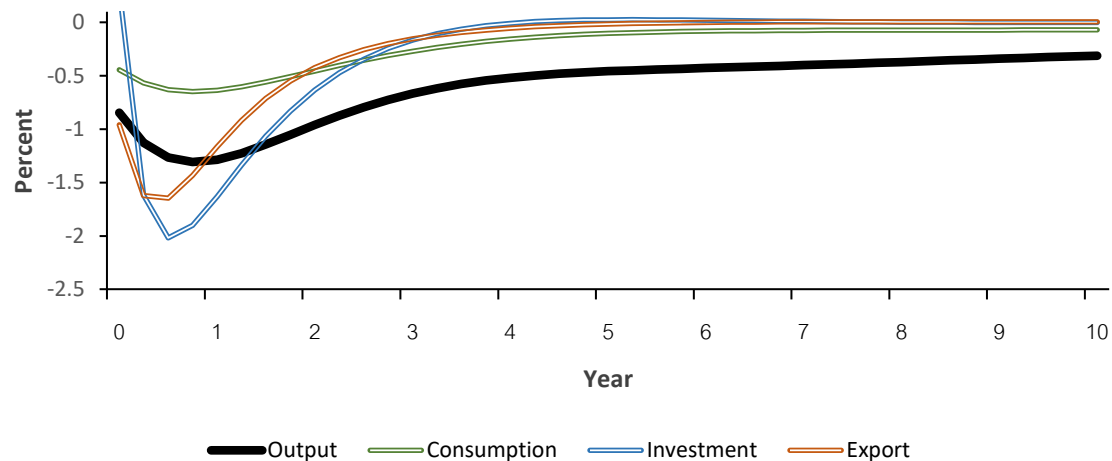


Econ Policy

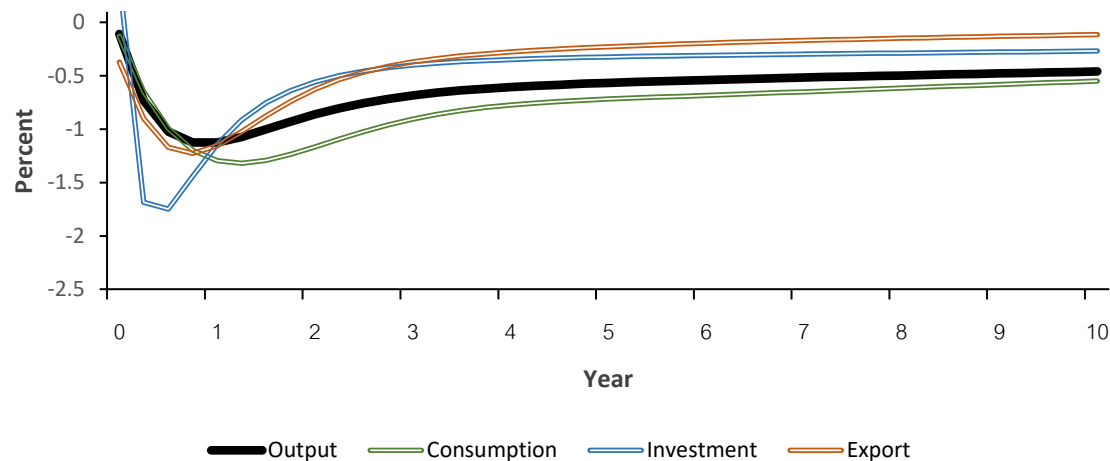


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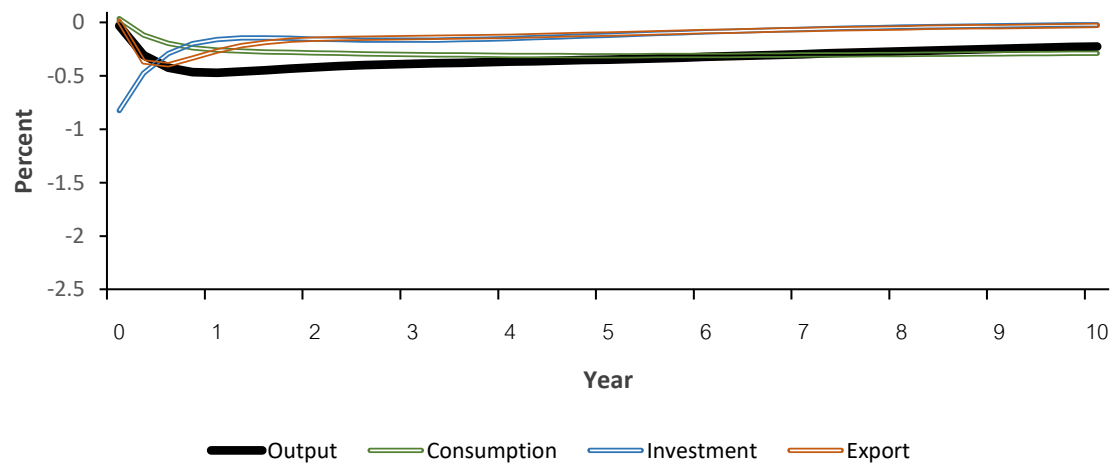
Econ Condition



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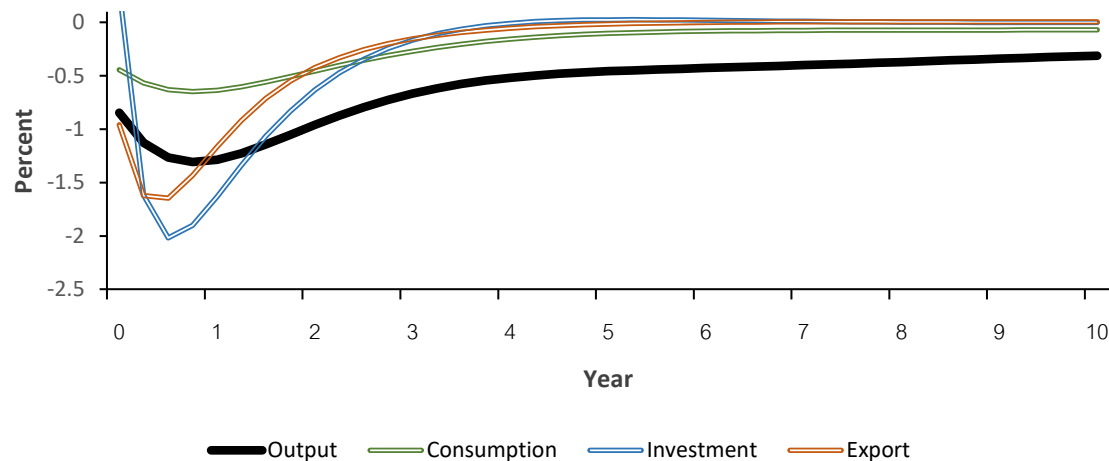


Politics

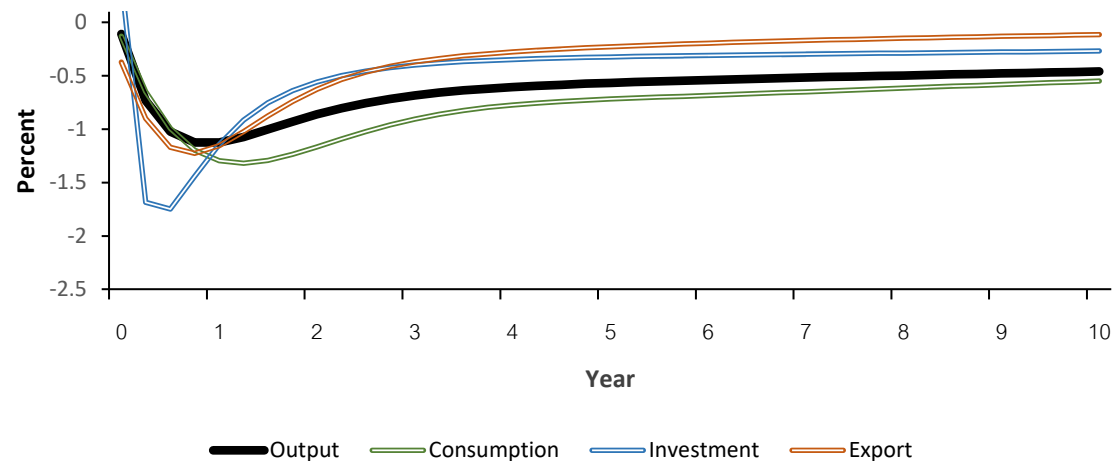


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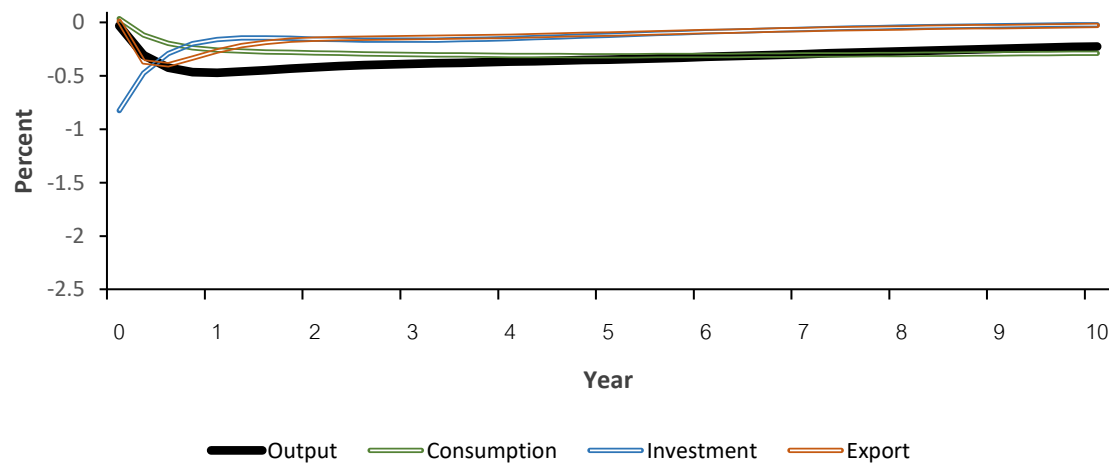
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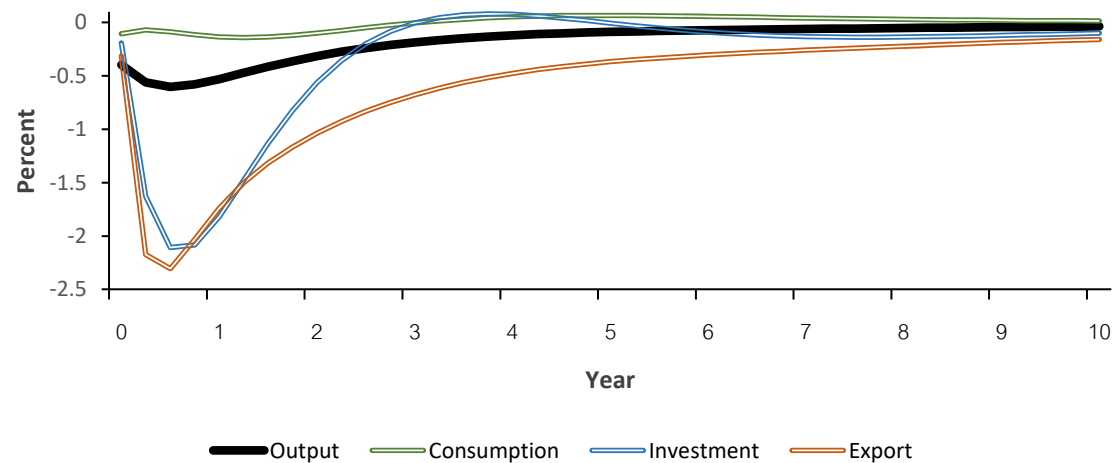
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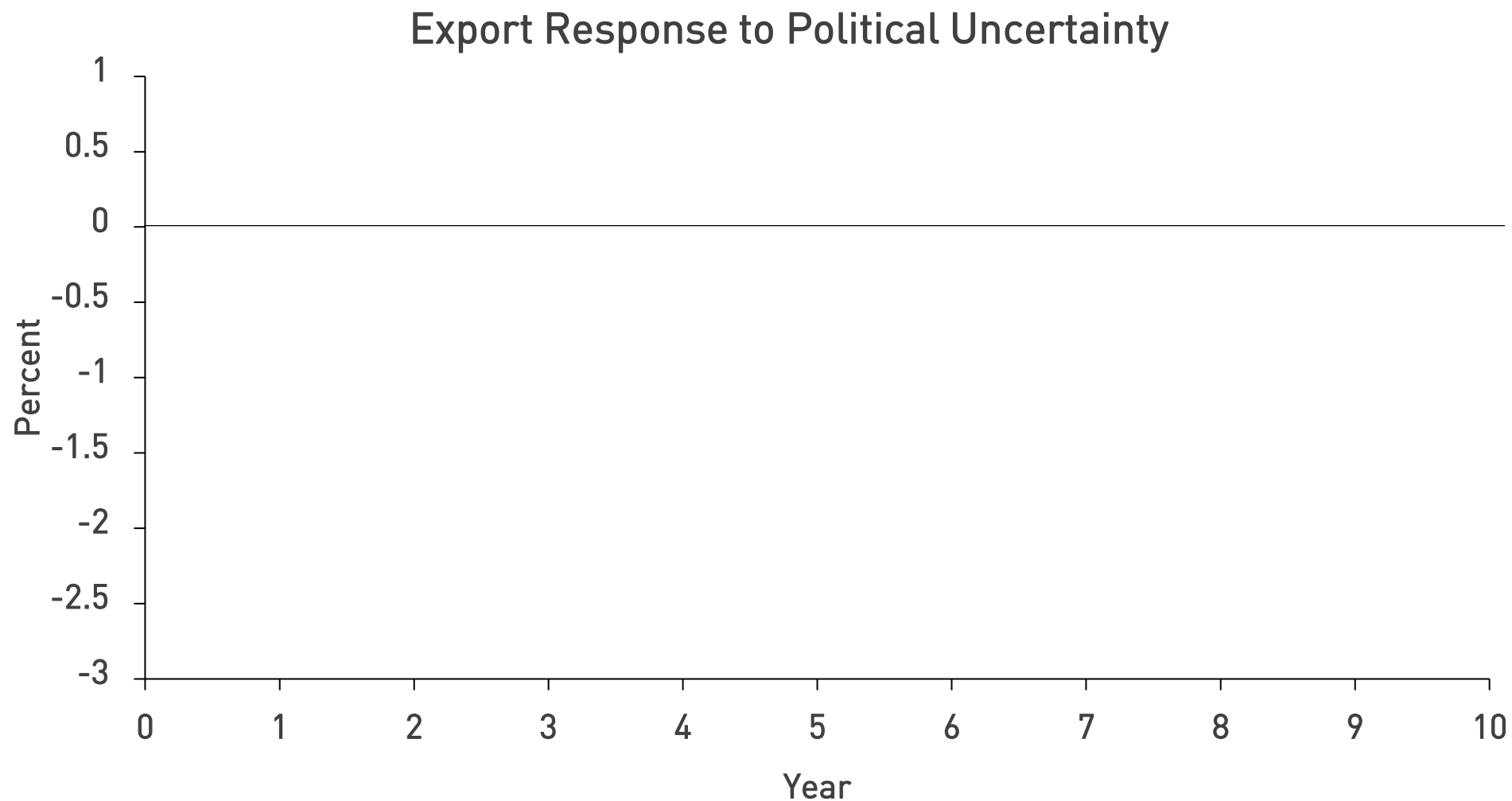
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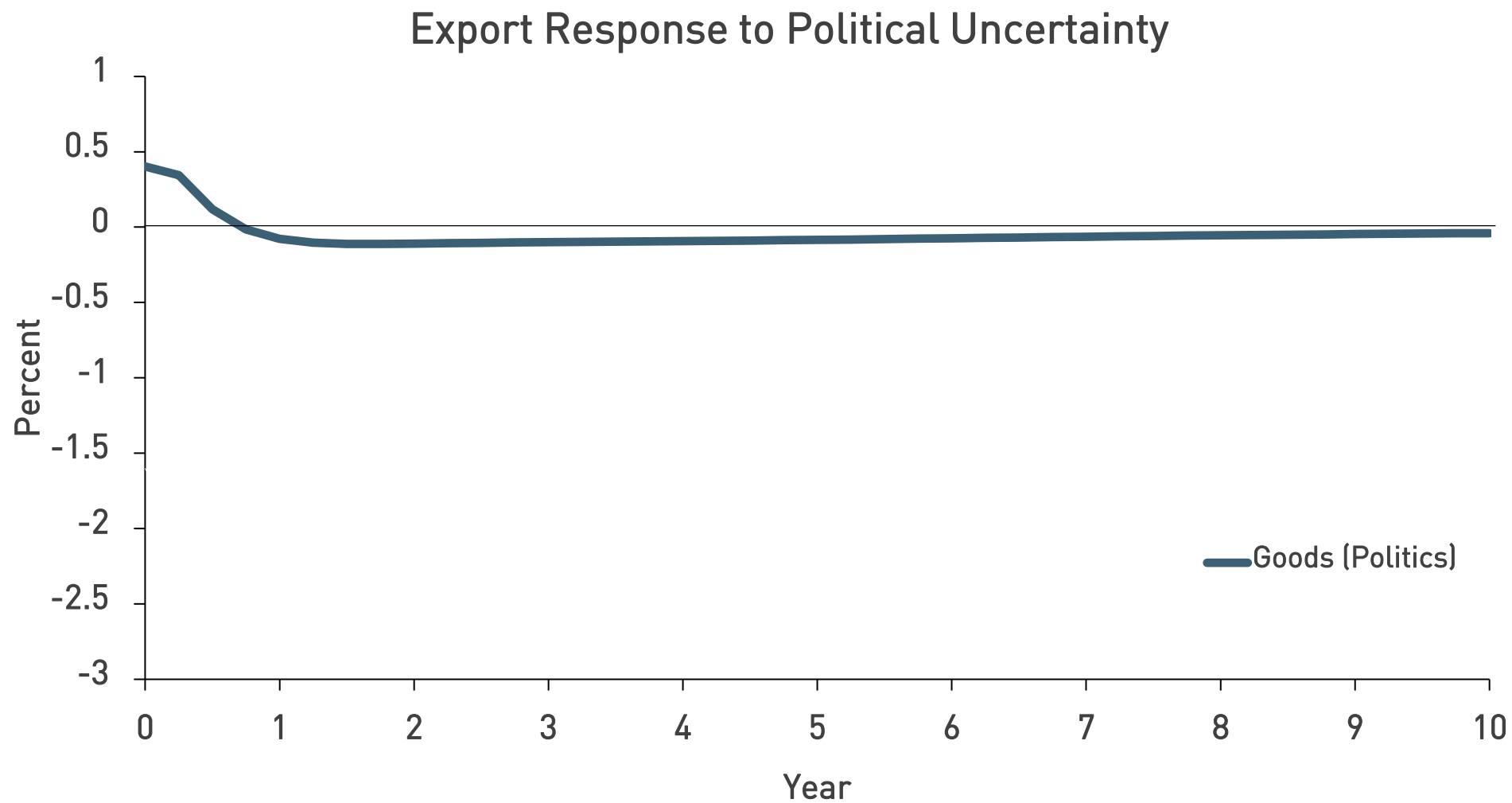
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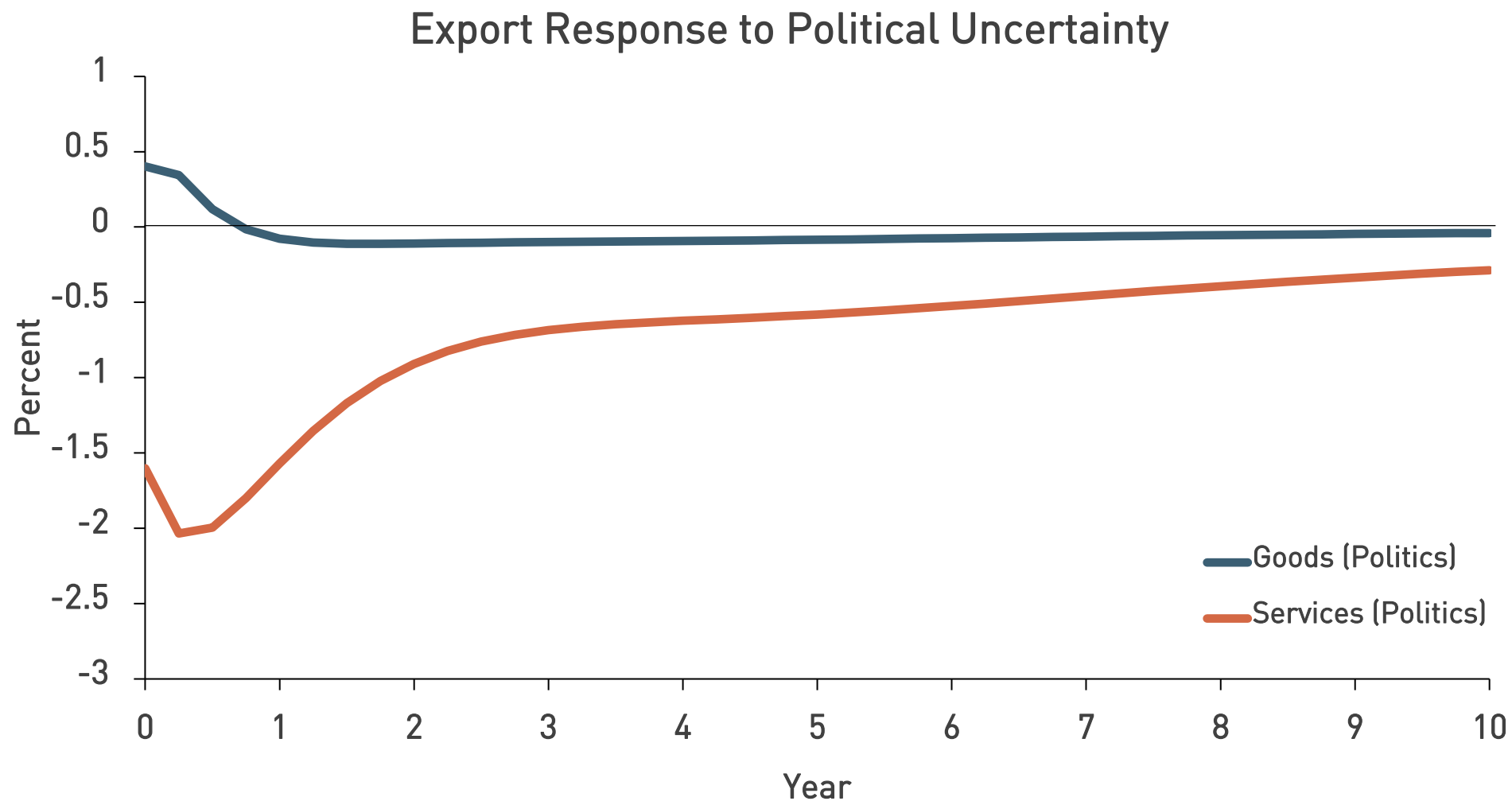
Differences in Direction



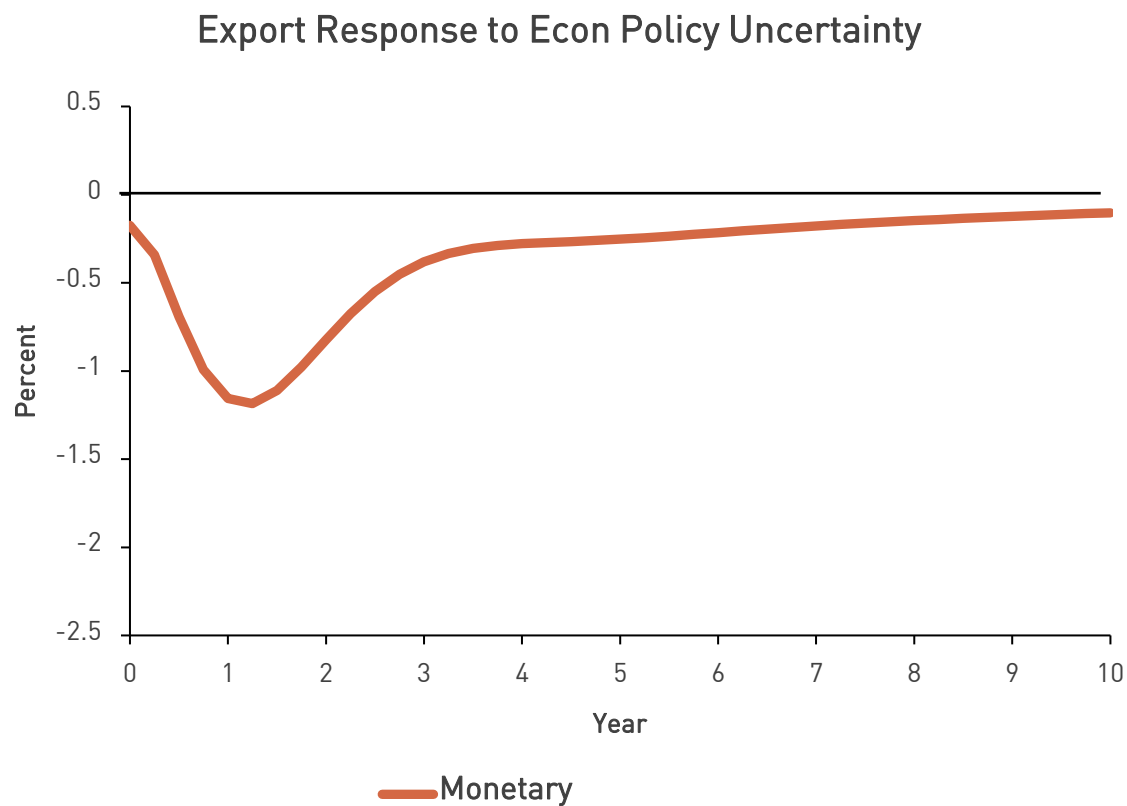
Differences in Direction



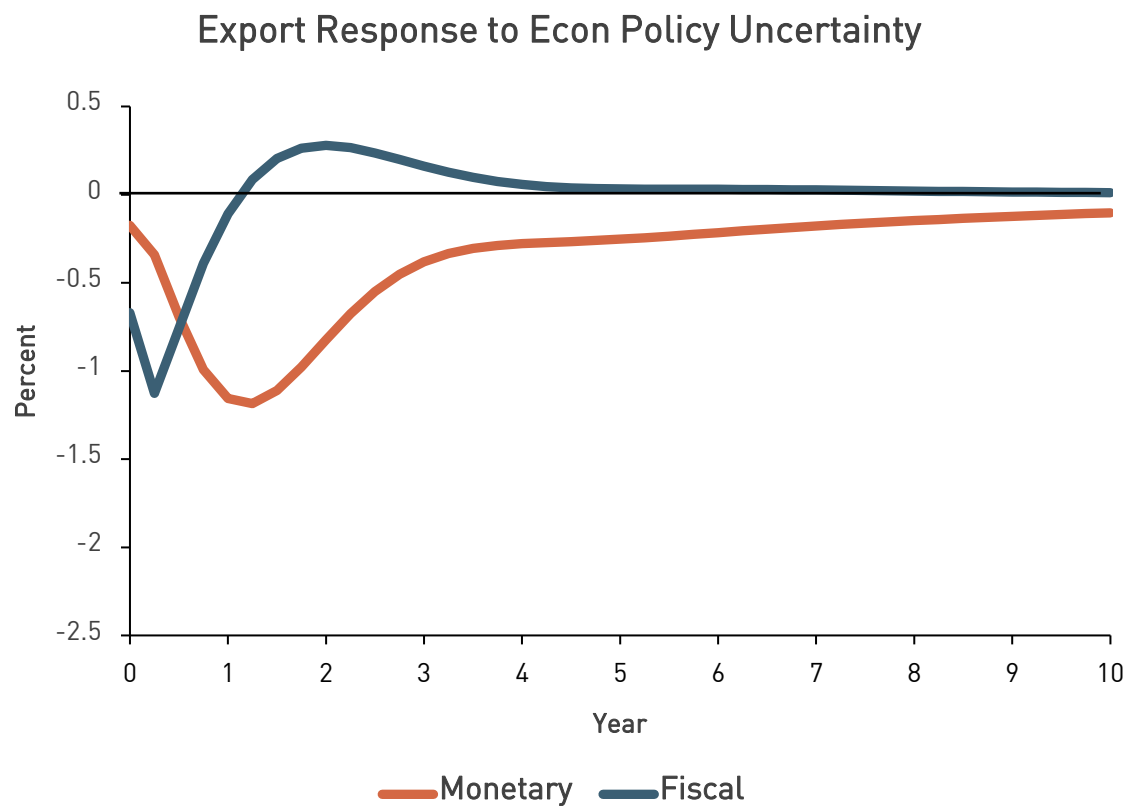
Differences in Direction



Differences in Persistence

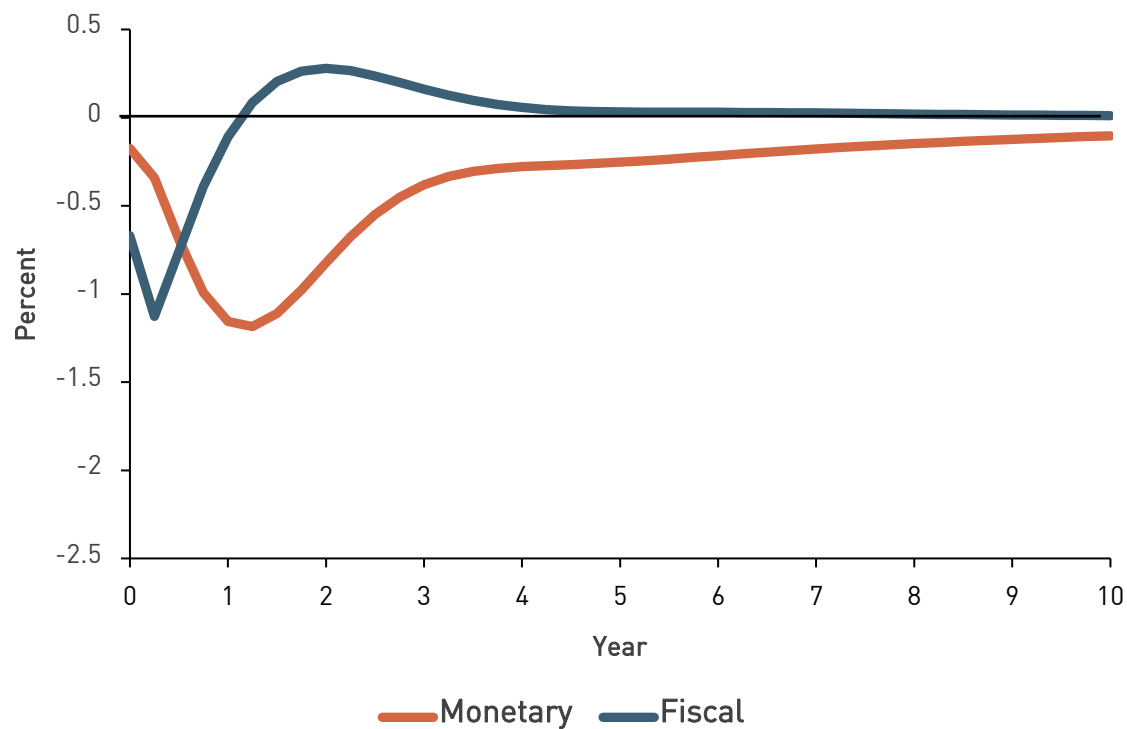


Differences in Persistence

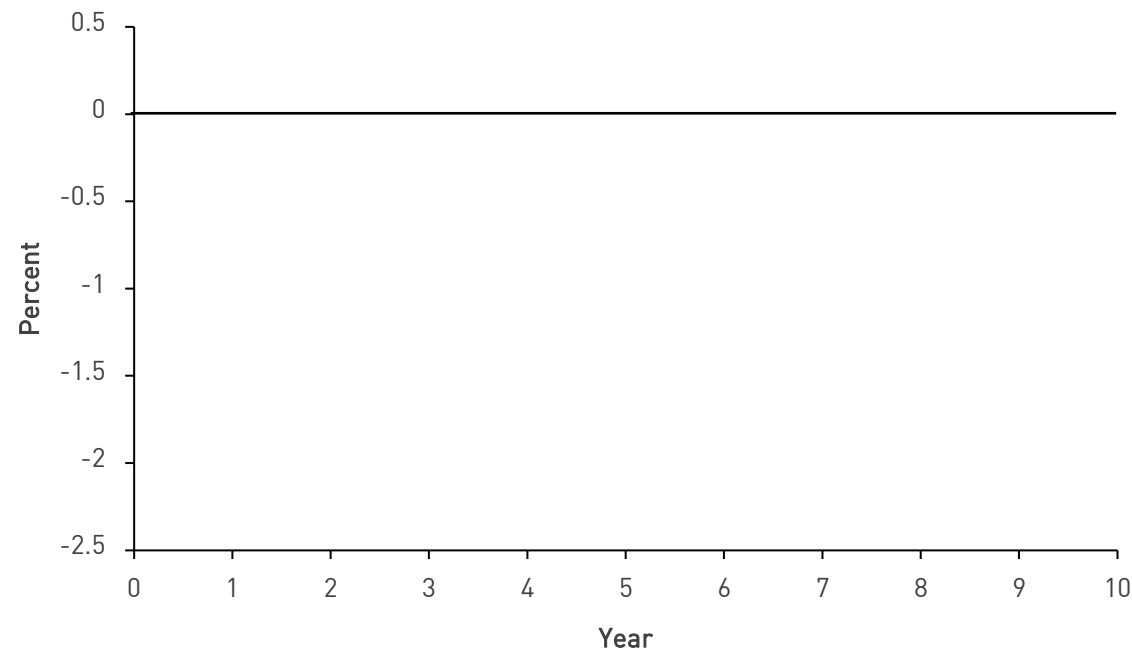


Differences in Persistence

Export Response to Econ Policy Uncertainty

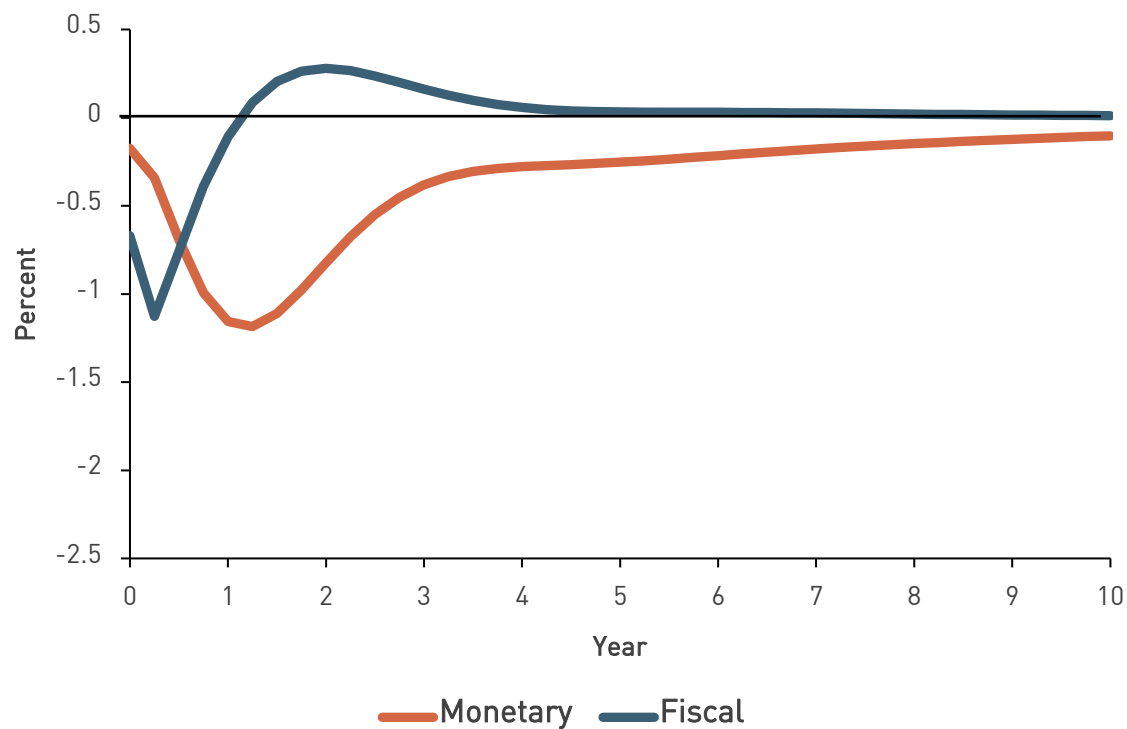


Export Response to Global vs Domestic Uncertainty

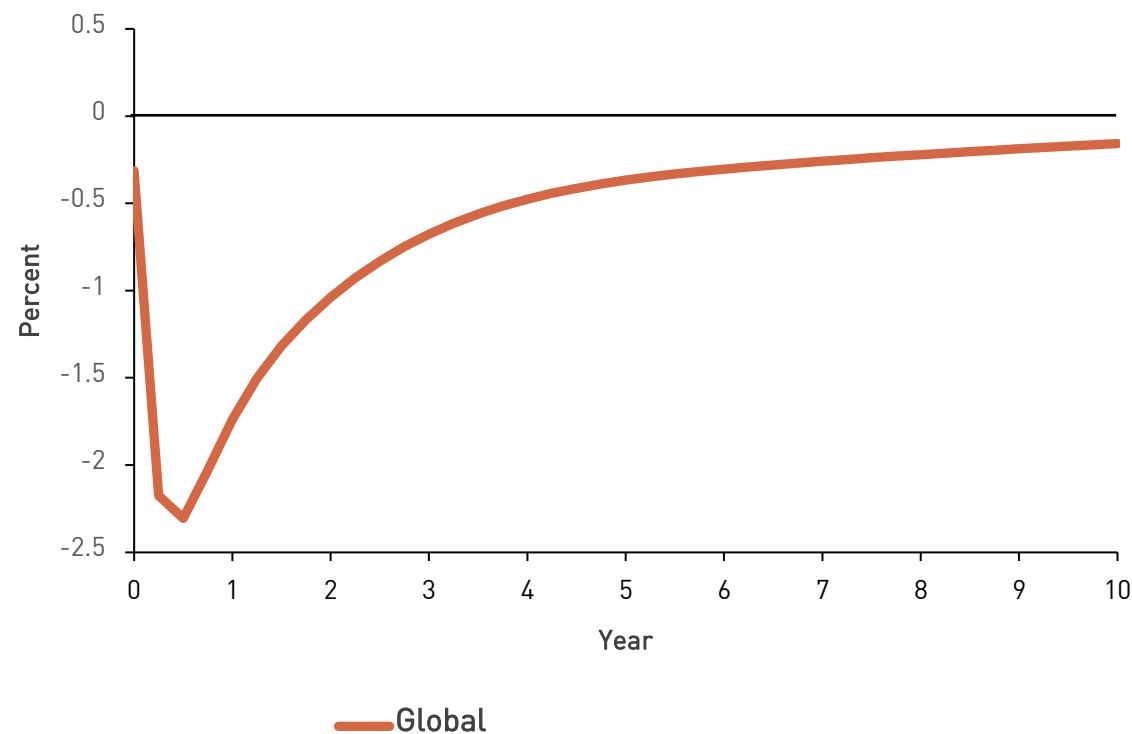


Differences in Persistence

Export Response to Econ Policy Uncertainty

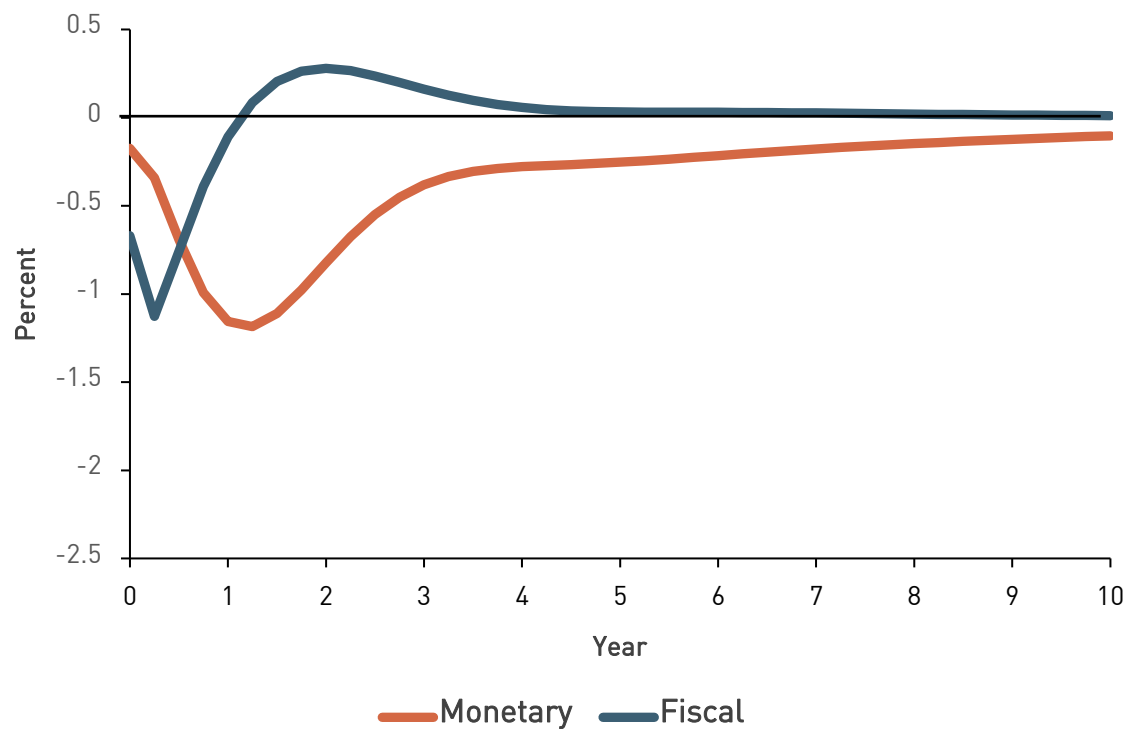


Export Response to Global vs Domestic Uncertainty

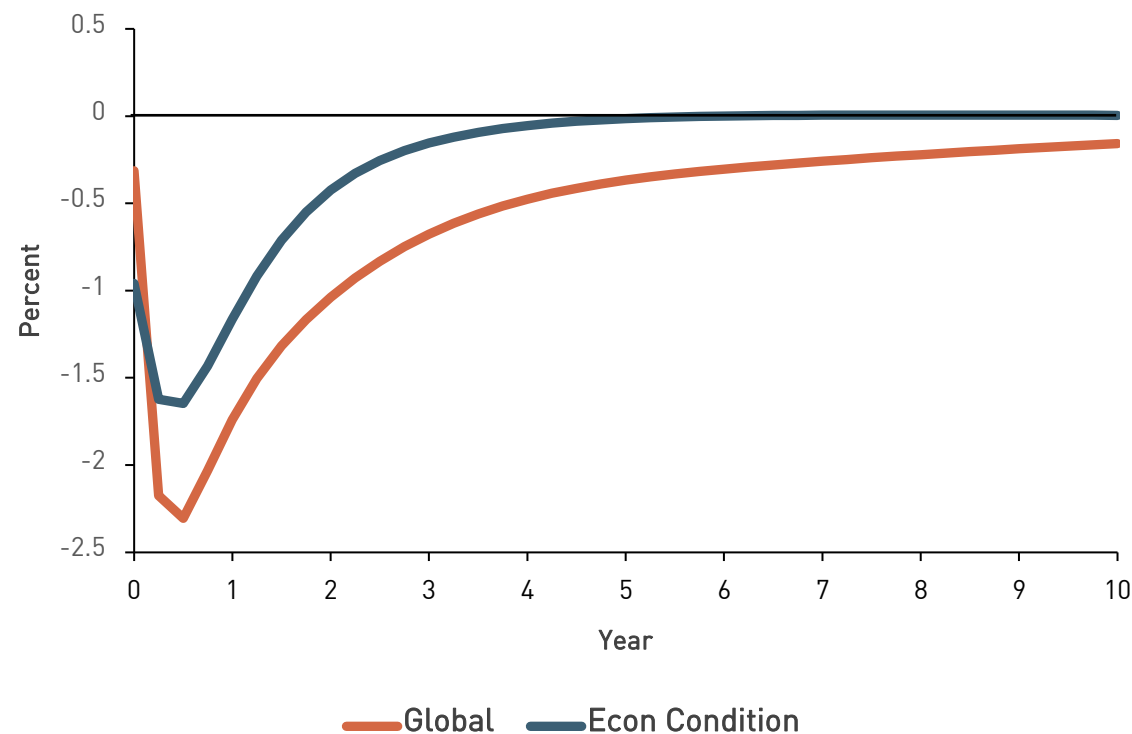


Differences in Persistence

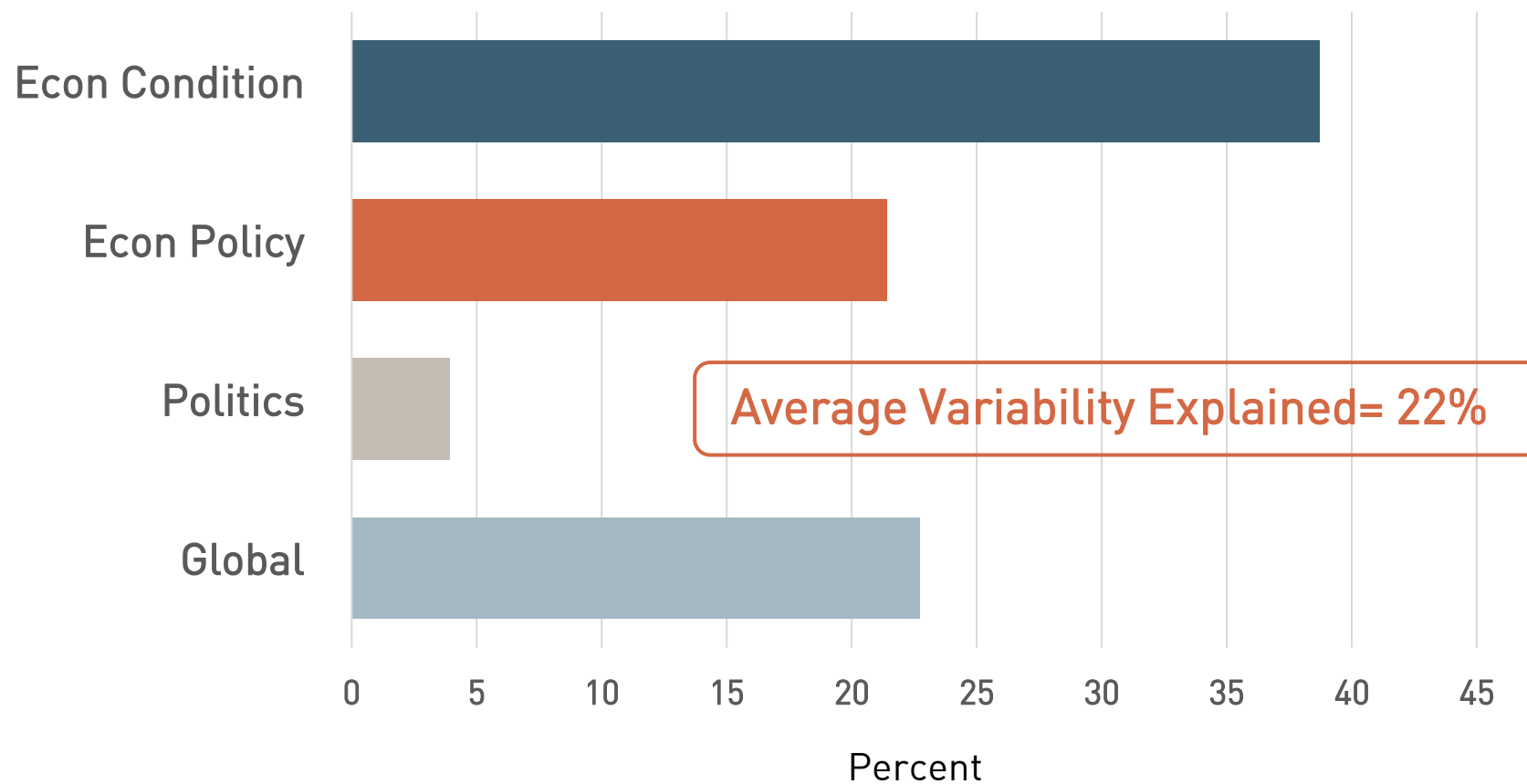
Export Response to Econ Policy Uncertainty



Export Response to Global vs Domestic Uncertainty



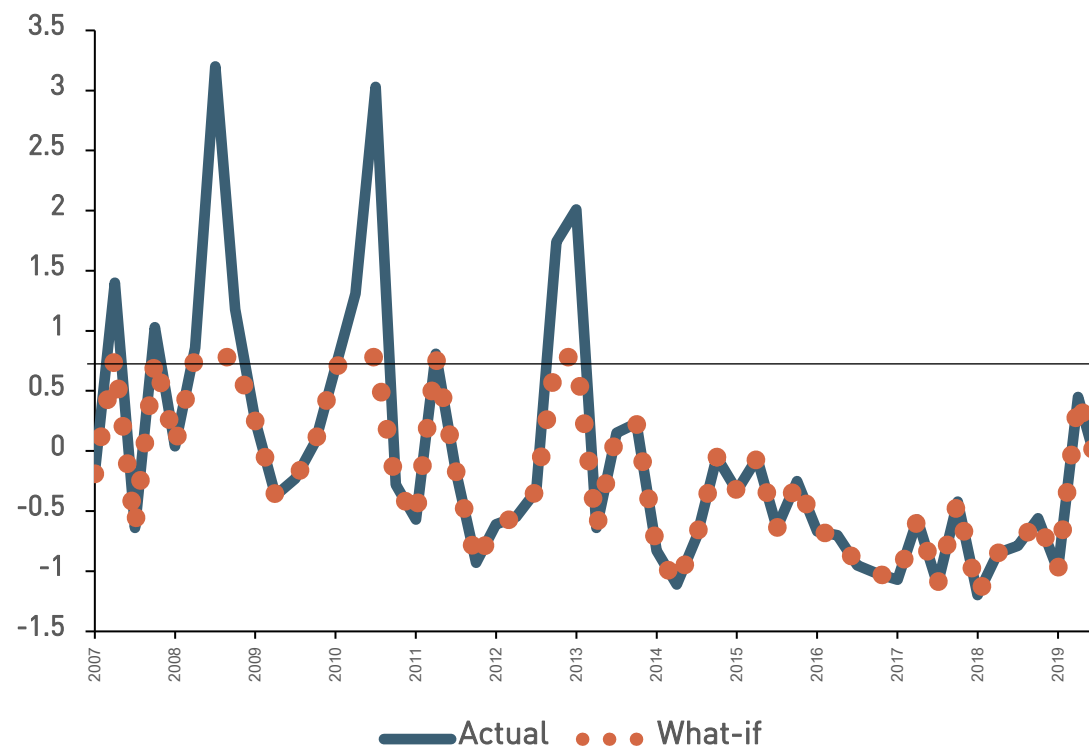
Contribution to Output Fluctuations



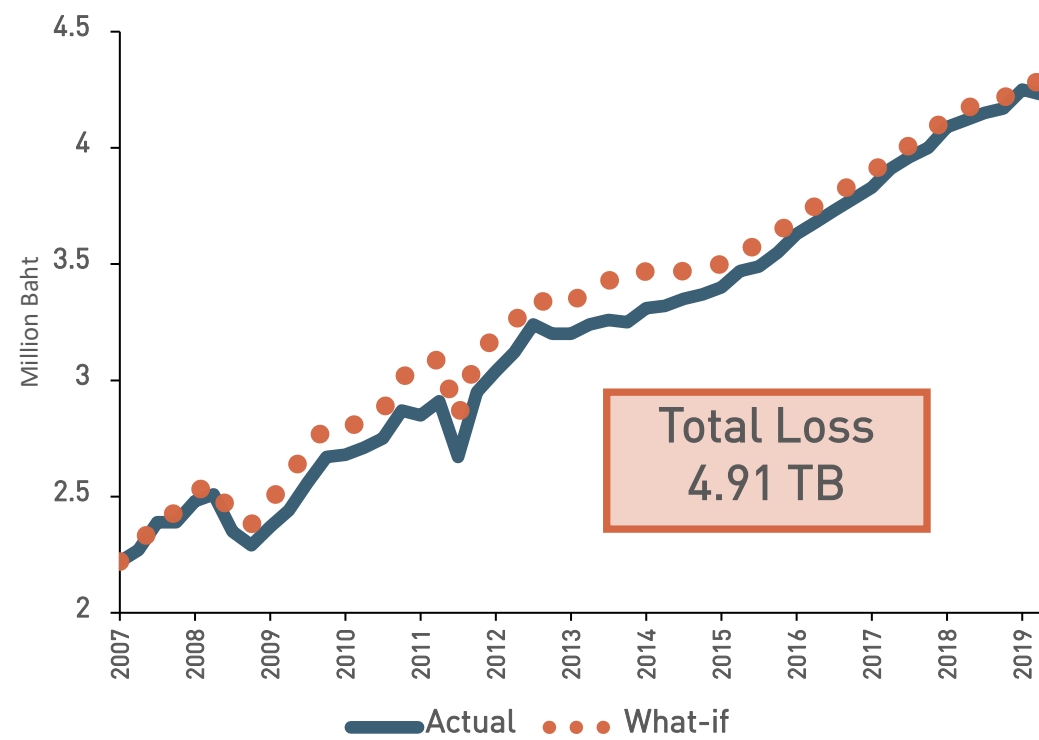
What are the costs? Can monetary policy help?

High Costs

Economic Policy Uncertainty

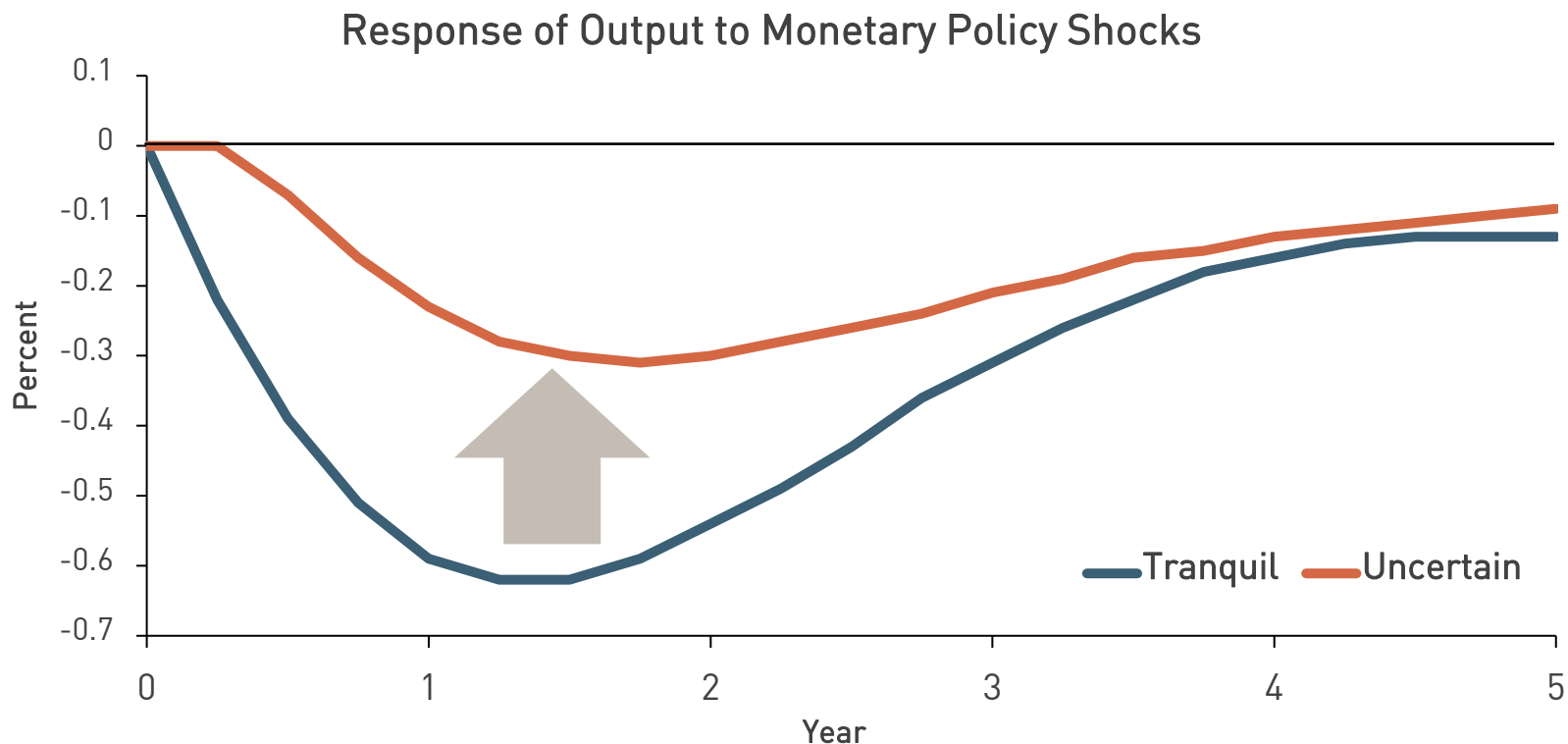


Output



Note: What-if scenarios consider uncertainty being less than or equal to the 8th decile of the distribution.

Limits of Monetary Policy



Note: “Uncertain” (“Tranquil”) times distinguish between levels of global economic policy uncertainty being greater than (less than or equal to) the 8th (2nd) decile of the distribution.

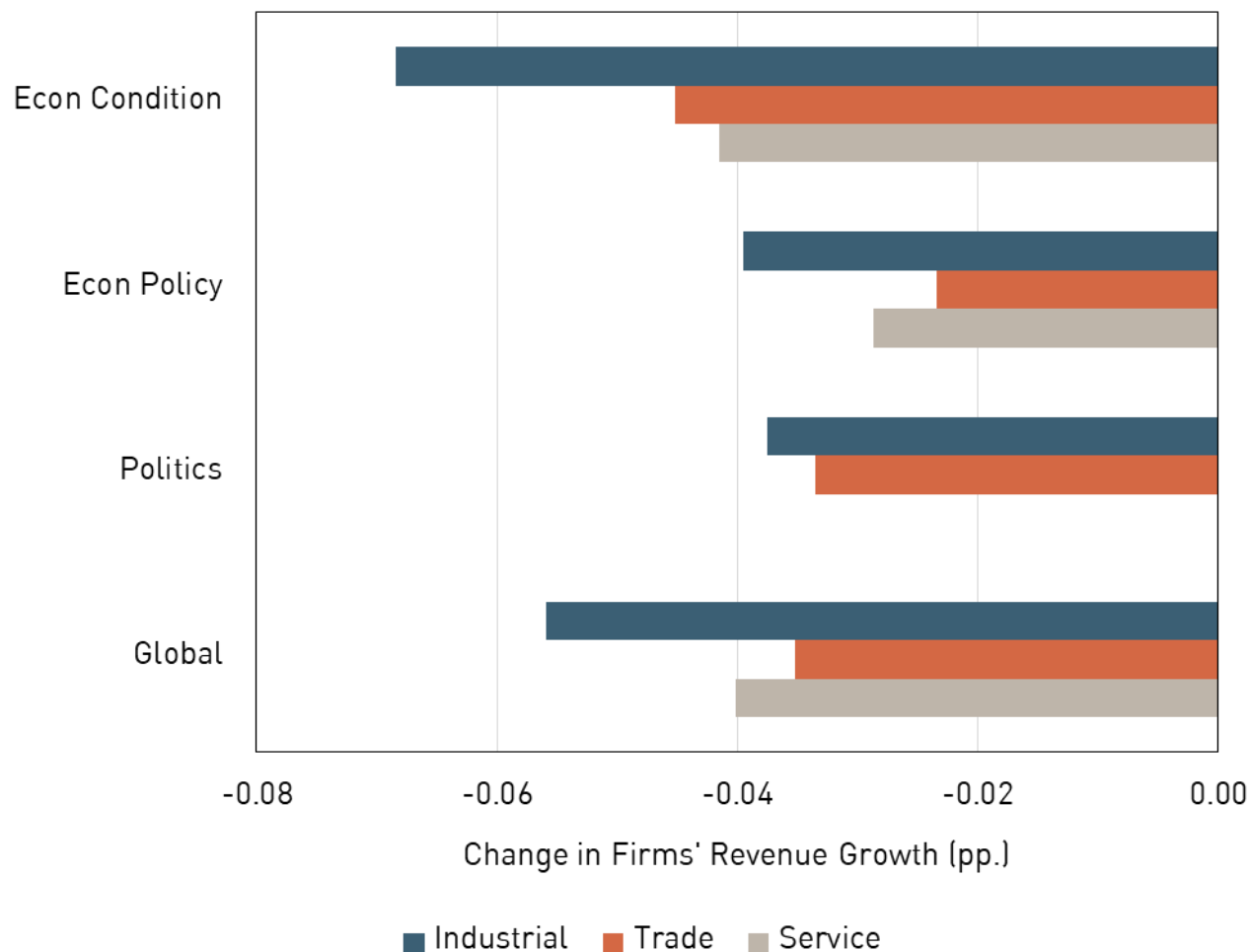
Takeaways

- Uncertainty shocks are contractionary but differ in impact and persistence
- Costs of uncertainty are high, while there are limits to what monetary policy can do

How does uncertainty affect firms' outputs?

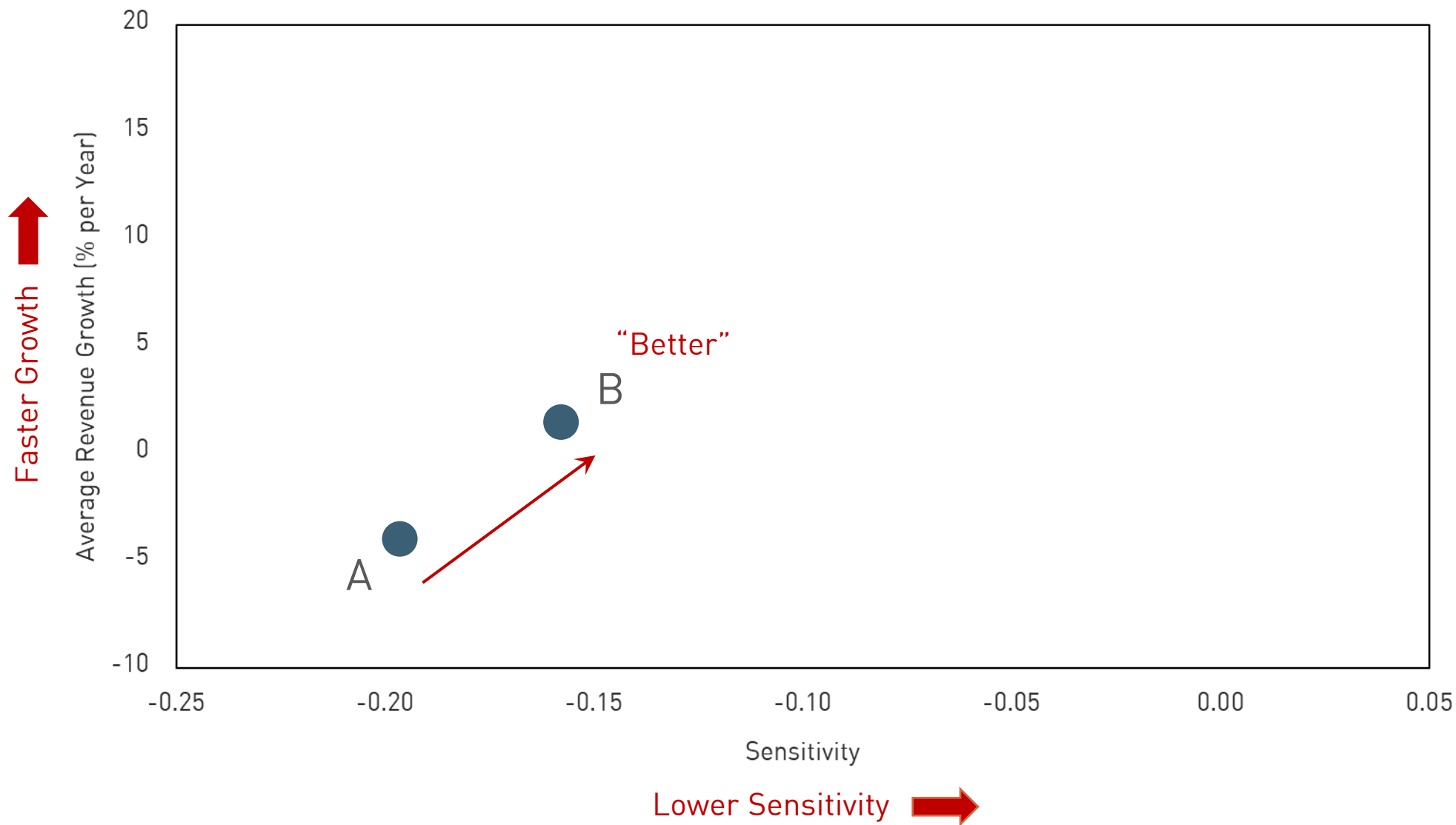
Uncertainty inhibits firms' growth

Uncertainty affect firms' revenue growth in all sectors.

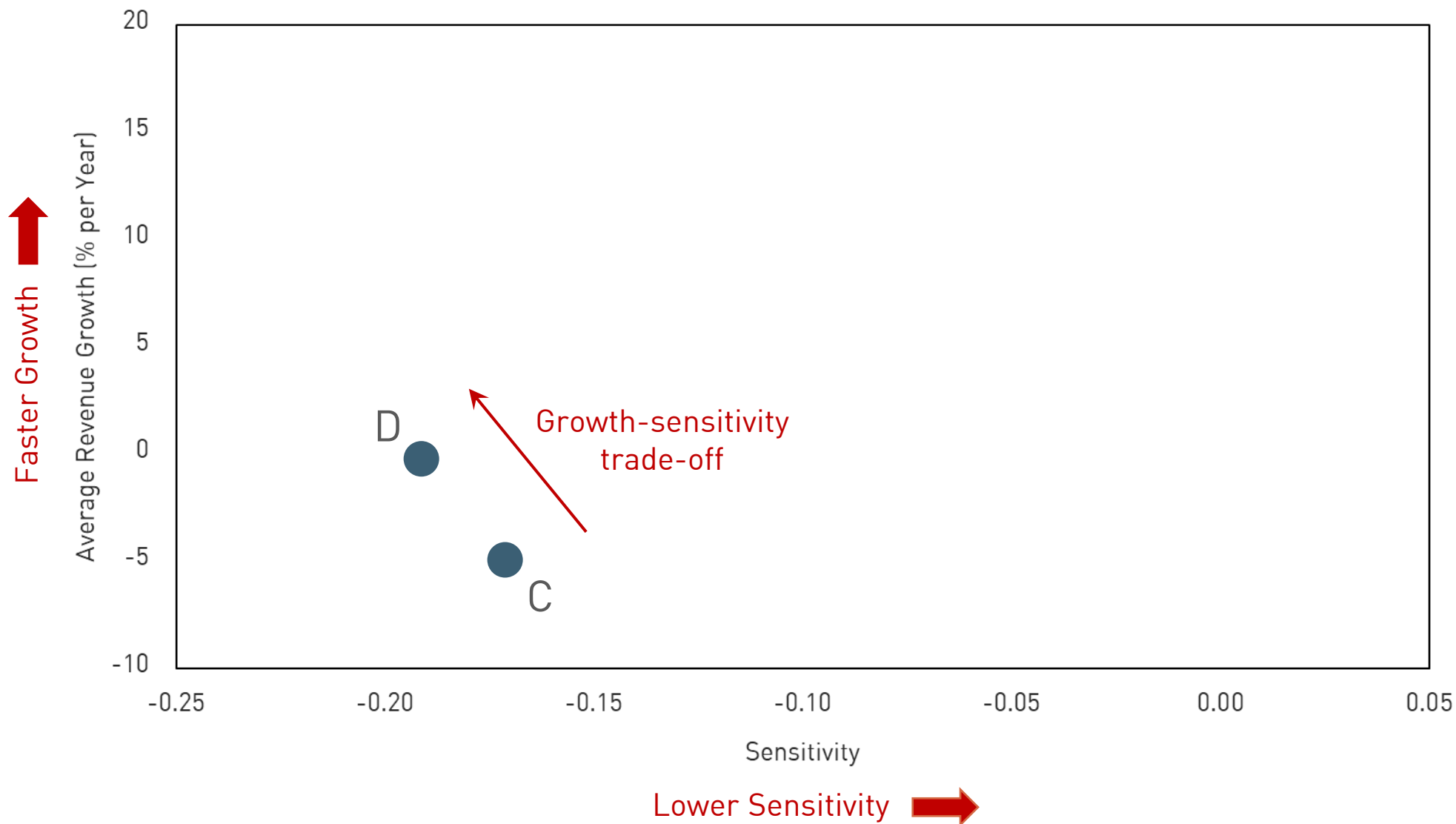


Does uncertainty have different
effects across firms and industries?

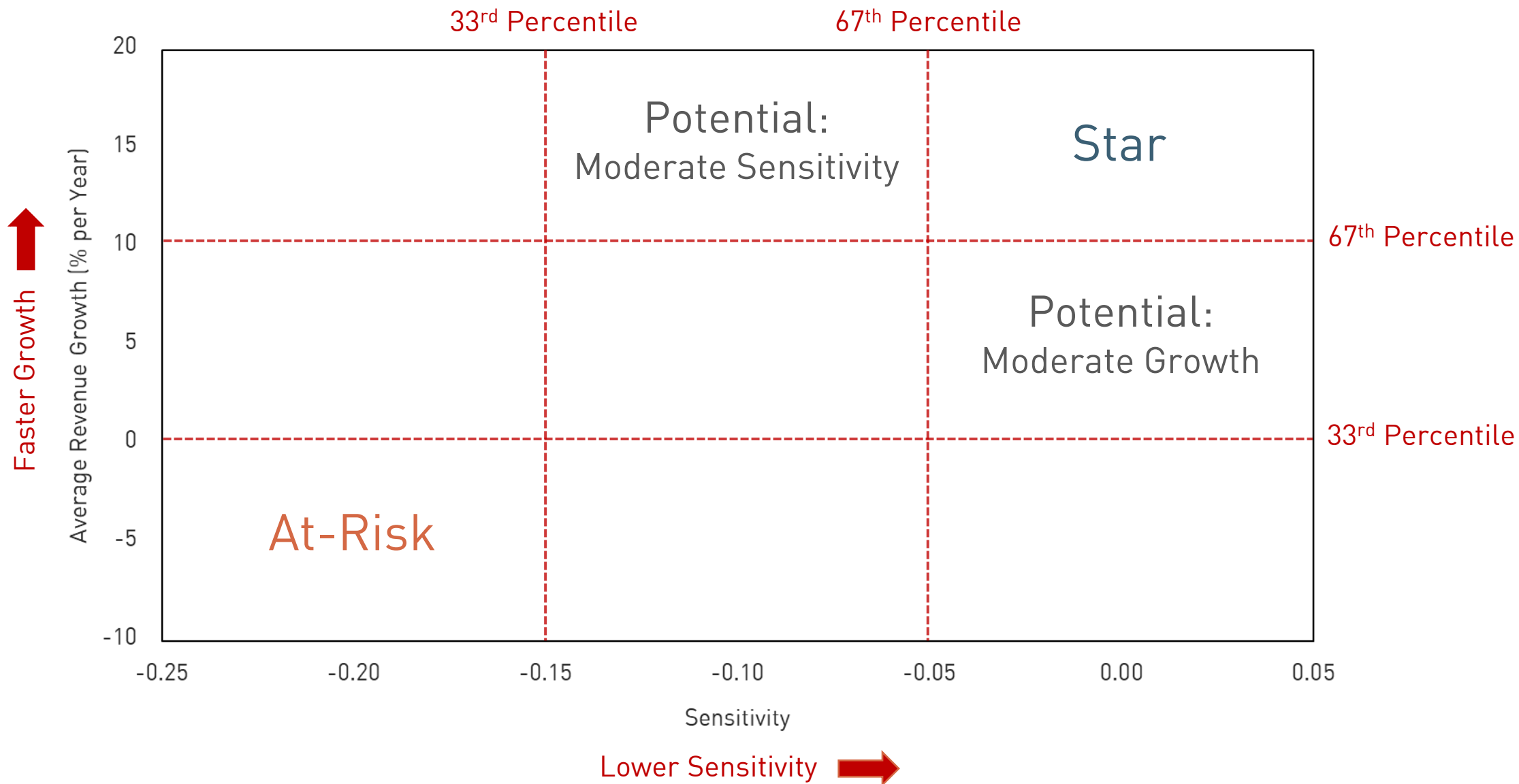
Growth-Sensitivity Trade-Off

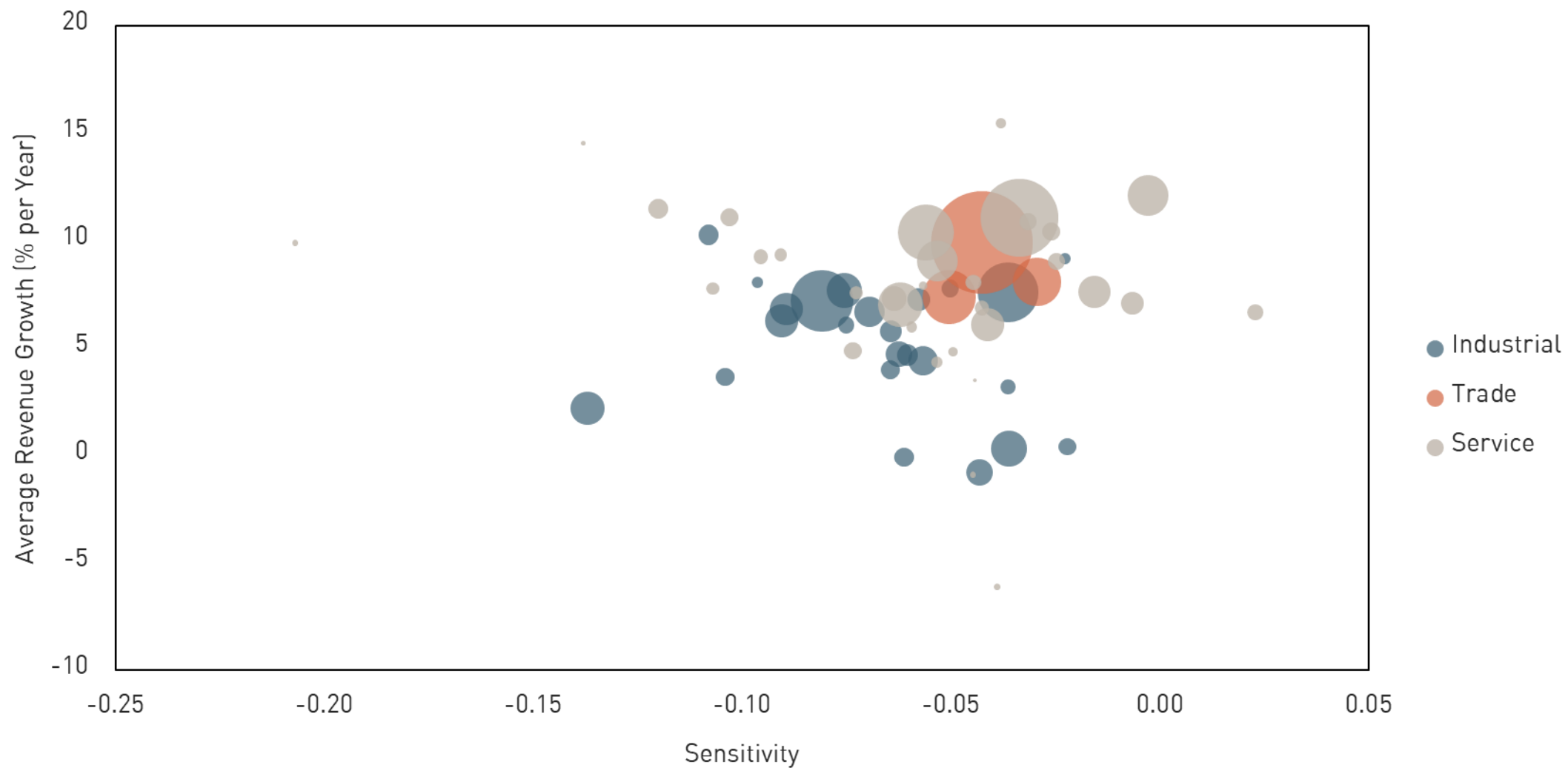


Growth-Sensitivity Trade-Off



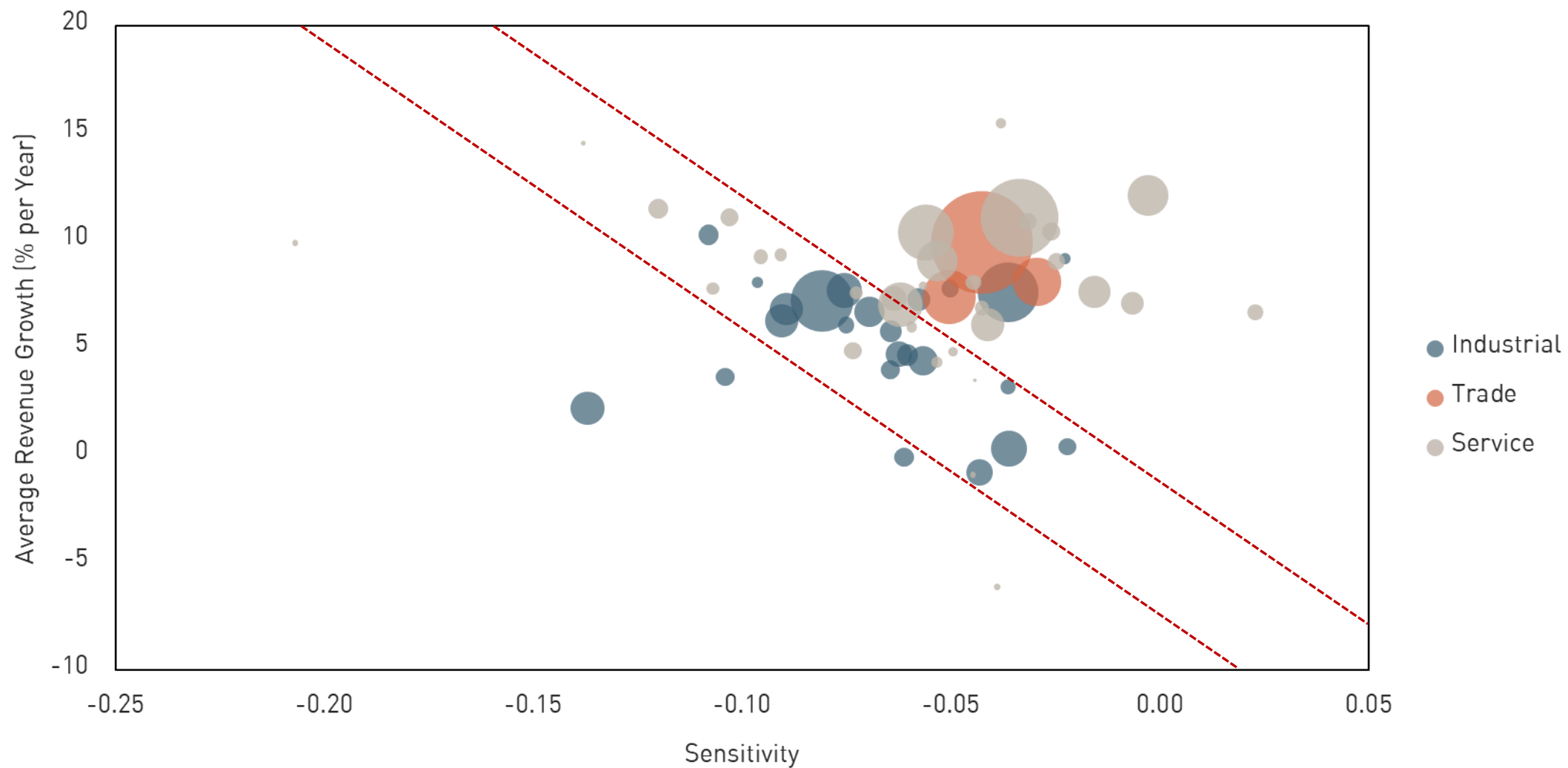
Growth-Sensitivity Trade-Off





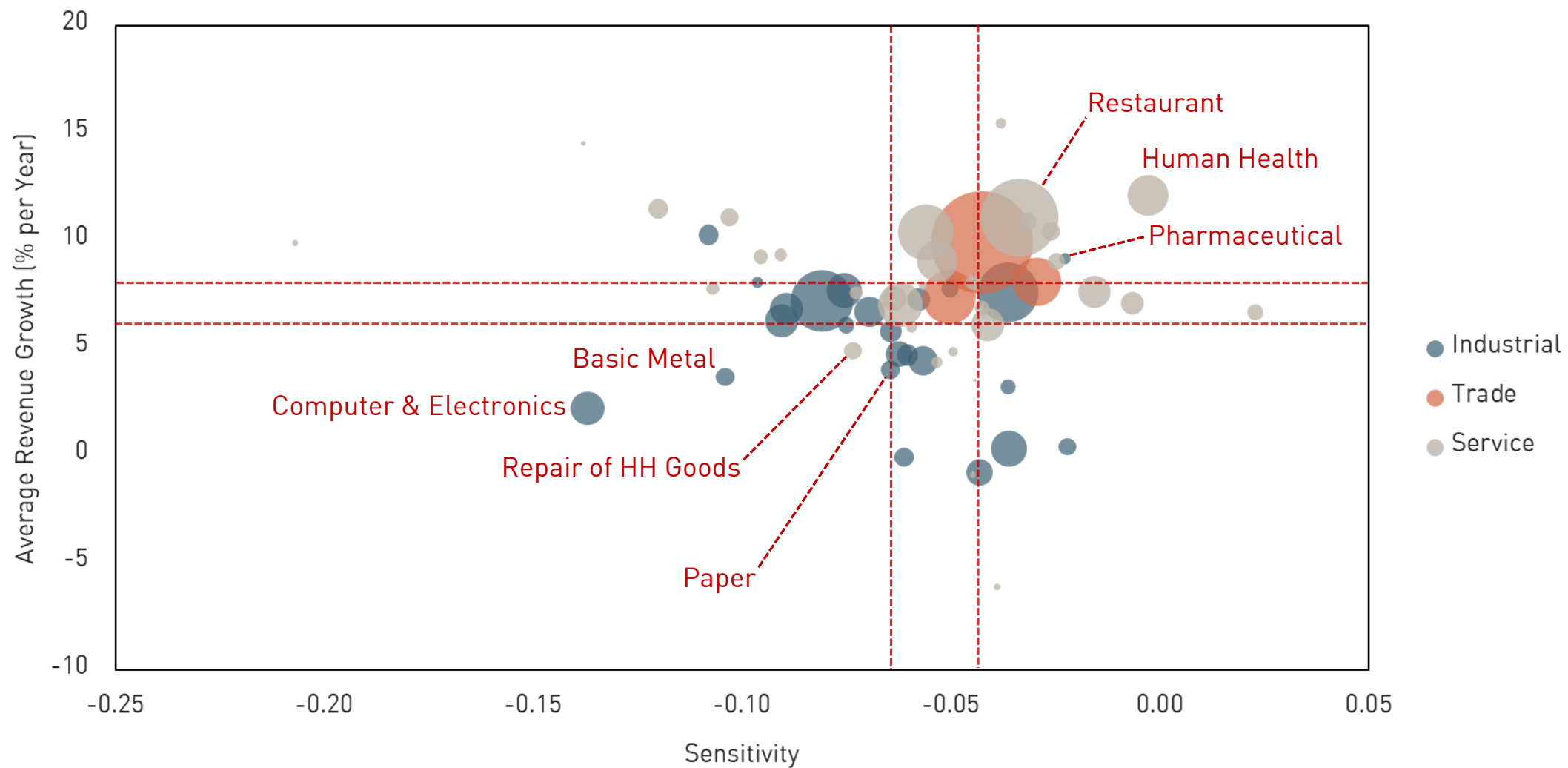
Note: Bubble size represents the number of workers in each industry.

Source: Authors' calculation based on data from the Department of Business Development, Ministry of Commerce and the National Statistical Office.



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Stars, At-Risk, and Potential Industries

Potential: Moderate Sensitivity

Retail Trade

Education

Postal & Courier Scientific R&D
Broadcasting Information Service

Stars

Restaurant

Auto Trade Human Health

Service to Buildings Library & Museum
Legal & Accounting Security & Investigation
Pharmaceutical

At-Risk

Computer & Electronics

Electrical Equipment Paper
Basic Metal Repair of HH Goods
Civil Engineering Rental & Leasing

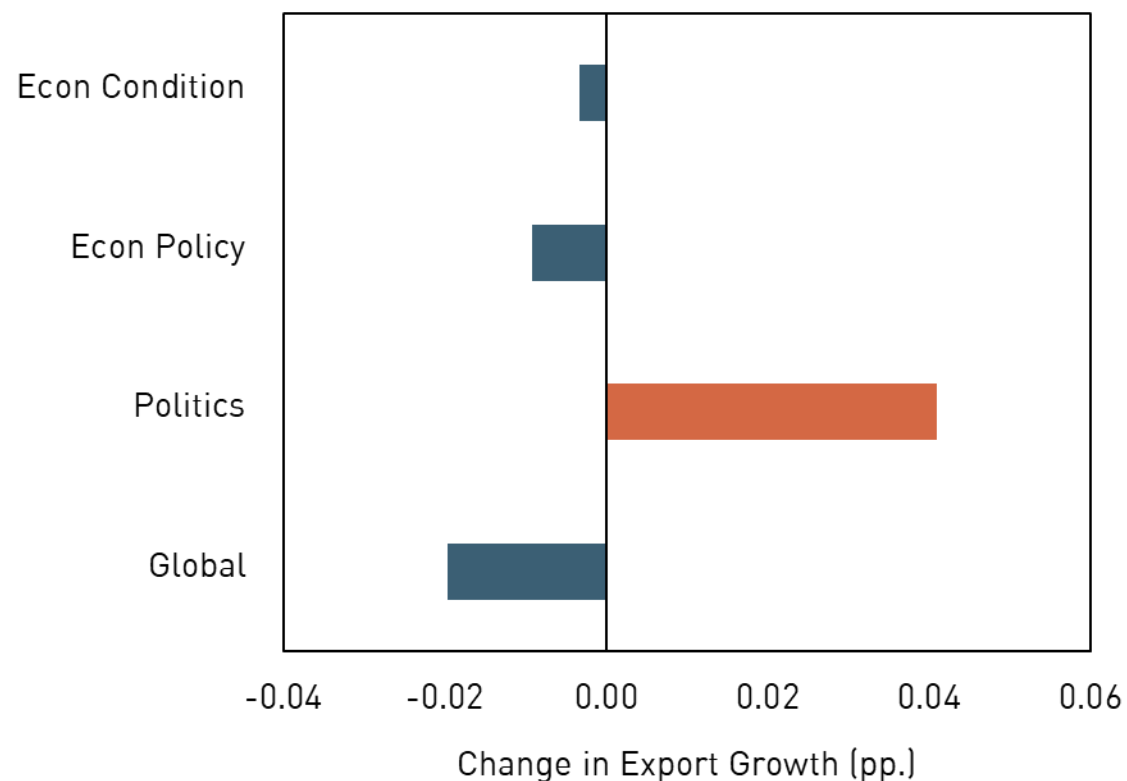
Potential: Moderate Growth

Food

Financial Service Hotel

Real Estate Telecommunication
Office Admin & Support Entertainment
Computer Programming

How do firms respond to uncertainty?



Source: Authors' calculation based on data from the Customs Department, Ministry of Finance.

Market Diversification

Facing uncertainty in politics,
firms move away from the
domestic market by increasing
their exports.

Uncertainty from Main Trading Partners

Sources of Uncertainty

Export
Destinations

Firm's Size

Export Growth		US			China			Japan		
		S	M	L	S	M	L	S	M	L
Main	US									
	China									
	Japan									
Southeast Asia	Singapore									
	Malaysia									
	Indonesia									
	Vietnam									
	Philippines									
Other Asia	HK									
	South Korea									
	Taiwan									
	Australia									
	New Zealand									
	India									
	UAE									
	Saudi Arabia									
	Turkey									
	Israel									
	Russia									

Source: Authors' calculation based on data from the Customs Department, Ministry of Finance.

Global Connectedness

Export Growth		US			China			Japan		
		S	M	L	S	M	L	S	M	L
Main	US									
	China									
	Japan									
Southeast Asia	Singapore									
	Malaysia									
	Indonesia									
	Vietnam									
	Philippines									
Other Asia	HK									
	South Korea									
	Taiwan									
	Australia									
	New Zealand									
	India									
	UAE									
	Saudi Arabia									
	Turkey									
	Israel									
	Russia									

Increasing uncertainty from main trading partners lowers the growth of exports to these destinations.

And even more so for export to other Asian countries, especially for the **medium-sized firms**

Export Diversification

Export Growth		US			China			Japan		
		S	M	L	S	M	L	S	M	L
Europe	Germany									
	Italy									
	Spain									
	UK									
	France									
	Switzerland									
	Netherlands									
	Belgium									
	Czech									
Americas	Canada									
	Mexico									
	Brazil									
	Argentina									
Africa	Nigeria									
	South Africa									
	Egypt									

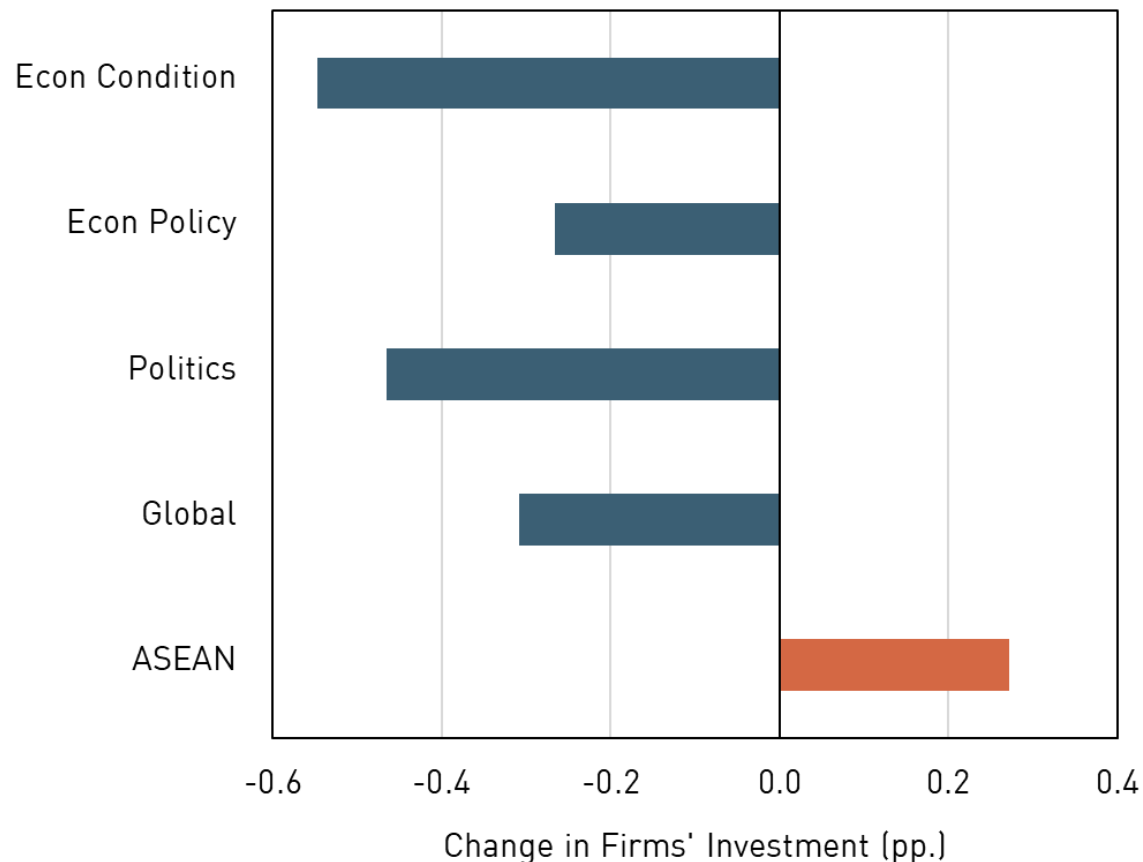


Firms respond by diversifying to other destinations

Source: Authors' calculation based on data from the Customs Department, Ministry of Finance.

Is there a long-term impact of
uncertainty?

Uncertainty suppresses investment



All four main types of uncertainty have a negative impact on firms' investment.

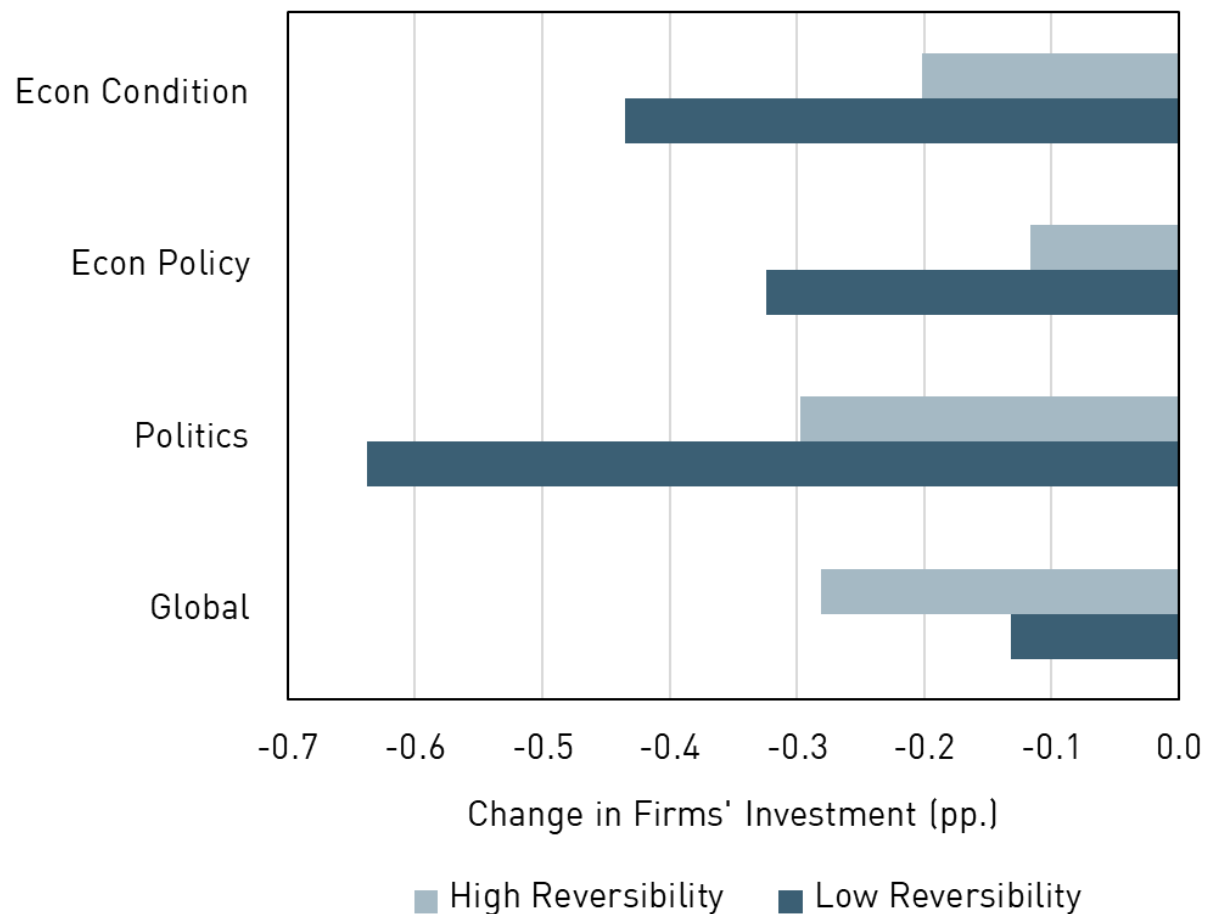
Uncertainty in ASEAN countries has a positive impact on firms' investment.

Source: Authors' calculation based on data from the Department of Business Development, Ministry of Commerce.

The Real Option Hypothesis

Facing uncertainty, firms might prefer the “wait-and-see” strategy and postpone their investment projects.

The real option hypothesis predicts that this effects will be stronger for the firms of which investment is less reversible.



How well firms cope with uncertainty in the short run?

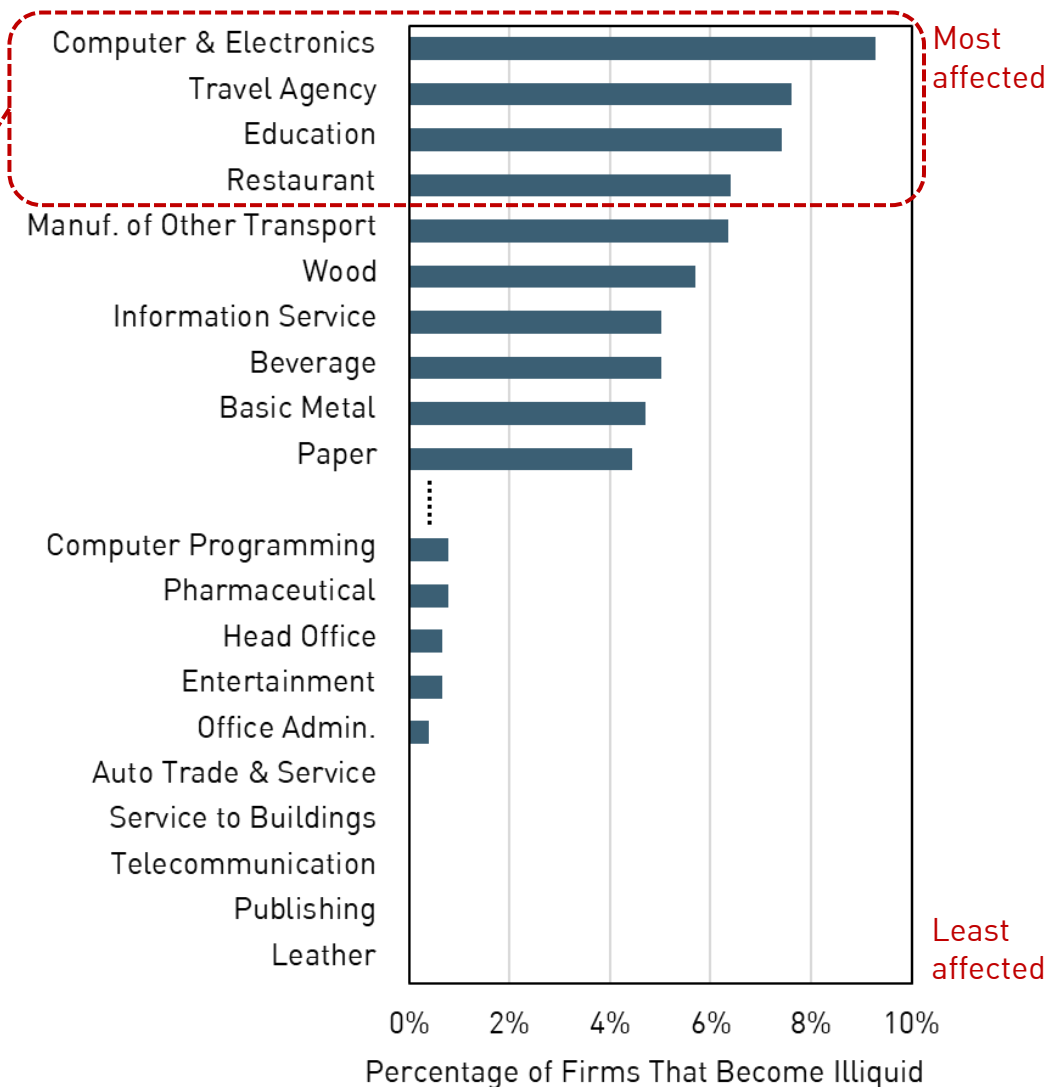
Uncertainty and Firms' Liquidity

Given global uncertainty equivalent to that in 2008, how many good firms in normal time would become illiquid?

On average, 2.2% of good firms would face liquidity problem.

The 4 most-affected industries are

- Computer & Electronics
- Travel Agency
- Education
- Restaurant



Key Takeaways

- Impacts from uncertainty differ across firms and industries
- Facing uncertainty, firms diversify their sources of revenue by increasing their exports and also by exporting to other destinations
- Uncertainty could create illiquidity shocks for an otherwise good firm

Navigating through Uncertainty



Policy Recommendations

1. Reduce uncertainty when possible

Government and policy makers can lower policy uncertainty via

- Effective communication
- Lower coordination failures

Policy Recommendations

2. Restructure toward “Star” industries

- Consider not only growth but also vulnerability
- Support “star” industries such as Human Health, Restaurant, or Pharmaceutical

Policy Recommendations

2. Restructure toward “Star” industries

- Consider not only growth but also vulnerability
- Support “star” industries such as Human Health, Restaurant, or Pharmaceutical
- Facilitate “potential” industries such as Retail Trade or Food to become stars

Policy Recommendations

3. Liquidity for vulnerable but otherwise performing firms

Government:

- Facilitate access to hedging instruments
- Provide short-term liquidity for good firms during the time of heightened uncertainty
- Support businesses (including SMEs) in entering other foreign markets

Navigating through Uncertainty



The opinions expressed in this presentation are those of the authors and should not be attributed to the Bank of Thailand or the Puey Ungphakorn Institute for Economic Research.