“Early in life I had noticed that no event is ever correctly reported in a newspaper…”
— George Orwell

Event Derivatives and Electoral Feedback

Anarcapulco 2019

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16 Feb 2019

Paul Sztorc

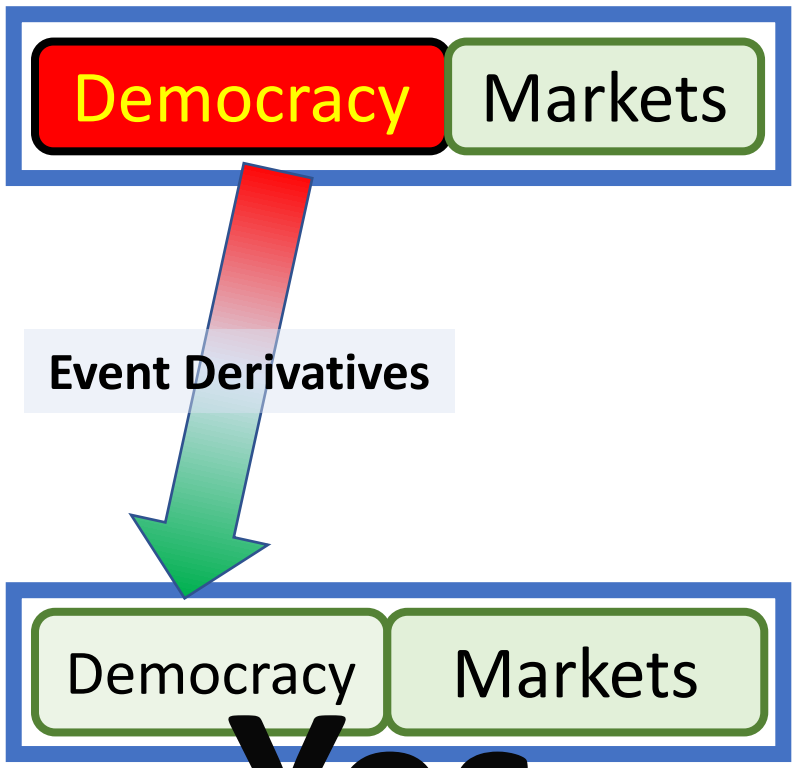
truthcoin.info

About Me

- Southern CT
- Case Western: BA Economics, MS Applied Math, MBA
- Consulting
- Yale Econ Department, Statistician, pre-PhD
- Bitcoin
  - Truthcoin.info blog,
  - Scaling Bitcoin I, II, III and IV; TABconf and BoB.

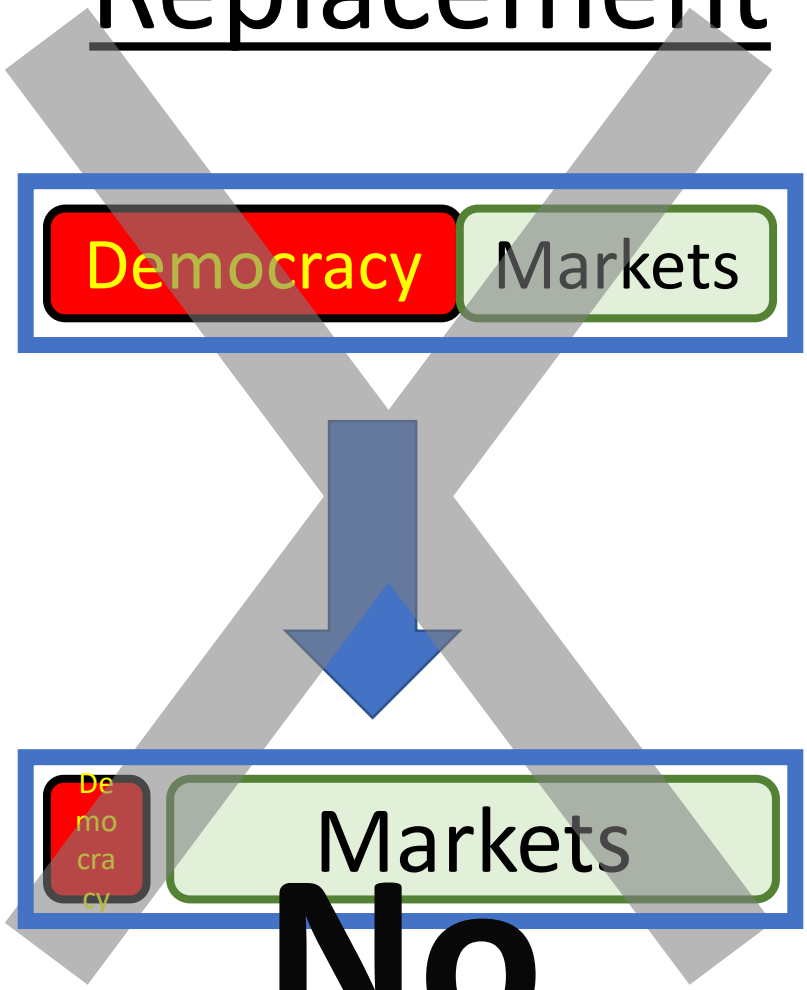
Improvement; NOT Replacement

Improvement



Yes

Replacement



No

Talk, in One Slide

- **Problem:** Politicians are installing bad policies into society, and getting away with it.
- **Solution:** Make it easy to: detect imperfect politicians, and fire them asap.

- **Specifically:** Create blockchain assets whose ultimate valuation reflects politician's competence. Citizens glance at spot prices, just before voting.

For Example, Voter might see:

Average, over years 2020-2024…	Incumbent Party	Rival Party
Total Government Spending ($/person)	$12,568	$10,407 better
Total Money Earned by all Citizens ($ billions)	$16,427	$17,009 Slightly better
Total Deaths, all causes (thousands of people)	2,917	2,901 basically the same

Agenda

1. Background	*Long*
2. Electoral Feedback	*Long*
3. Event Derivatives	*Long*
4. Synthesis	*Short*
5. Why Laypeople Will Care	*Short*

Background Knowledge

1. Idea has intellectual history.
2. (At least) one decent project exists.
3. No ICO, No Utility Token

Name-Dropping: Finney, Merkle

Intrade's Conditional Prediction Markets

By Hal Finney · July 29, 2008 7:14 pm · Comments (24) · « Prev · Next »

We have often discussed the possible benefits of prediction markets for reducing bias. One key element that could be particularly useful is a conditional prediction market, where betting claims are based on outcomes conditional on some factor we want to evaluate. Robin recently mentioned the possible benefit from market claims on longevity or health conditional on various interventions.

Unfortunately, there are few prediction markets in the world, and fewer conditional ones, so it is hard to know how practical this institution may become. Thanks to an initiative by OB contributor Peter McCluskey, Intrade – the large, real-money prediction market – has added conditional claims

"There are only a few people alive today worth listening to. Robin Hanson is one of them."

– Ralph Merkle, co-inventor of asymmetric (public/private) key cryptography, inventor of cryptographic hashing, and of the Merkle tree.

More Supporters

ECONOMICS

The Promise of Prediction Markets

The ability of groups of people to make predictions is a potent research tool that should be freed of unnecessary government restrictions.

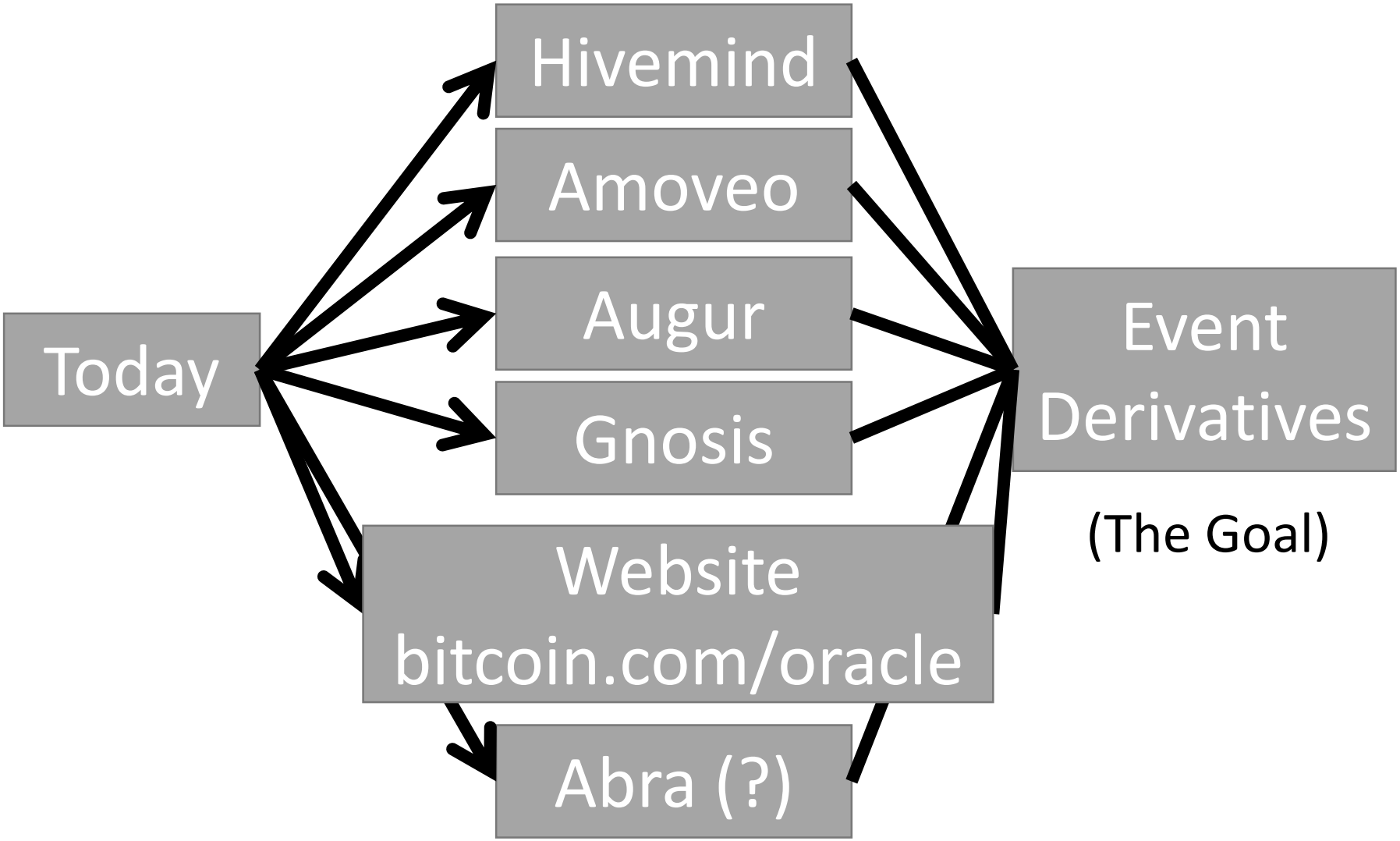
Kenneth J. Arrow,[1] Robert Forsythe,[2] Michael Gorham,[3] Robert Hahn,[4*] Robin Hanson,[5] John O. Ledyard,[6] Saul Levmore,[7] Robert Litan,[8] Paul Milgrom,[1] Forrest D. Nelson,[9] George R. Neumann,[9] Marco Ottaviani,[10] Thomas C. Schelling,[11] Robert J. Shiller,[12] Vernon L. Smith,[13] Erik Snowberg,[14] Cass R. Sunstein,[7] Paul C. Tetlock,[15] Philip E. Tetlock,[16] Hal R. Varian,[17] Justin Wolfers,[18] Eric Zitzewitz[19]

Prediction markets are forums for trading contracts that yield payments based on the outcome of uncertain events.

Information Revelation Through Time

6

We Need at Least One Solution, to the Blockchain Oracle Problem



Truthcoin

Peer-to-Peer Oracle System and Prediction Marketplace

Paul Sztorc[1]
truthcoin@gmail.com
https://github.com/psztorc/Truthcoin
1M5tVTtynuqiS7Goq8hbh5UBcxLaa5XQb8
Version 1.5 – 12/14/2015

Abstract. Bitcoin can support financial derivatives and smart contracts, but the main benefits are lost if a trusted third party is required to inform these contracts. Instead, I propose a proof-of-work sidechain which collects information on the creation and state of Prediction Markets (PMs).

Paper Reviews (~2015)

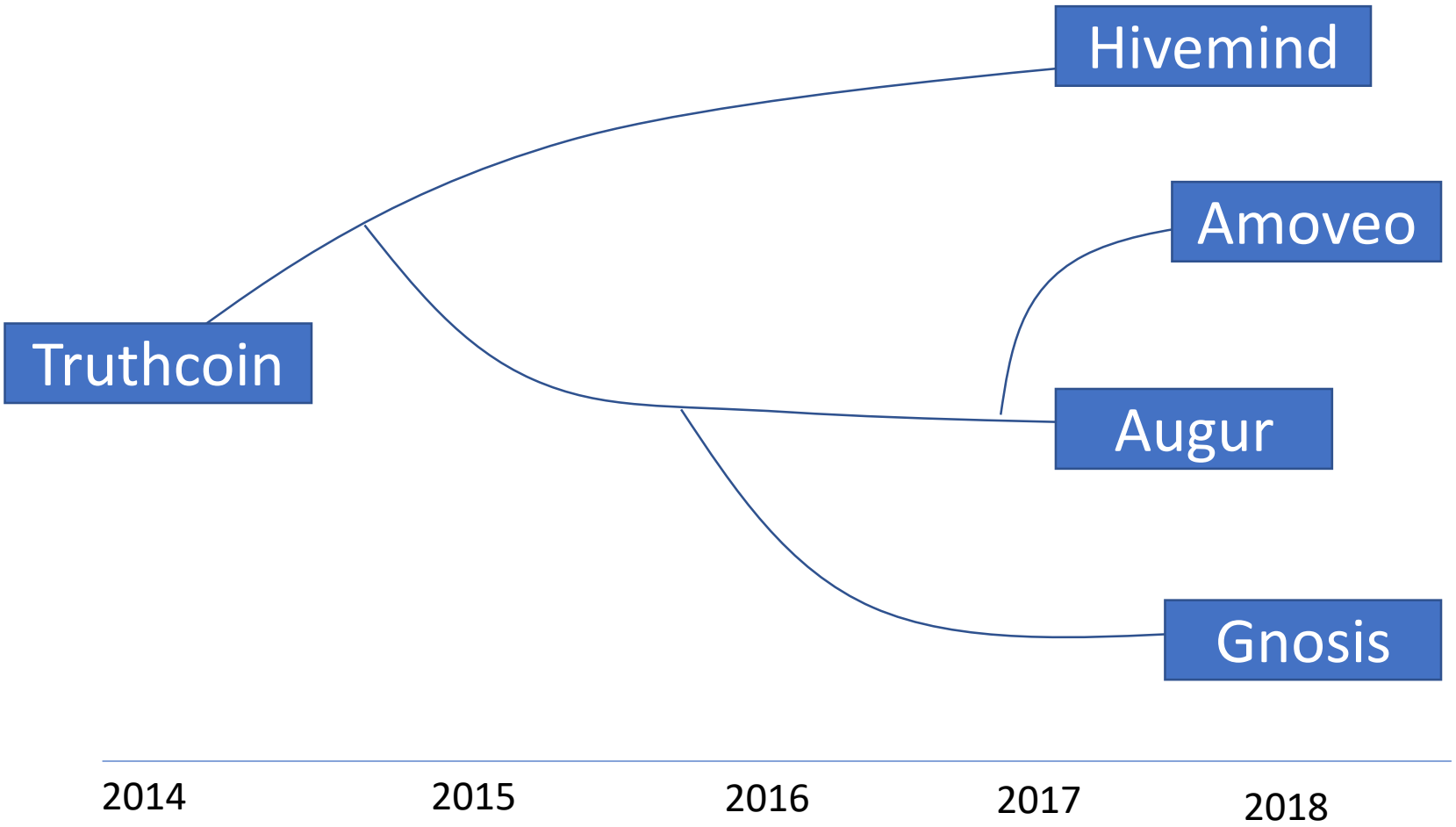
- "…may be the most important invention since Bitcoin itself."
- **Roger Ver**

- "I'm very optimistic about the feasibility of this project."
- **Andrew Poelstra**

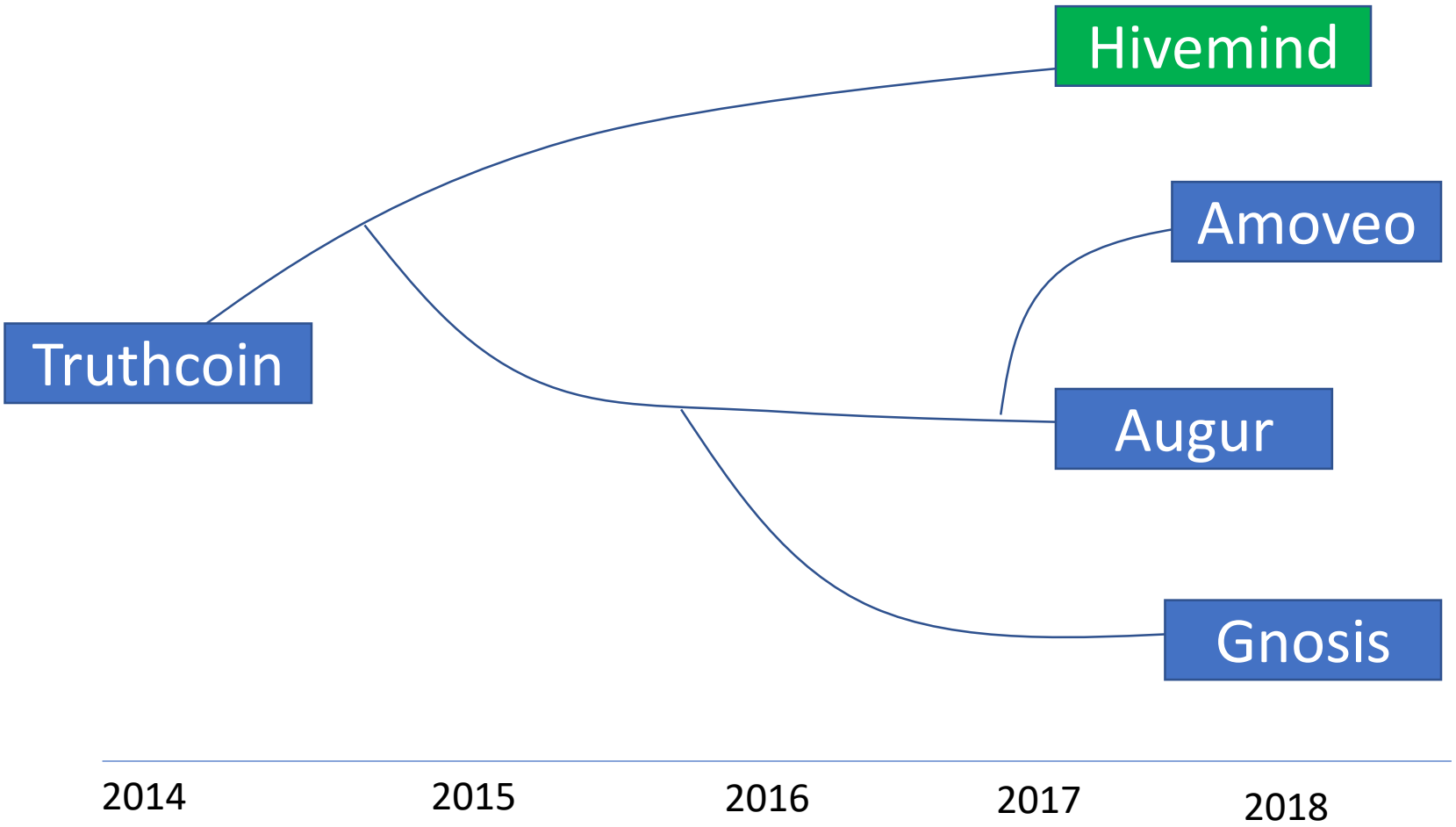
- "…a real project with interesting use cases."
- **Dr. Adam Back**

- "…at least it's clever crazy rather than stupid crazy. :)"
- **Peter Todd**

Multiple Implementations



Multiple Implementations



Hivemind Core - Wallet [testnet]

File Settings Help

Overview | Send | Receive | Transactions | Markets | Decisions | Author | Vote

This is a pre-release test build - use at your own risk - do not use for mining or merchant applications

Recent Hivemind Objects:

Type/Icon	
	Bitcoin exchange rate as reported by CoinD
	Will Jeff Immelt have been replaced, as CEO
	Global surface temperature anomaly, cumul
	Will Barack Obama win US President in 201
	Unemployment drivers
	Fire Immelt?
	Unemployment drivers

Balances

Available:	400.00000000 BTC
Pending:	0.00000000 BTC
Immature:	50.00000000 BTC
Total:	450.00000000 BTC

Recent transactions

5/17/16 11:41 (19y1RCwANn71vEZkxMrDoAjXuCzERyJE8A)	[+50.00000000 BTC]
5/17/16 11:41 (14u1sX6BTJnnTAL2dPDgm7WKKubofpwuEy)	+50.00000000 BTC
5/17/16 11:41 (1D6kbEHq7BXpJsVbuxLivt4CV4fv8poCk7)	+50.00000000 BTC
5/17/16 11:41 (1AAdn8e5v7QM155C6Cc6Z8u82SZWDLH6cd)	+50.00000000 BTC
5/17/16 11:41 (16bfT93g3QY53xsEkK6UwnKYaa7FDBxsoc)	+50.00000000 BTC
5/17/16 11:40 (1NwRMJnpetsFHVCpzjeYo1s89StTi4HHDa)	+50.00000000 BTC

BTC

Hivemind Core - Wallet [testnet]

File Settings Help

Overview Send Receive Transactions Markets Decisions Author Vote

Branch: Main

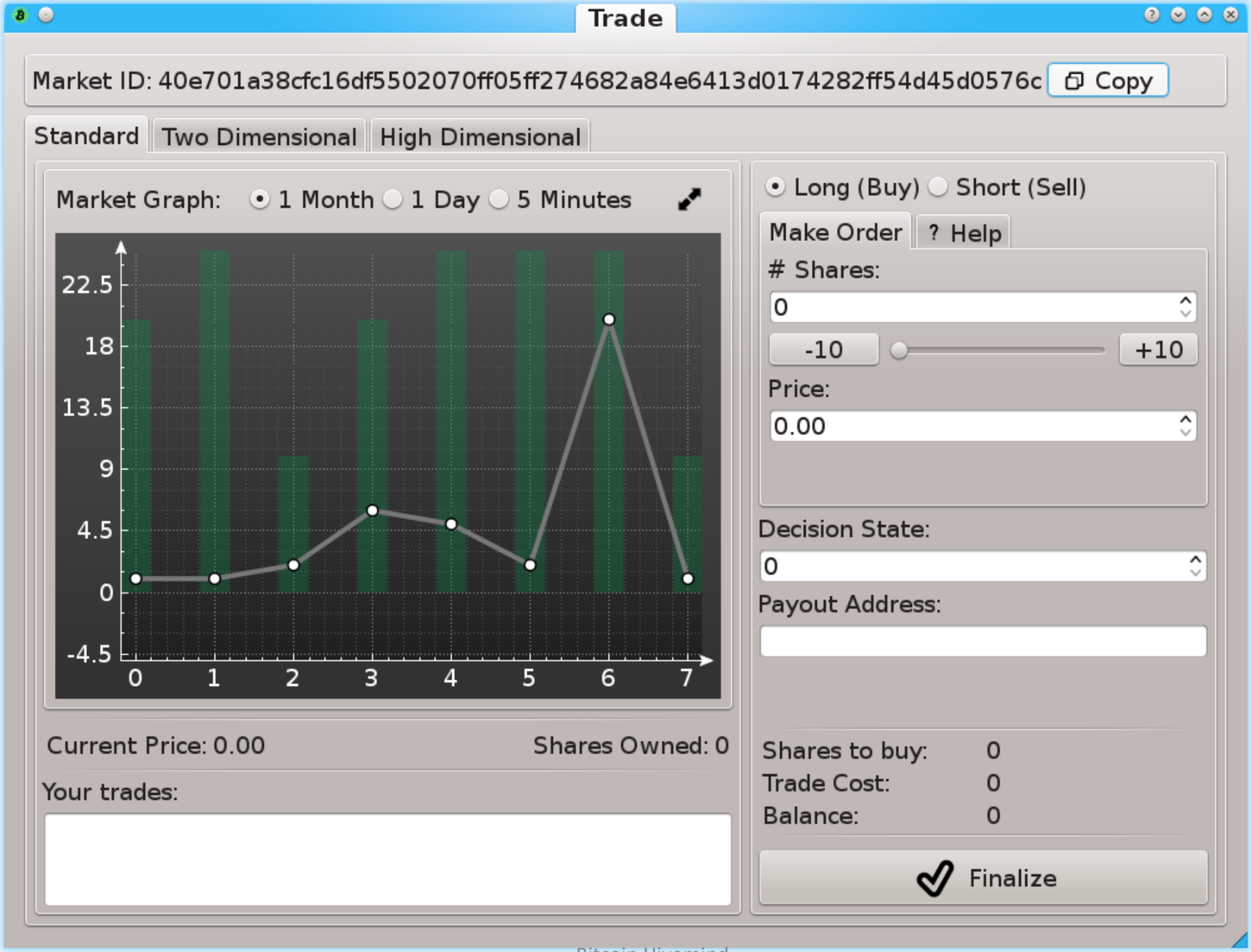
Search:

Tags:

Scale: 1d 3d 1wk 3wk 1m 3m 1yr < >

Graph	Market Info
Unemployment drivers	Title: Unemployment drivers Description: Market on unemployment Tags: tags Market ID: 40e701a38cfc16df5502070ff05ff274682a84e6413d0174282ff...
Fire Immelt?	Title: Fire Immelt? Description: Market on the employment of GE CEO Immelt Tags: tags Market ID: 23f3591495cf5158b35c0e1945fade02aa6021350fbea957a768...
Unemployment drivers	

BTC


Trade
Market ID: 40e701a38cfc16df5502070ff05ff274682a84e6413d0174282ff54d45d0576c
Copy
Standard
Two Dimensional
High Dimensional
Market Graph:
1 Month
1 Day
5 Minutes
22.5
18
13.5
9
4.5
0
-4.5
0
1
2
3
4
5
6
7
Current Price: 0.00
Shares Owned: 0
Your trades:
Long (Buy)
Short (Sell)
Make Order
? Help
Shares:
0
-10
+10
Price:
0.00
Decision State:
0
Payout Address:
Shares to buy: 0
Trade Cost: 0
Balance: 0
Finalize

Background Knowledge

1. Idea has intellectual history.
2. (At least) one decent project exists.
3. No ICO, No Utility Token

Agenda

1. Background
2. Electoral Feedback
3. Event Derivatives
4. Synthesis
5. Why Laypeople Will Care

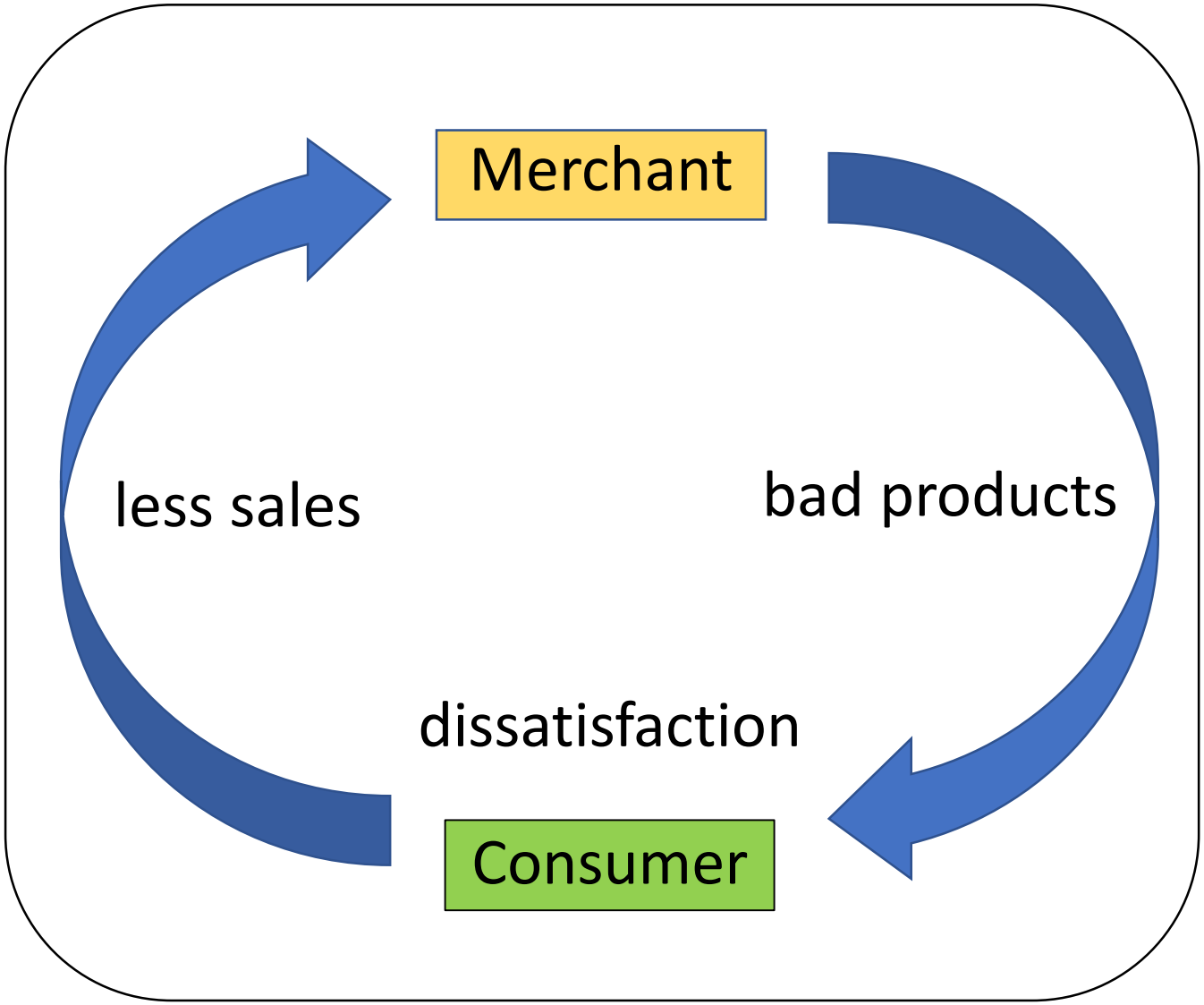
Why does the Public Sector Disappoint?

Mayor Quimby

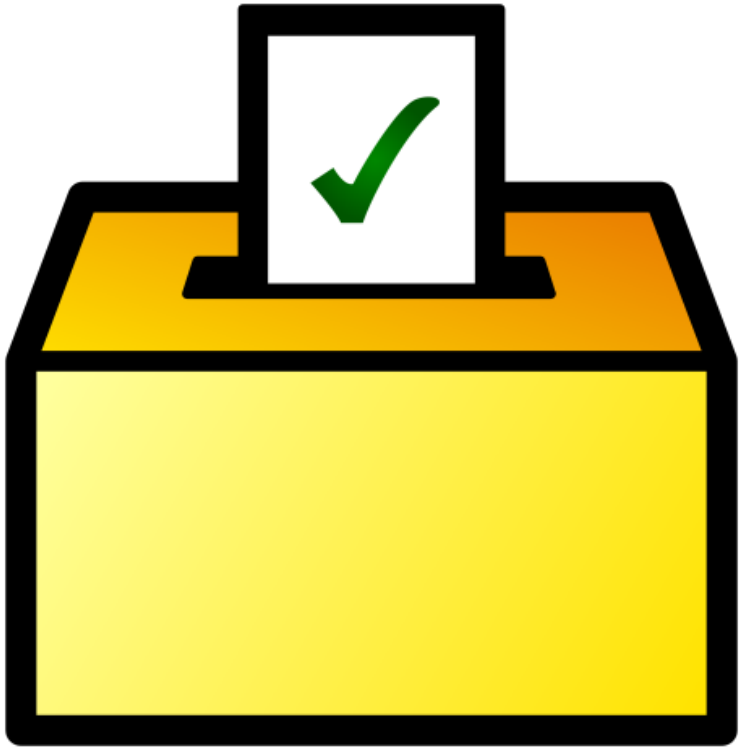
Chief Wiggum

Giant D****h vs.
T**d Sandwich

Feedback (Free Market)

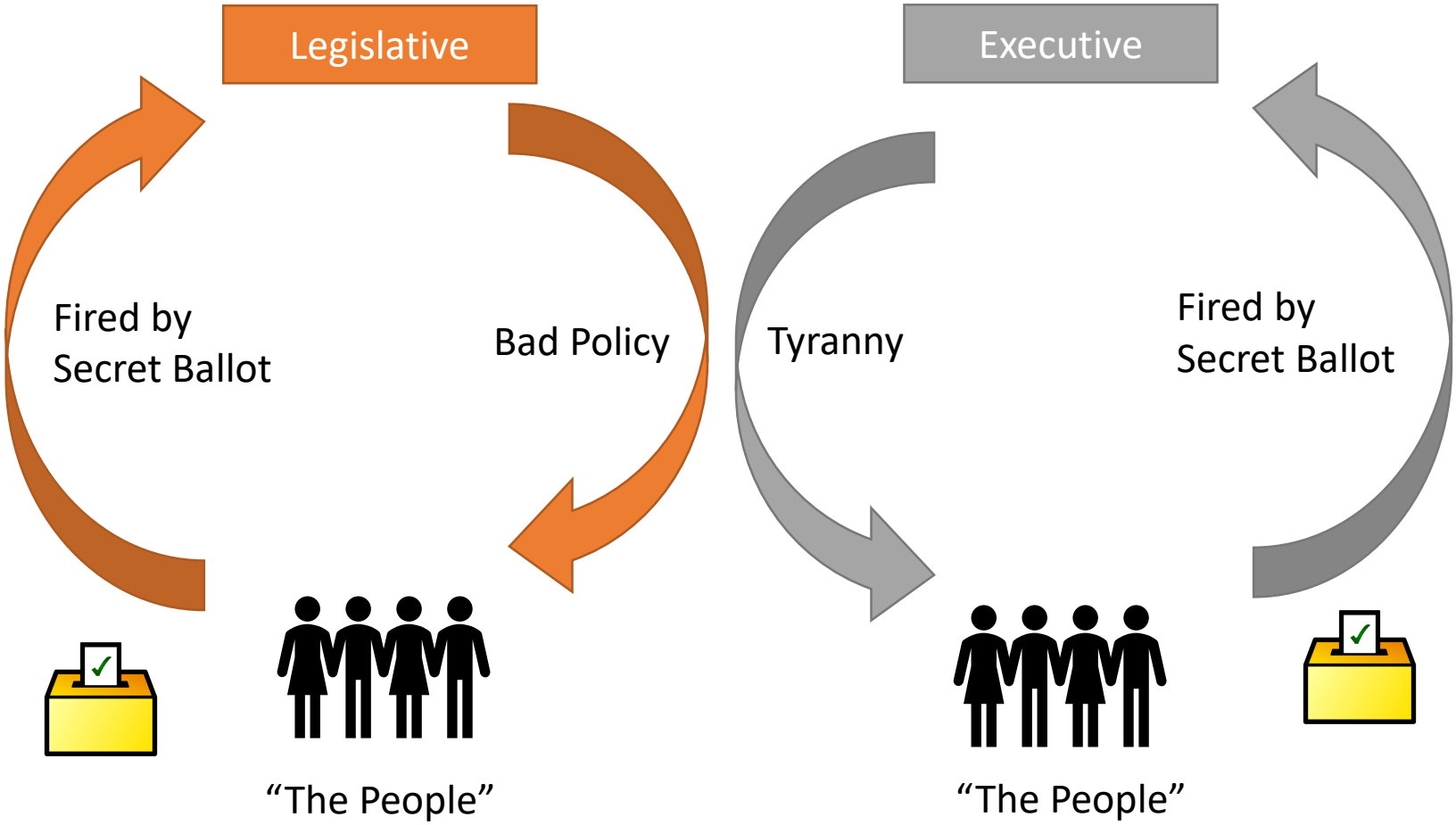


Feedback (Democracy)

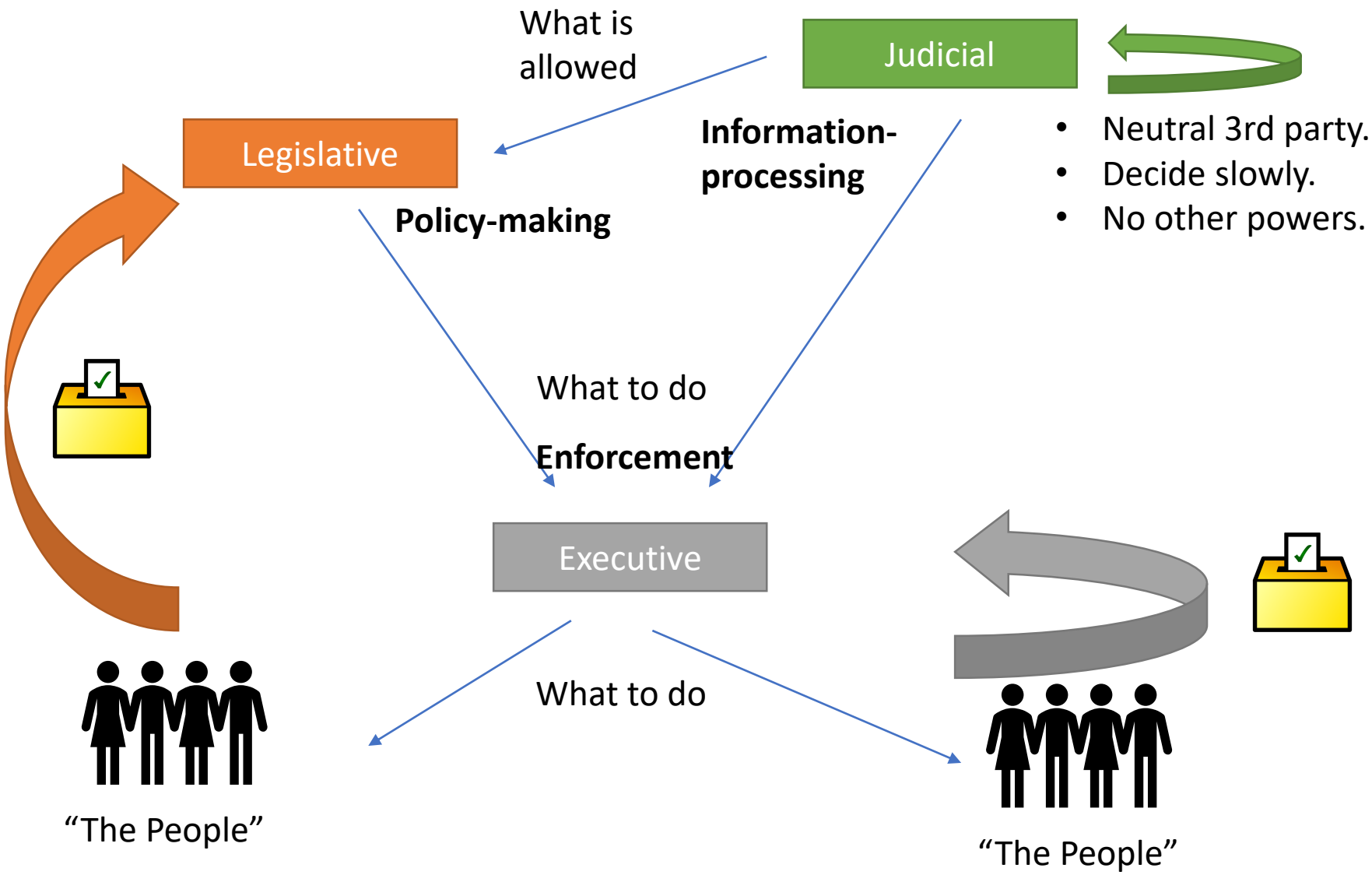


Ballot Box

Feedback to Remove Errors

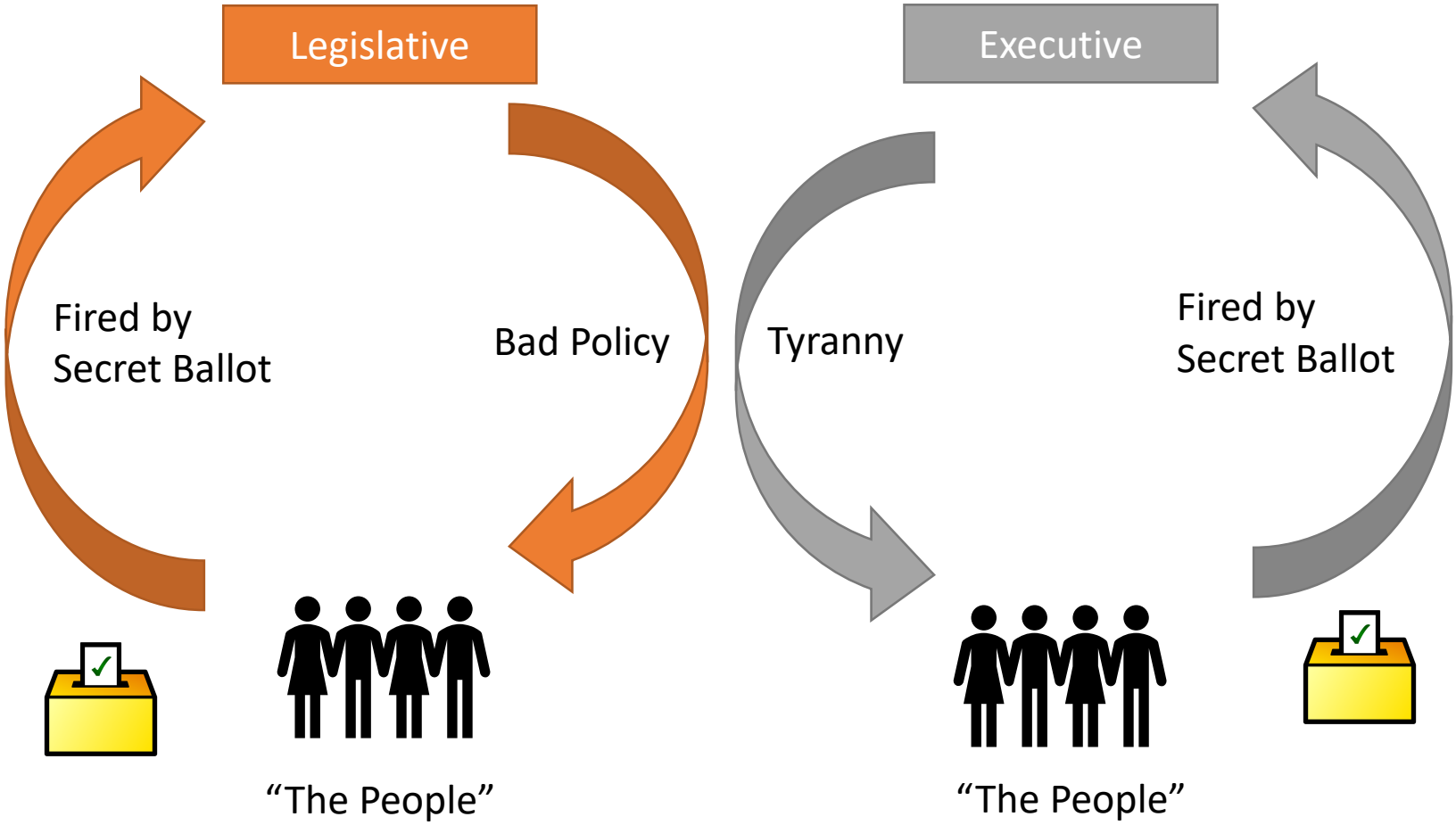


Post-Enlightenment Political Technology



- Neutral 3rd party.
- Decide slowly.
- No other powers.

Feedback to Remove Errors



Feedback: Market vs Electoral

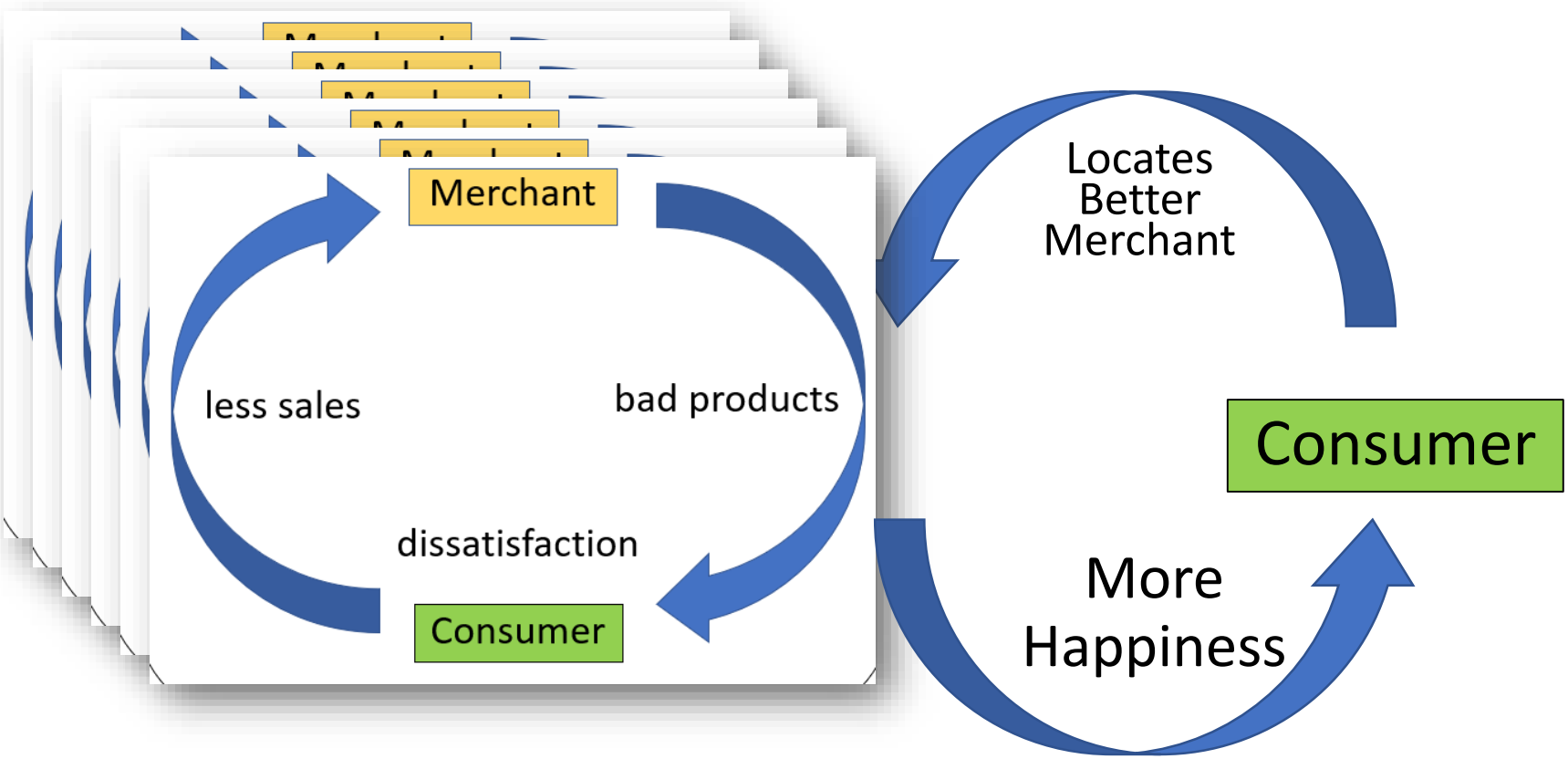
1. Frequency
2.

Feedback: Market vs Electoral

1. Frequency
2. **<u>Research</u>**

Research = Search for Alternatives

- Disappointing sale → search for alternatives.

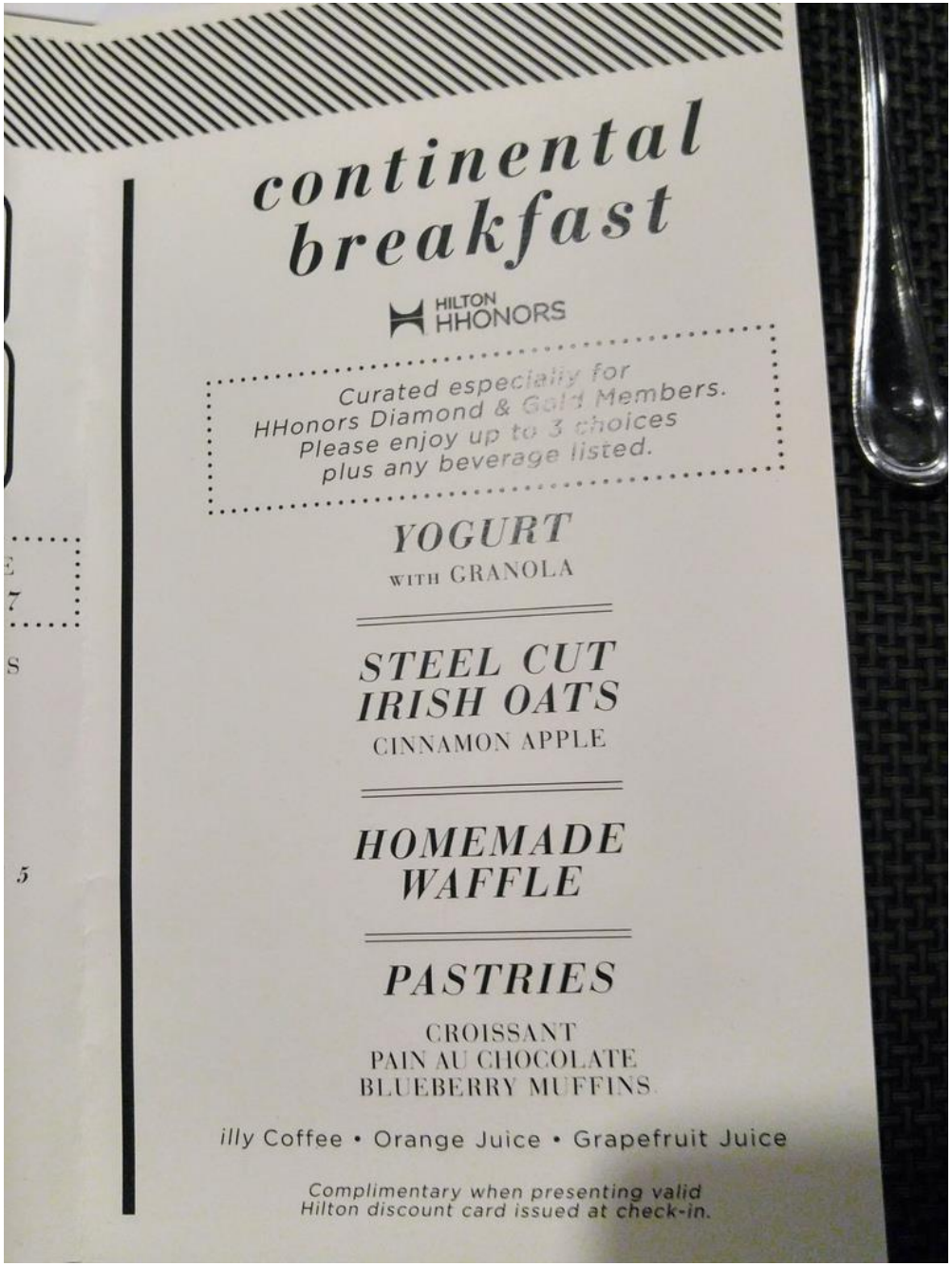


Costs/Benefits of Research

	Cost	Benefit	Quantity
Private Sector (Non-interactive)	100%	100%	Efficient
Public Sector (Interactive)	100%	~ 0 %	Shortage

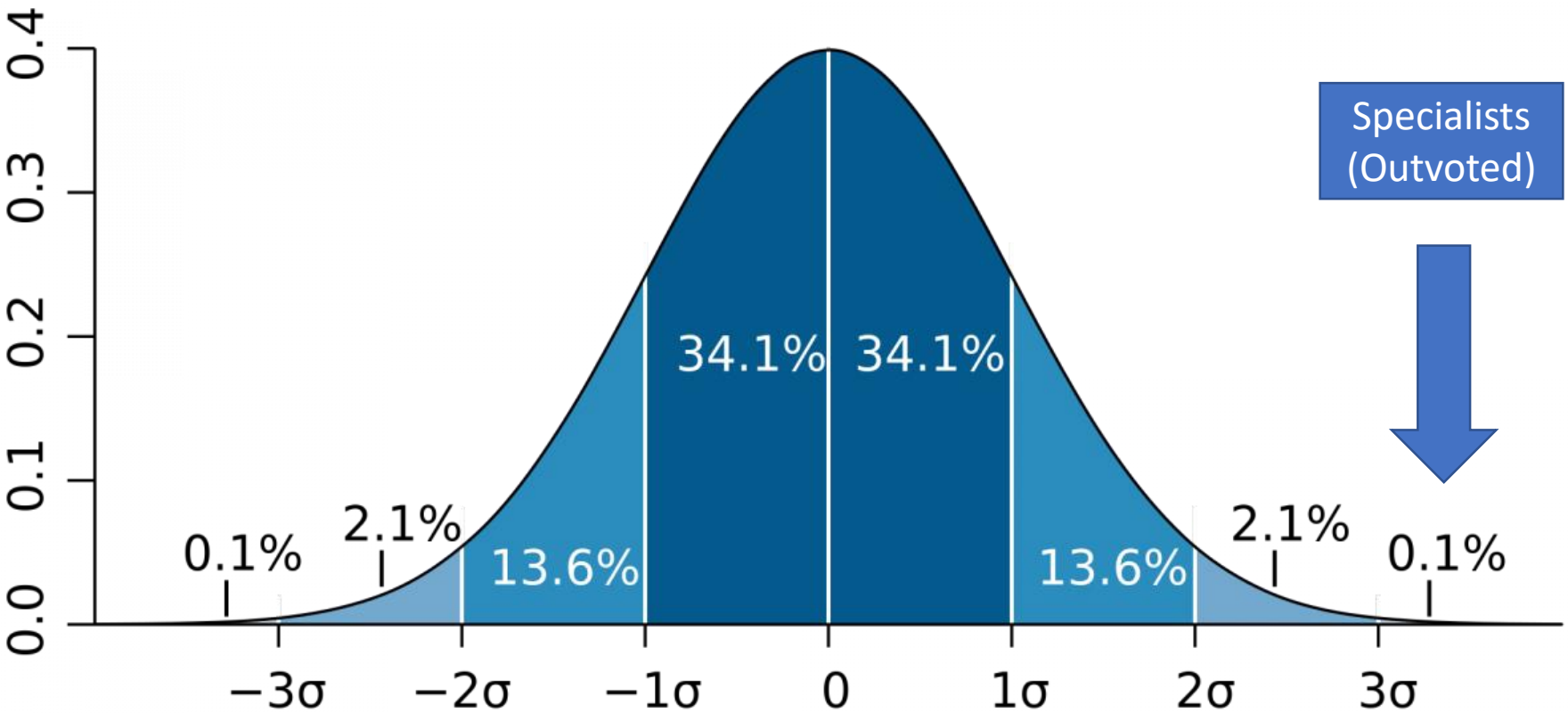
71% of Americans can't even ***name*** their Congressional Representative (Delli-Carpini and Keeter (1997))

Let alone: rival candidates, or policies or their effects.


continental breakfast
HILTON HHONORS
Curated especially for HHonors Diamond & Gold Members. Please enjoy up to 3 choices plus any beverage listed.
YOGURT
WITH GRANOLA
STEEL CUT IRISH OATS
CINNAMON APPLE
HOMEMADE WAFFLE
PASTRIES
CROISSANT
PAIN AU CHOCOLATE
BLUEBERRY MUFFINS
illy Coffee • Orange Juice • Grapefruit Juice
Complimentary when presenting valid Hilton discount card issued at check-in.

Educating People = Won't Solve Problem

- Worth Doing? Yes.
- But: Layperson = NOT an expert specialist, by definition.



Agenda

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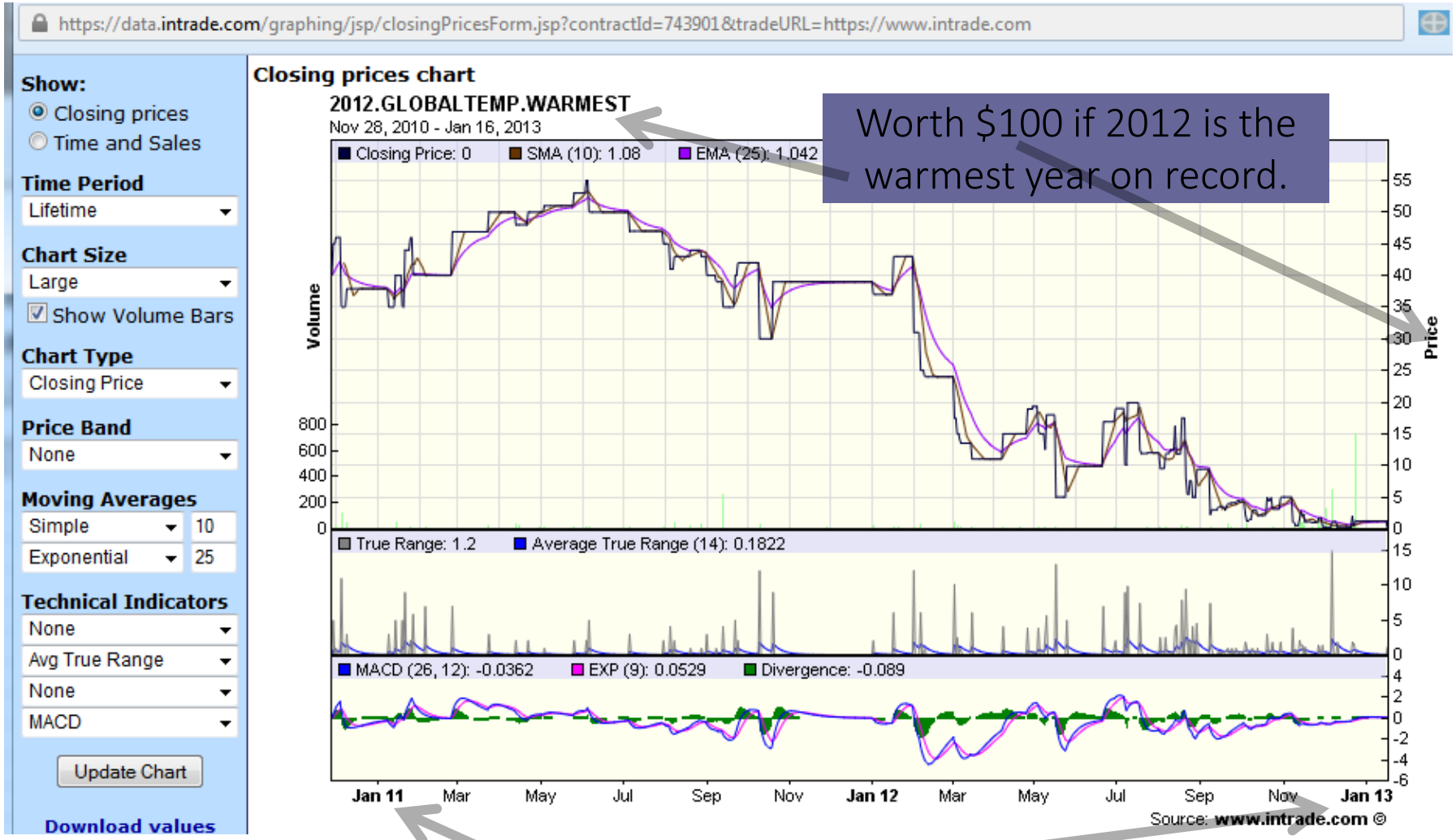
Event Derivative (InTrade.com) - 2012 global warming

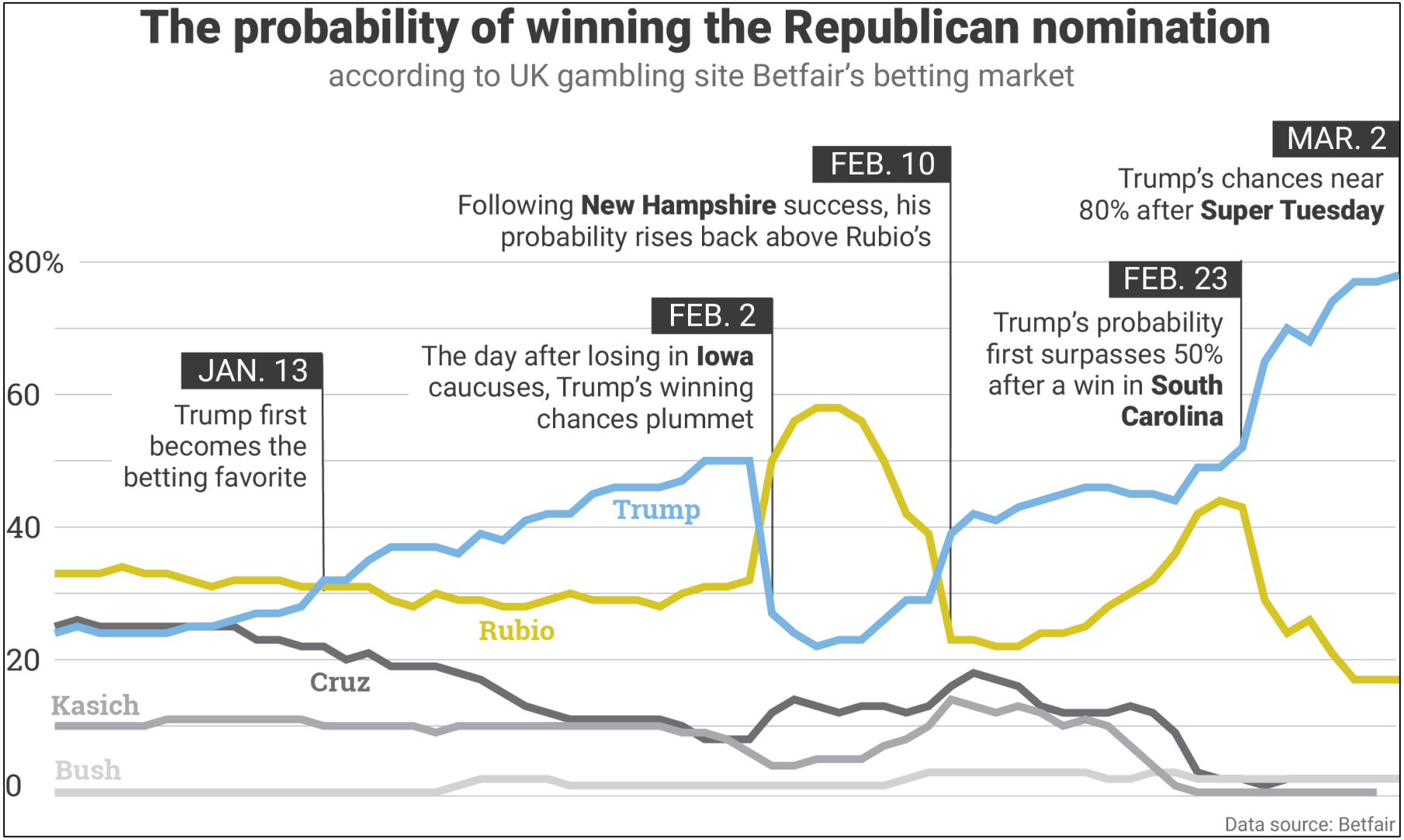
(also called a "prediction market")



Worth $100 if 2012 is the warmest year on record.

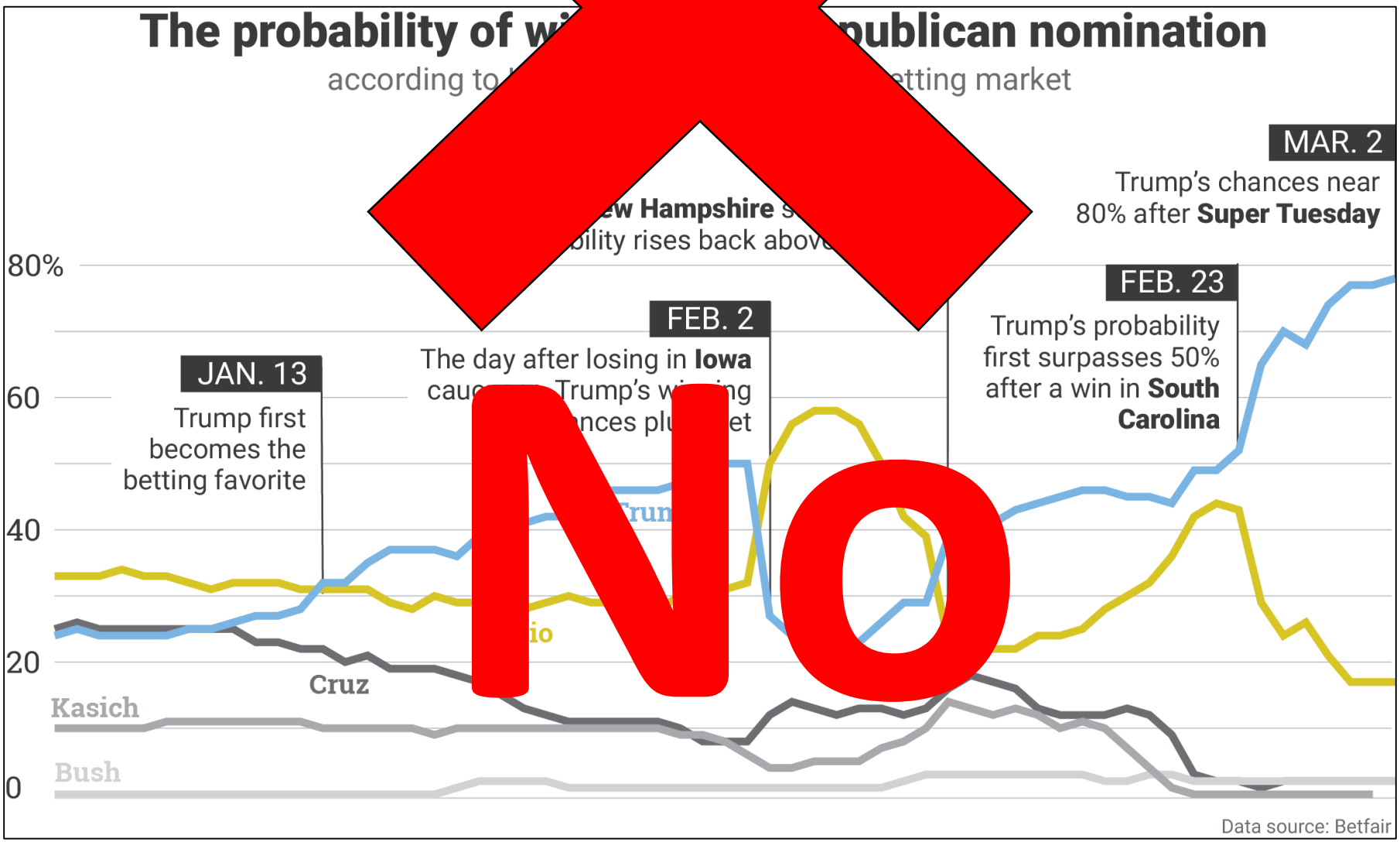
Ran from Jan 2011 to End of 2012

Betting on who will win



Graphic from NationalJournal.com

Betting on w



Graphic from NationalJournal.com

Nine Slides on Multivariate Betting

(1/9) Probability -- Review

283	Heads
284	Heads
285	Tails
286	Heads
287	Heads
288	Heads
289	Tails
290	Heads
291	Heads
292	Tails
293	Tails
294	Tails
295	Tails
296	Heads
297	Heads
298	Tails
299	Tails
300	Heads
301	Tails

Some future event (coin flip).

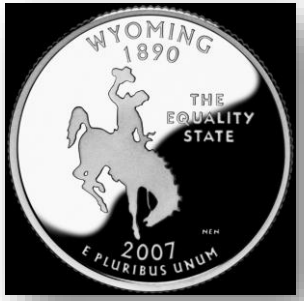
Heads has 50% likelihood.

Tails has 50% likelihood.

Coin Flip #303

H	.50
T	.50
	1.00

Total probabilities add up to 100%.



(2/9) Probability -- Review

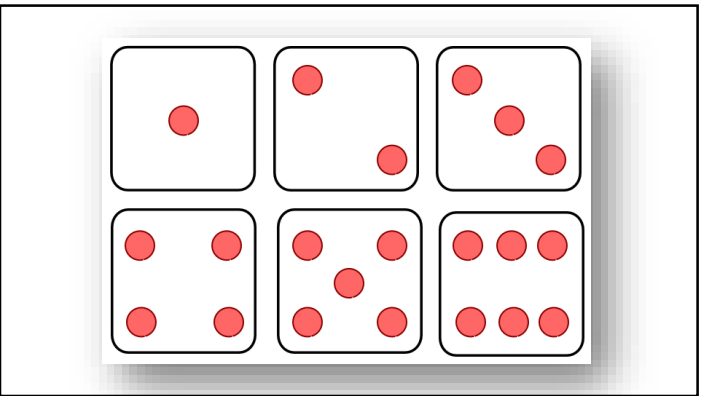
Some future event (dice roll).

Dice Roll #1190

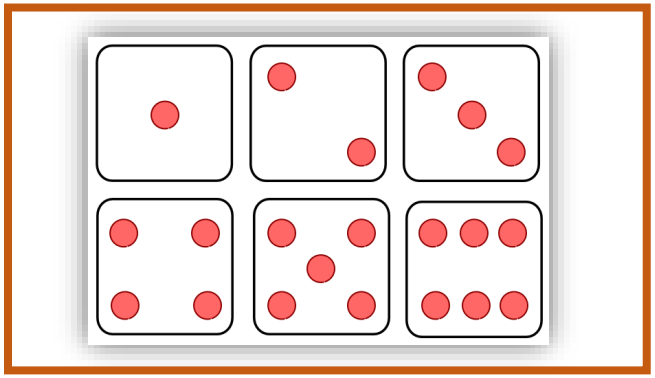
(1)	1/6
(2)	1/6
(3)	1/6
(4)	1/6
(5)	1/6
(6)	1/6

1.00

Each outcome has one-sixth likelihood.



(3/9) – Two Random Events, Taken Together



Dice Roll #1190

Coin Flip #303

	(1)	(2)	(3)	(4)	(5)	(6)	"margin"
H	1/12	1/12	1/12	1/12	1/12	1/12	.50
T	1/12	1/12	1/12	1/12	1/12	1/12	.50
	1/6	1/6	1/6	1/6	1/6	1/6	1.00
						"margin"	

Rolling a two AND flipping a tails.

Rolling a two.

Flipping a tails.

(4/9) -- Conditional Probability Taught Quickly

282	Heads
283	Heads
284	Heads
285	Tails
286	Heads
287	Heads
288	Heads
289	Tails
290	Heads
291	Heads
292	Tails
293	Tails
294	Tails
295	Tails
296	Heads
297	Heads
298	Tails
299	Tails
300	Heads
301	Tails
302	Tails
303	[illegible]
304	Tails

Coin Flip #304

Coin Flip #305	H	T
H	.25	.25
T	.25	.25

Two coins.

Coin Flip #304

Coin Flip #304	H	T
H	?	?
T	?	?

The same event (#304 x #304) (not realistic)!

1	2	3	4	5	6
?	?	?	?	?	?
?	?	?	?	?	?
?	?	?	?	?	?
?	?	?	?	?	?
?	?	?	?	?	?
?	?	?	?	?	?

The same dice.

(5/9) -- Conditional Probability Taught Quickly

283	Heads
284	Heads
285	Tails
286	Heads
287	Heads
288	Heads
289	Tails
290	Heads
291	Heads
292	Tails
293	Tails
294	Tails
295	Tails
296	Heads
297	Heads
298	Tails
299	Tails
300	Heads
301	Tails
304	Tails

Coin Flip #305 \ Coin Flip #304	H	T
H	.25	.25
T	.25	.25

Two coins.

Coin Flip #304 \ Coin Flip #304	H	T
H	.50	0
T	0	.50

The same event (#304 x #304) (not realistic)!

1	2	3	4	5	6
?	?	?	?	?	?
?	?	?	?	?	?
?	?	?	?	?	?
?	?	?	?	?	?
?	?	?	?	?	?
?	?	?	?	?	?

The same dice.

(6/8) -- Conditional Probability Taught Quickly

Coin Flip #304

Coin Flip #305	H	T
H	.25	.25
T	.25	.25

Two coins.

Coin Flip #304

Coin Flip #304	H	T
H	.50	0
T	0	.50

The same event (#304 x #304) (not realistic)!

Dice Roll #4011

Dice Roll #4011	1	2	3	4	5	6
1	?	?	?	?	?	?
2	?	?	?	?	?	?
3	?	?	?	?	?	?
4	?	?	?	?	?	?
5	?	?	?	?	?	?
6	?	?	?	?	?	?

The same dice roll (again, unrealistic!).

(7/9) -- Conditional Probability Taught Quickly

Coin Flip #304

Coin Flip #305	H	T
H	.25	.25
T	.25	.25

Two coins.

Coin Flip #304

Coin Flip #304	H	T
H	.50	0
T	0	.50

The same event (#304 x #304) (not realistic)!

Dice Roll #4011

Dice Roll #4011	1	2	3	4	5	6
1	(1/6)	0	0	0	0	0
2	0	(1/6)	0	0	0	0
3	0	0	(1/6)	0	0	0
4	0	0	0	(1/6)	0	0
5	0	0	0	0	(1/6)	0
6	0	0	0	0	0	(1/6)

The same dice roll (again, unrealistic!).

(8/9) “Clumping” = Related

Coin Flip #304

Coin Flip #304	H	T
H	.50	0
T	0	.50

Will Candidate X be Elected?

Will American Voters Earn Higher Incomes?

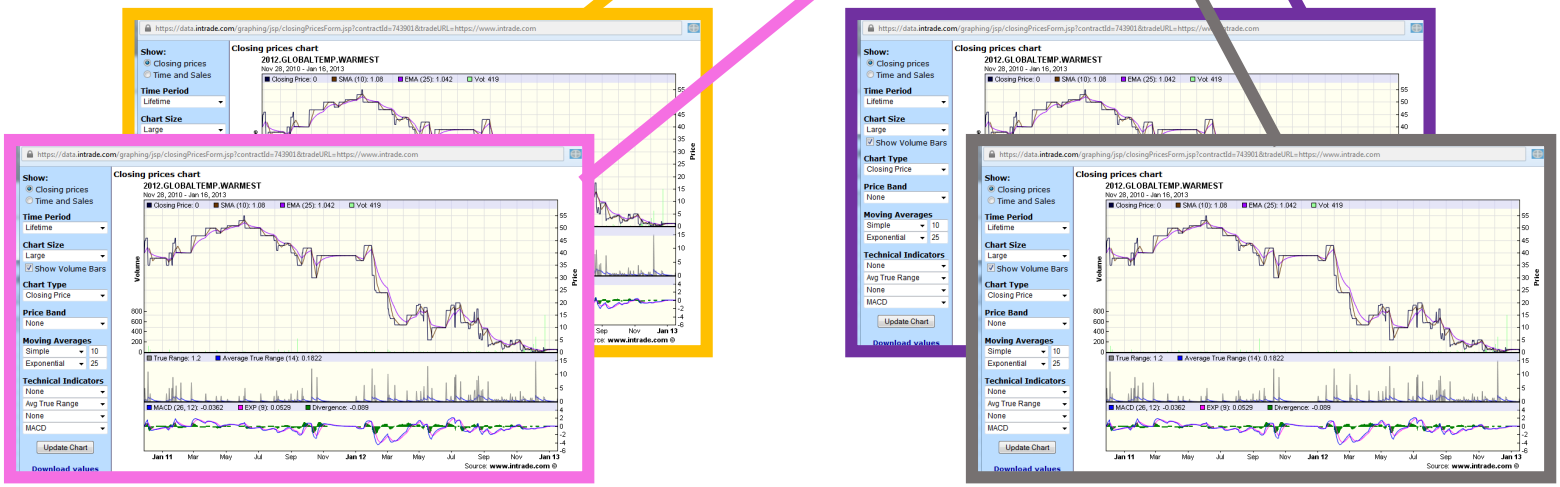
	Yes	No
Yes	.50	0
No	0	.50

(9/9) Synthesis – Just Four Different Event-Derivative Markets

Will Candidate X be Elected?

Will American Voters Earn Higher Incomes?

	Yes	No
Yes	.50	0
No	0	.50



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Basic Arithmetic

Nov 2020 Election Winner	"Good Economy" in 2021 (<5% Unemployment)? No	Yes		"Good Economy" (Conditional Likelihood)
Someone Else	0.0005	0.0005	0.001	50%
Democrat	.42	.19	.61	31%
Republican	.23	.15	.38	39%
Elon Musk	.00	.009	.009	100%
	.6505	.3495		

Voter Sees on Election Morning (For Example):

Average, over years 2020-2024…	Incumbent Party	Rival Party
Total Government Spending ($/person)	$12,568	$10,407 better
Total Money Earned by all Citizens ($ billions)	$16,427	$17,009 Slightly better
Total Deaths, all causes (thousands of people)	2,917	2,901 basically the same

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Why would laypeople check their phones on election day?

Photo from MIT.edu

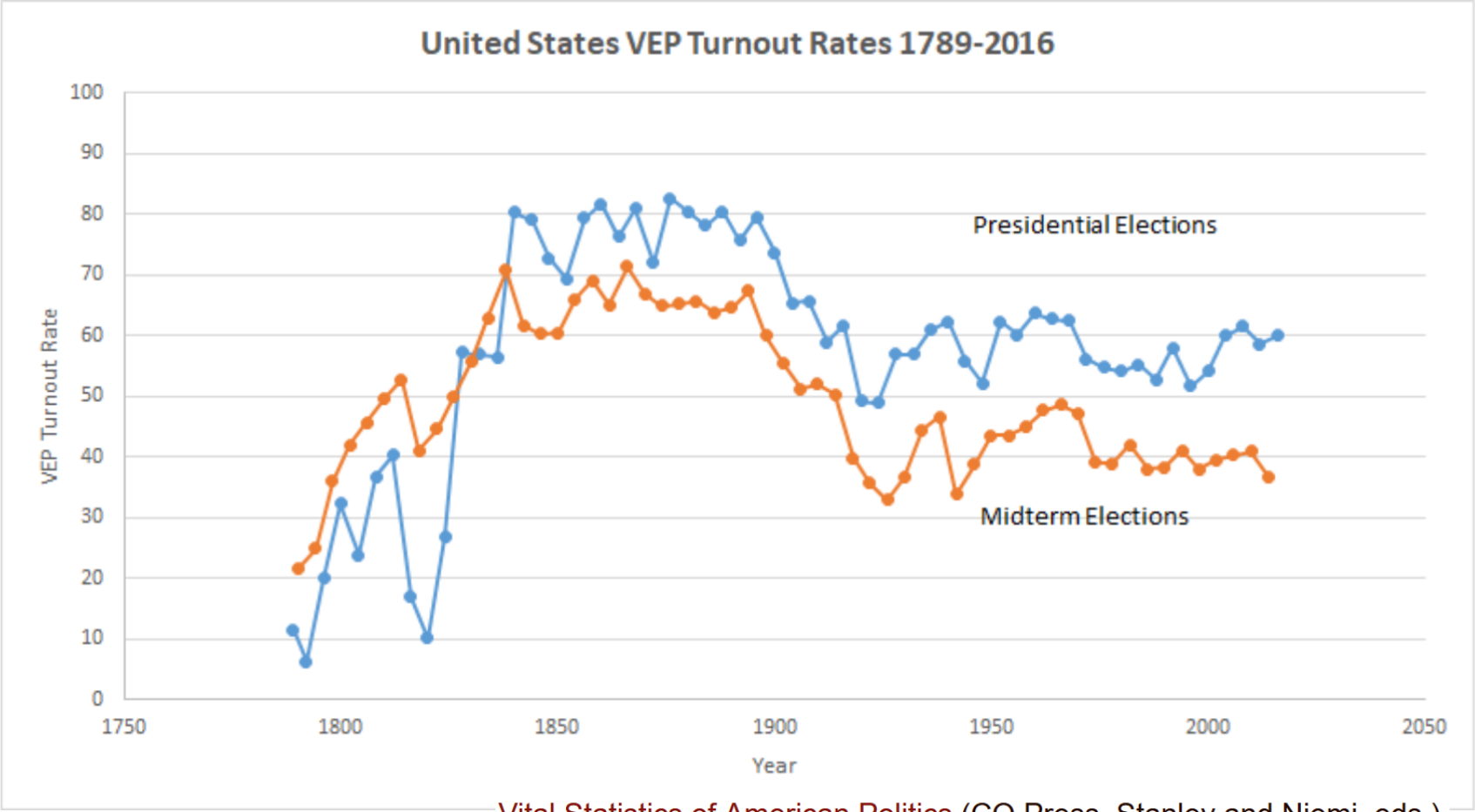
Why would laypeople check their phones on election day?

Photo from MIT.edu

Why navigate phone to these prices? Why not just ignore them (as usual)?

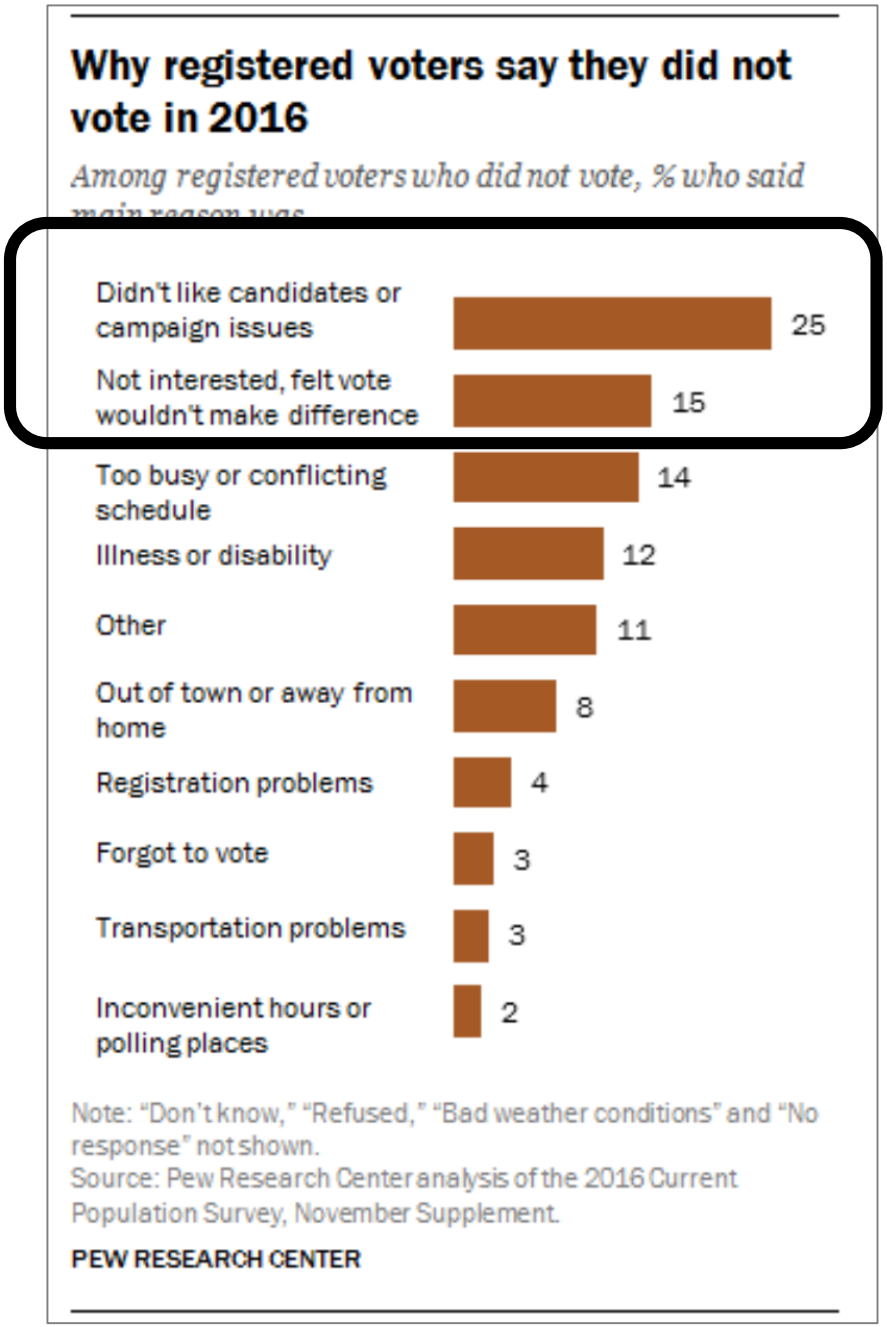
- Consider how **low the voter turnout rate** is. And how low the margins are. Task is actually quite easy.
- Event-derivative accuracy will remain high. People will gradually become more interested.
- Metrics that cannot be corrupted in the long term.

Low Voter Turnout

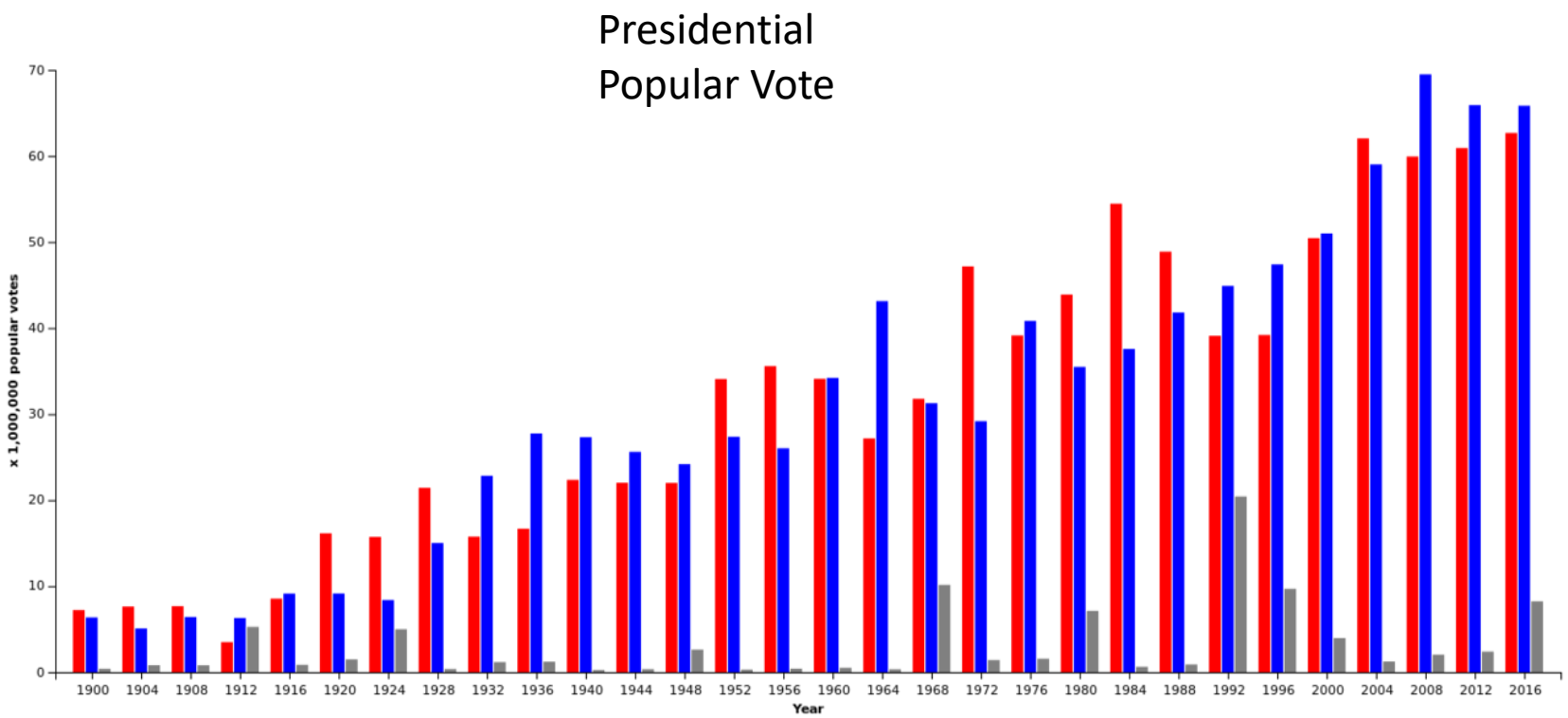


Vital Statistics of American Politics (CQ Press, Stanley and Niemi, eds.).

Why Turnout Low: Voters Admit Feeling Overwhelmed



Popular Vote – Victory Margins Are Very Narrow



Wikipedia Commons

Updated Nov 13, 2018

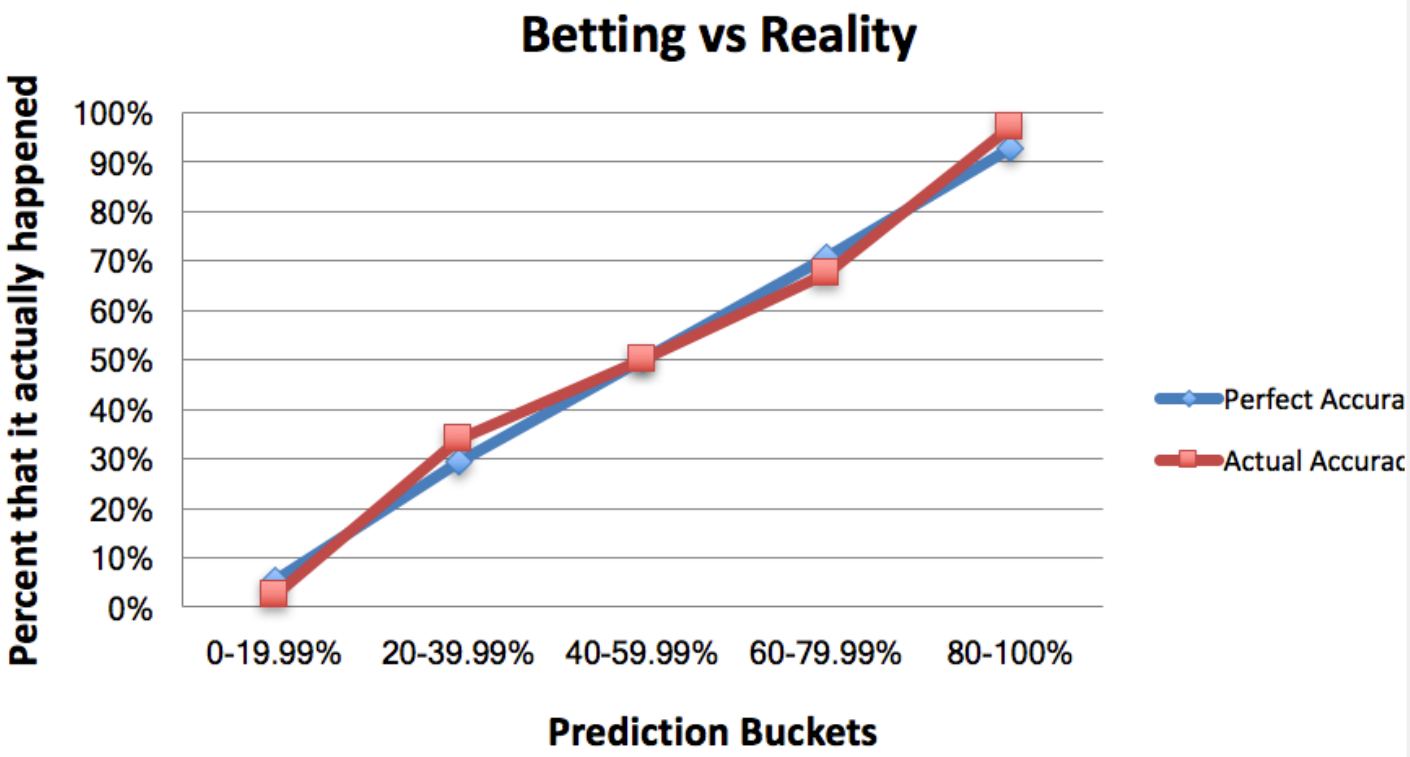
ElectionBettingOdds.com tracked some 462 different candidate chances across dozens of races and states in 2016 and 2018.

How accurate has this site been?

When a candidate favored by bettors loses, it's easy to fall into the trap of thinking the bettors were "wrong". But remember that when bettors give someone, for example, a 65% chance to win -- that also means the bettors give the person a 35% chance to *lose*.

The following graph shows how closely the betting tracked reality.

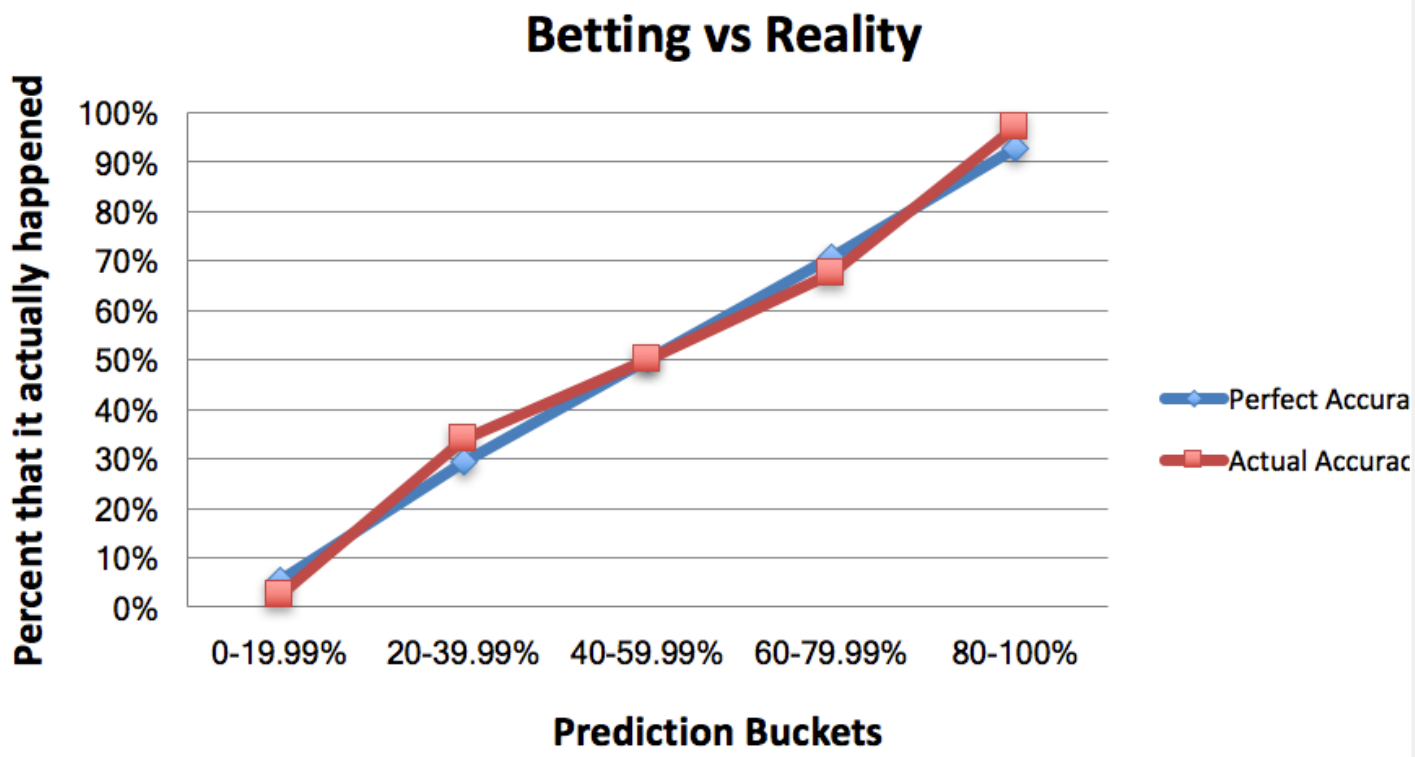
The blue line shows what predictions would look like if they were perfect. Where the red line differs from the blue line, the predictions were off somewhat:



Updated Nov 13, 2018

"Ramp it up" Lowbrow → Highbrow

- Sports (SuperBowl, March Madness)
- E-Sports
- Arts (Oscars, Tonys).



Last Slide:
Here, Politician Rhetoric Is Irrelevant

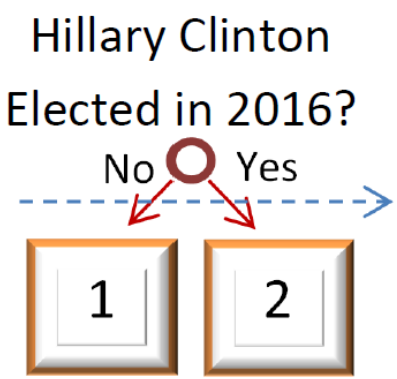
- As this idea becomes influential, politicians will start competing on these metrics.
- But in order for their numbers to go up, they'll need to actually ***hit*** the target in reality.

- For example: Politician could announce that they want everyone to die, and plan to kill everyone, but unless traders believe that the politician can follow through with this plan, the 'deaths' numbers won't budget an inch.
- Layperson already knows that politicians are liars. (Will prefer this.)

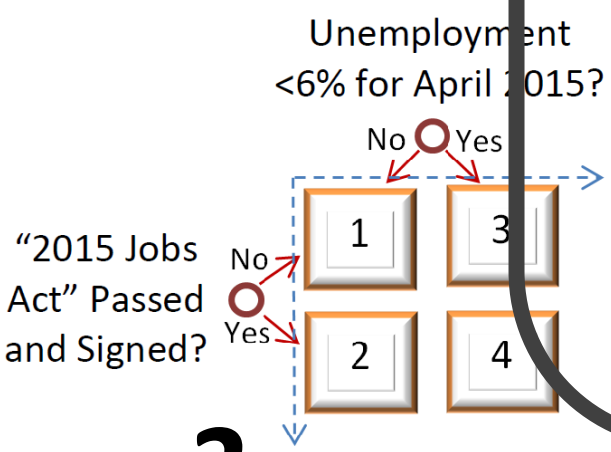
Thank You!

Questions?

Liquidity?



1



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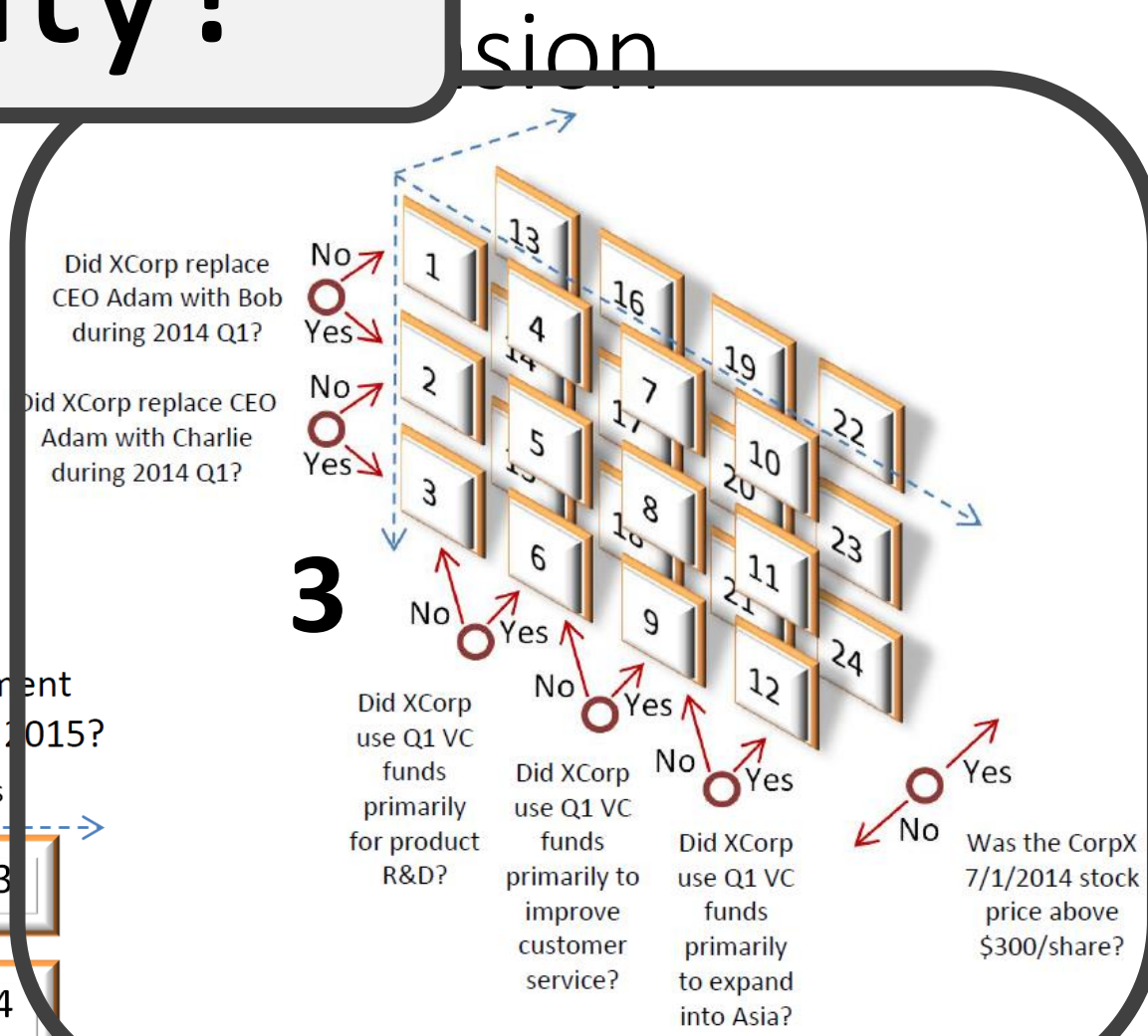


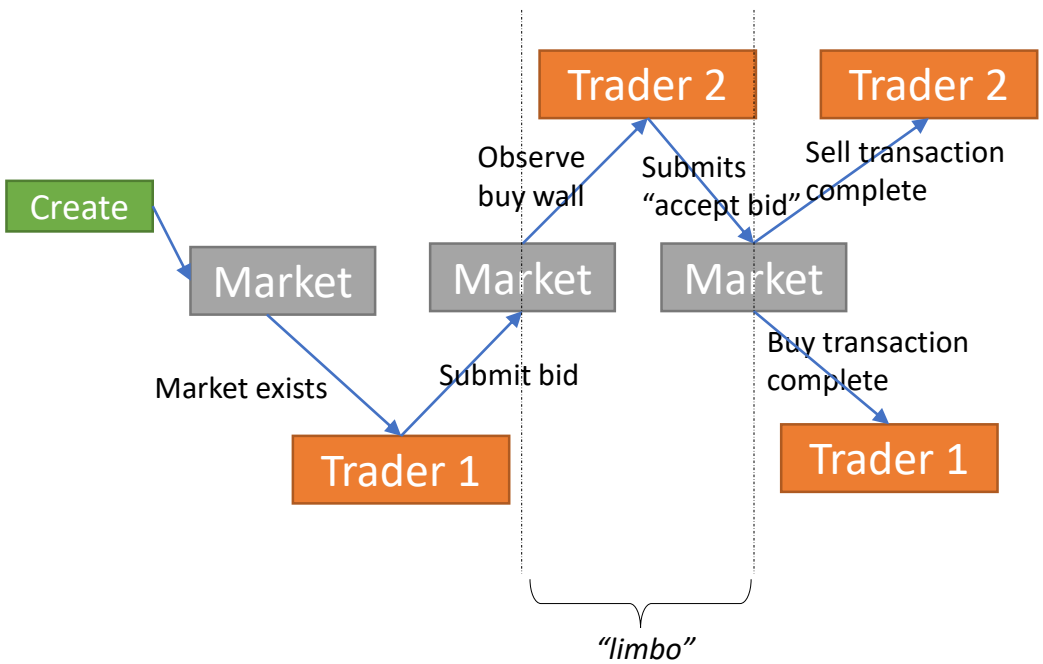
3

Too many assets (24?!)
Will people really buy/sell each?

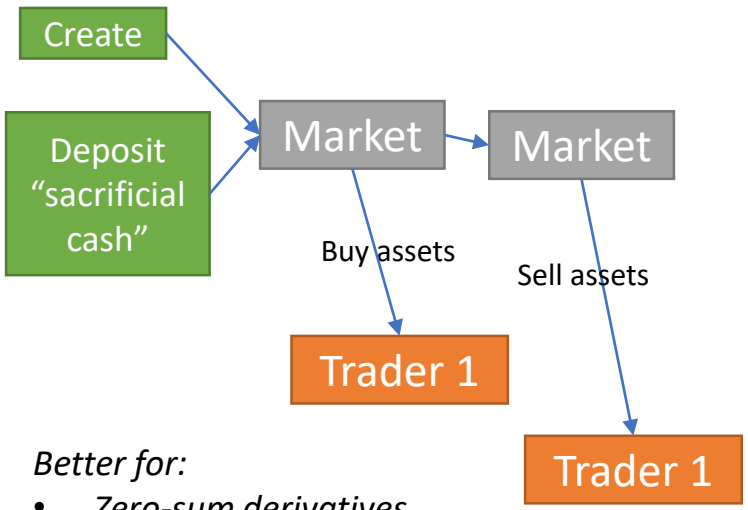
Permanent Liquidity (via MSR)

- No "offers" – Ie, No Bids/Asks.
- No interaction between buyer/seller.
  (Instead, traders interact w/ protocol.)
- No "limbo"

Usual Way
("Double Auction" Market)



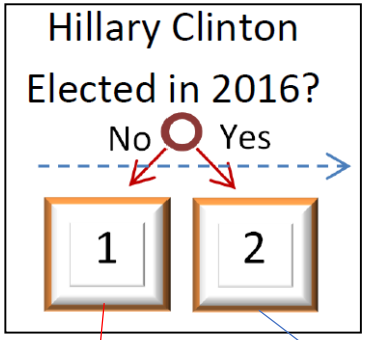
New Way
("Scoring Rule" Market)

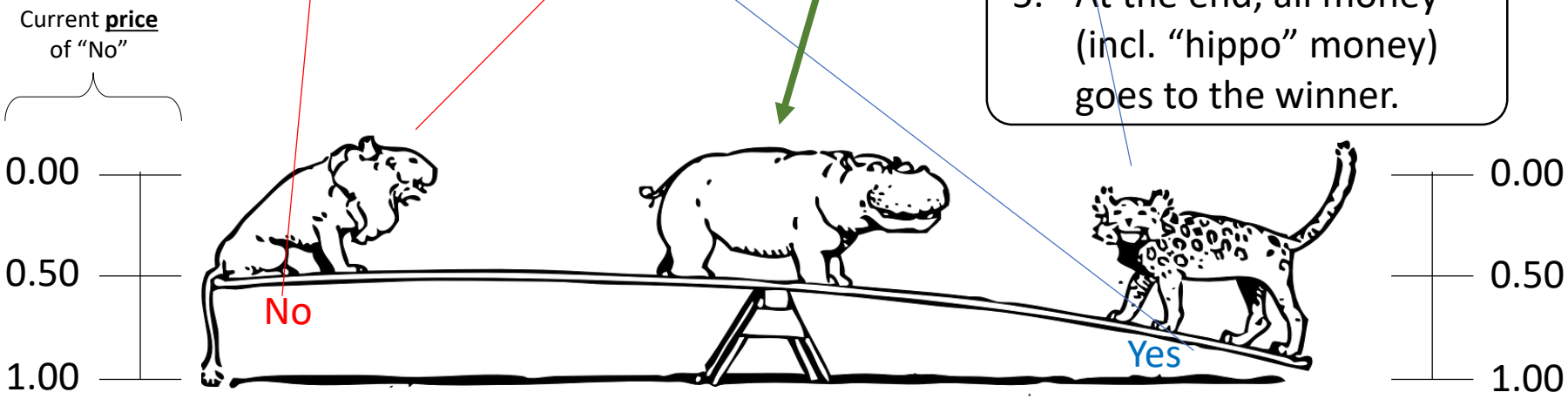


Better for:
- *Zero-sum derivatives*
- *Blockchains*

See-Saw Metaphor

1. Sacrificial 'startup' money placed in center.
2. Trader buys shares (of "no", by putting money on left side).
3. Trader buys shares (of "yes" by putting money on right side).
4. Traders sell by depositing shares and removing money from the see-saw.
5. At the end, all money (incl. "hippo" money) goes to the winner.





Thanks pixabay for free images.

Permanent Liquidity

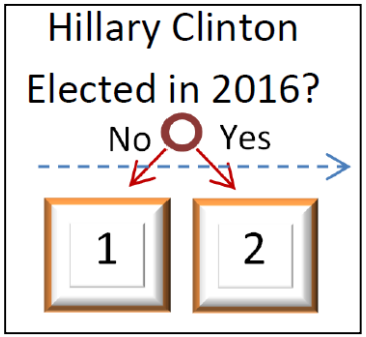
No "offers" – Ie, No Bids/Asks.
No interaction between buyer/seller.
Instead, traders interact w/ protocol.

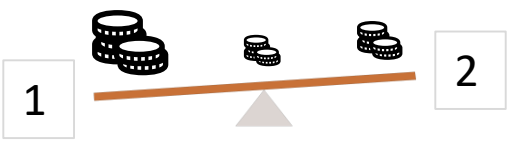
Flow of Time

	Shares Outstanding		LMSR (Market Account)	Update Cost (User Pays)	Interpretation
Time	a=0	a=1	0		
1	0	0	4.8520	4.852030	
2	1	0	5.3699	0.517842	Bought 1 Shar
3	1	6	8.7893	3.419407	Bought 6 Shar
4	18	6	19.1591	10.369869	Bought 17 Sha
5	18	18	22.8520	3.692882	Bought 12 Sha
6	32	18	32.8885	10.036466	Bought 14 Sha
7	32	30	35.9232	3.034721	Bought 12 Sha
8	39	30	40.7086	4.785379	Bought 7 Shar
9	39	43	46.1339	5.425344	Bought 13 Sha
10	57	43	57.8885	11.754556	Bought 18 Sha
11	57	61	64.1339	6.245444	Bought 18 Sha
12	61	61	65.8520	1.718090	Bought 4 Shar
13	61	40	61.3401	-4.511919	Sold 21 Share
14	42	40	45.9232	-15.416894	Sold 19 Share
15	42	9	42.0625	-3.860733	Sold 31 Share
16	42	4	42.0307	-0.031826	Sold 5 Shares
End	42	4	42.0307	Account Balance	Market resolv
			42.0000	Redemptions	Individuals re

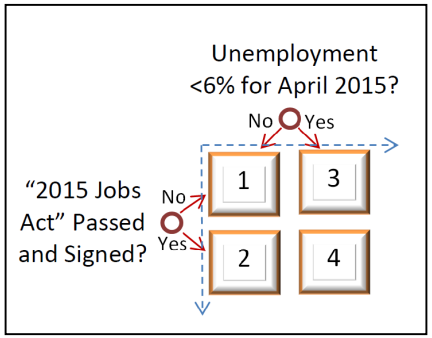
Full collateralization.

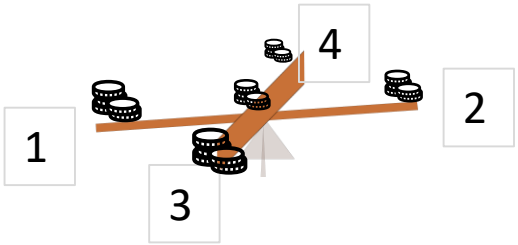
See-Saw → Tray



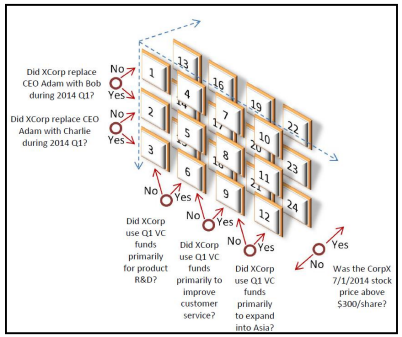


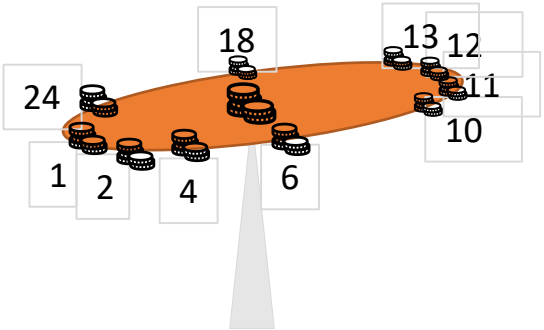
2 states





4 states





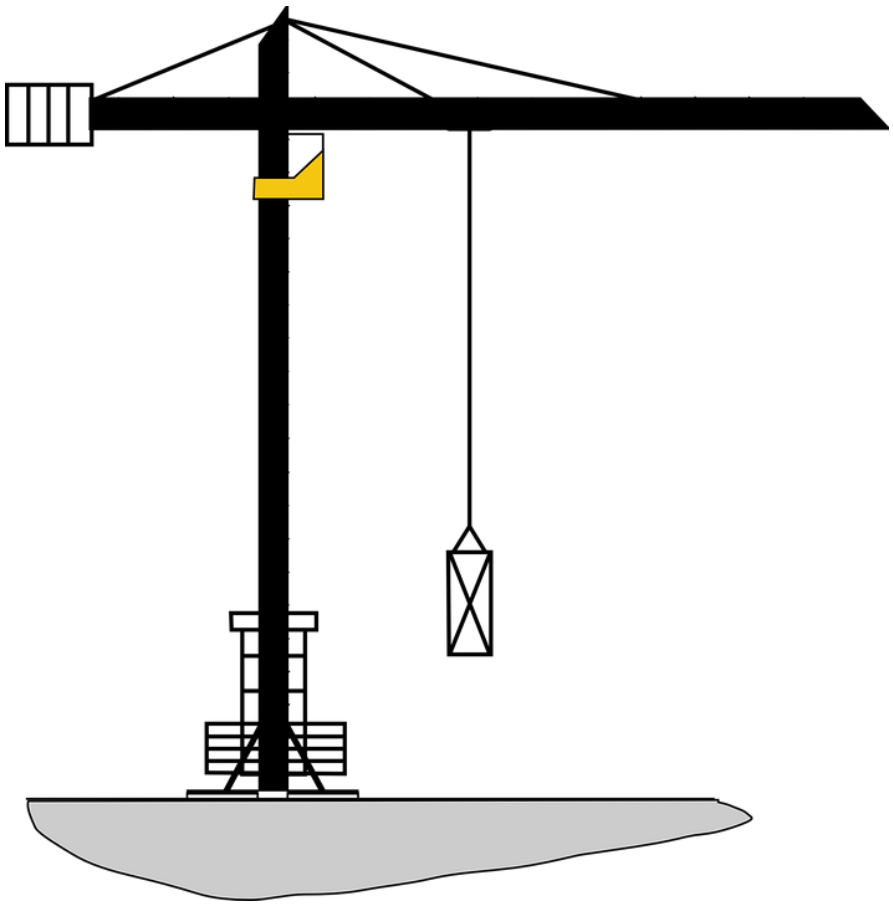
n states

- In general, the liberty movement struggles with being persuasive. But, we do have a disproportionate number of wealthy people, and/or people who are just good with money. Good savers.
- Way to turn money → healthier, more liquid, more popular market, more fun market. → more accuracy.
- Credibility bolster by the objective fact that contributions do not endorse any single outcome at the expense of others.
- Appealing to Third-Parties … usual suspects (virtue signalers / people who think they are right).
- How much is donated to other projects?
  - Annenberg "FactCheck.org" roughly 1 million per year.

- Skyhooks
  - Persuasion
  - Switching Voting
  - Some kind of (one-time) revolution

Crane. Not Skyhook

Crane



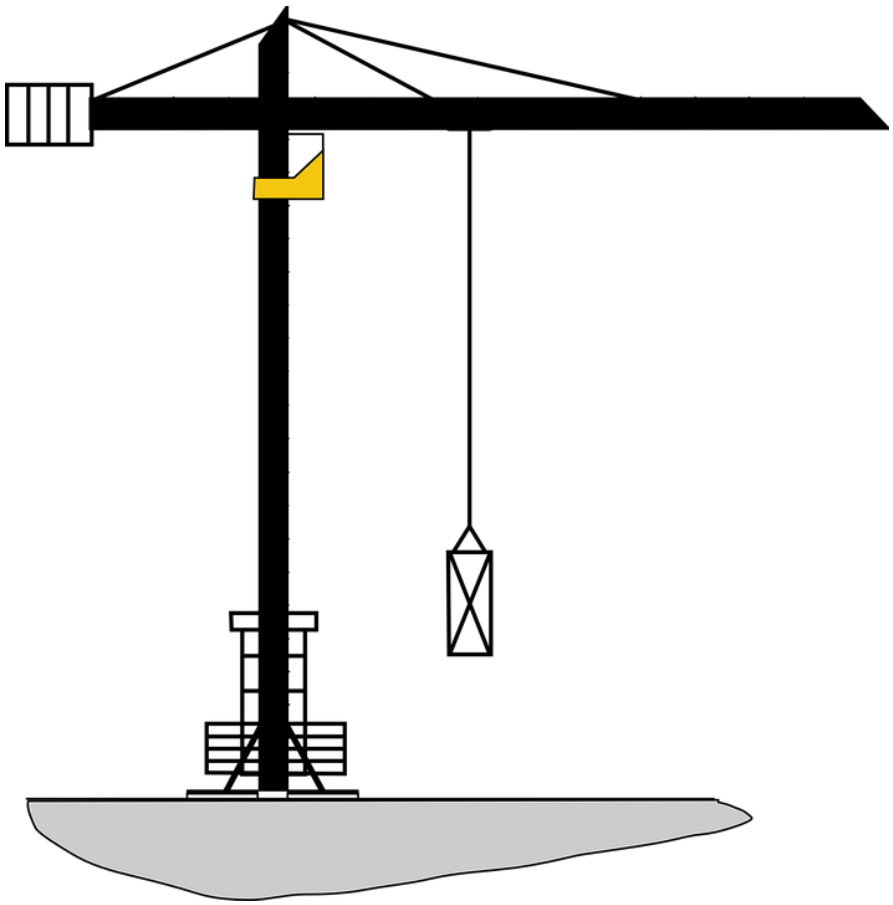
Lift via: Physics
Xfers weight to different part of ground.

Skyhook

Lift via: Magic
Unexplained force.

Crane. Not Skyhook

Crane



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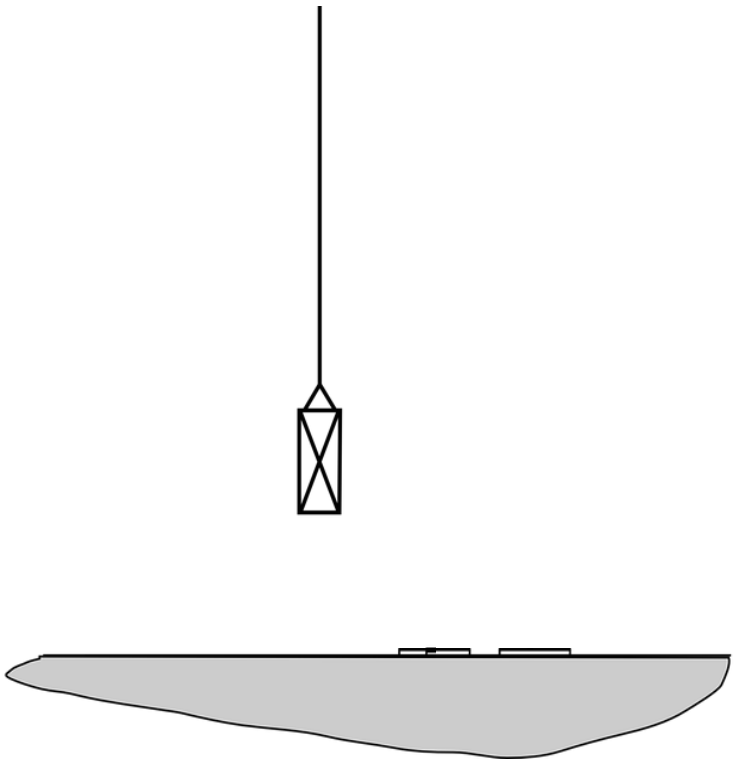

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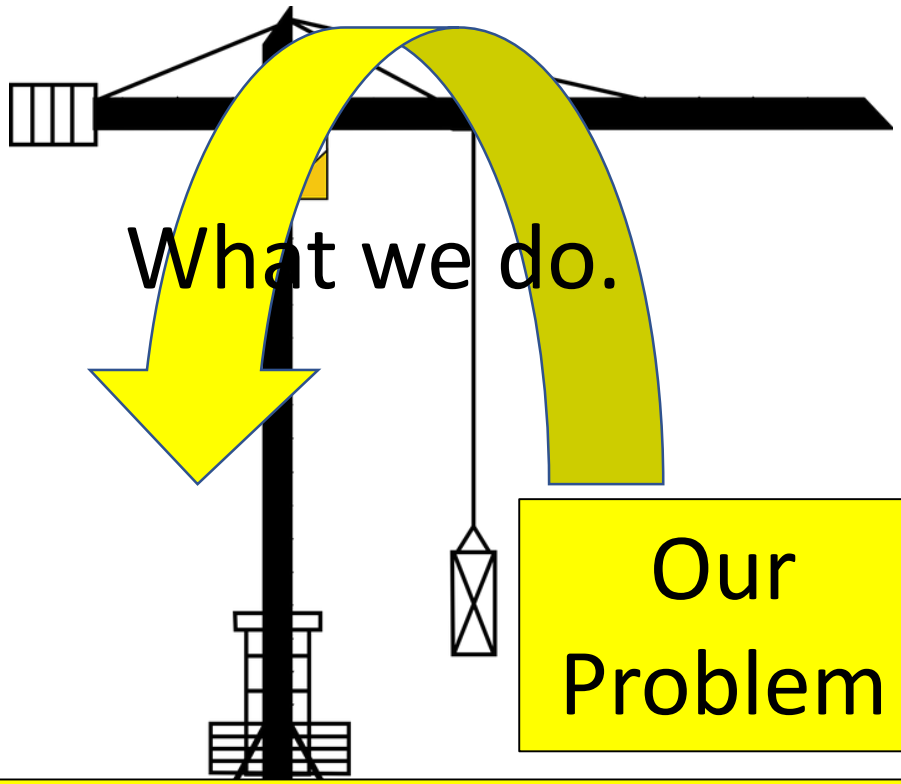
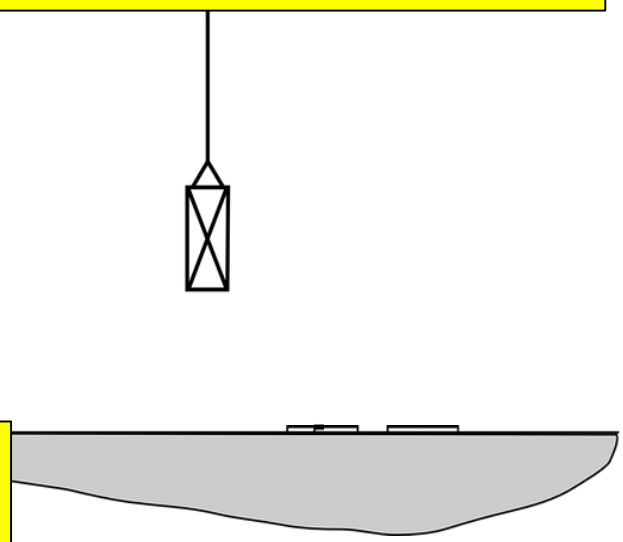
Crane



Our Problem

Things other people do.

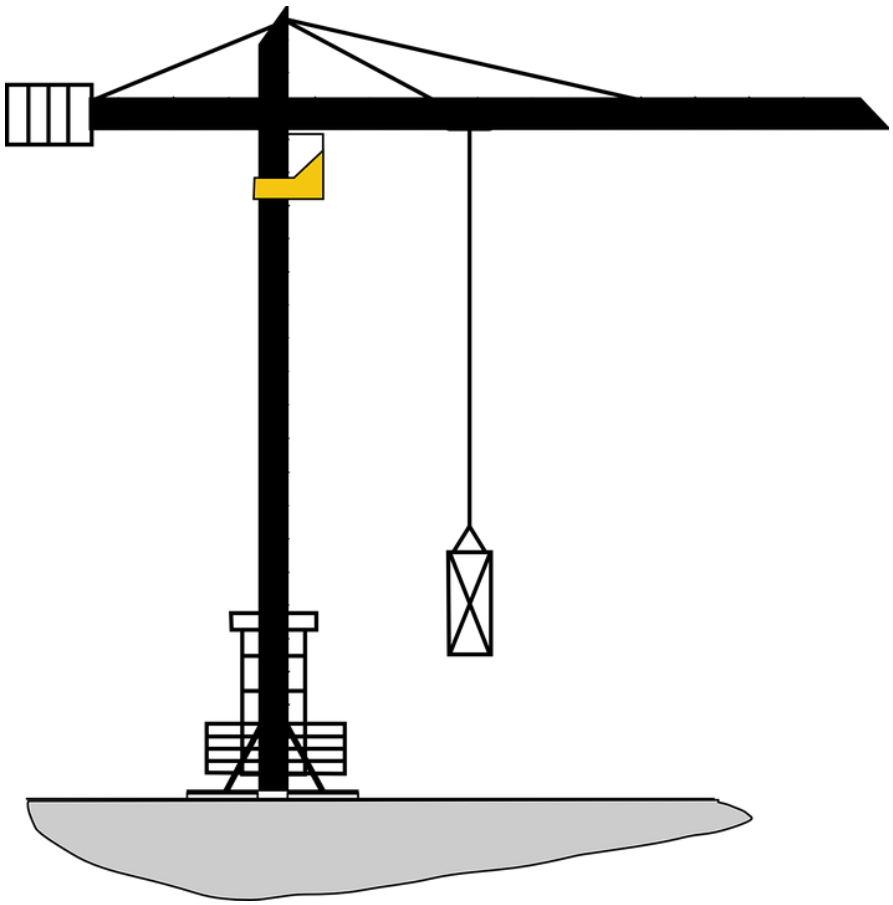
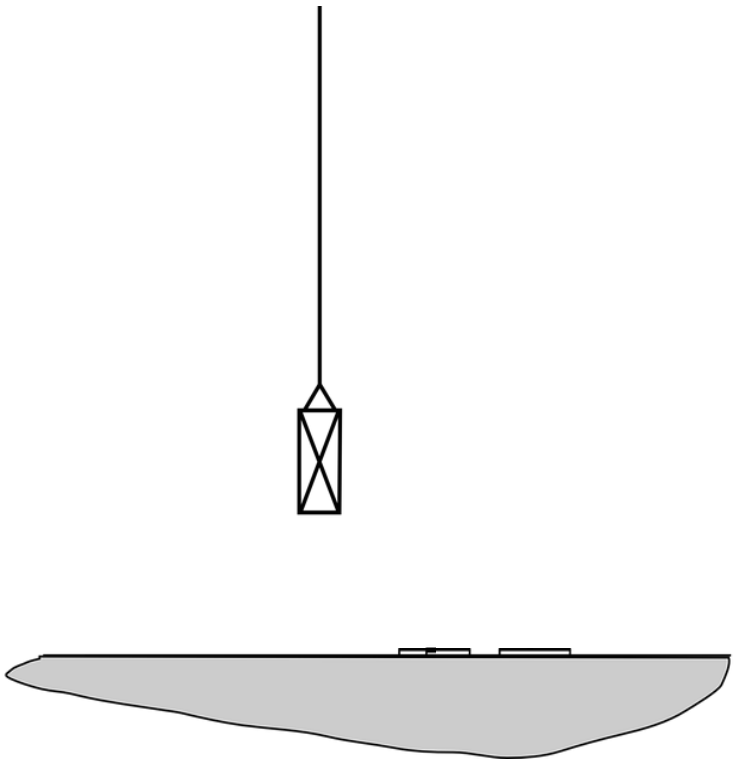
(Actually they wont do them.)



Everything that needs to change, we can do unilaterally.

Lift via: Magic
Unexplained force.

Crane



Skyhook