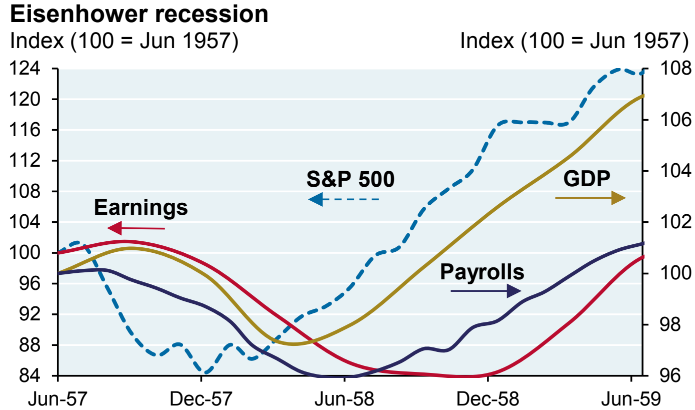
Reruns: how equity declines precede the fall in earnings, growth and employment during recessions; new US semiconductor export policies on China and the clash of empires; and another press article extolling the renewable energy virtues of a country with little relevance for anyone else

Reruns. When bear markets occur and the investment mistakes of the prior cycle are revealed, bearish investment commentary tends to intensify. There is a confessional, self-flagellating quality to some of this research, as if its authors are trying to atone for having missed the signals and risks during the prior boom. I read around 1,500 pages of research each week and the most consistent message now is a litany of gloom on earnings, valuations, wage and price inflation, Central Bank policy normalization, housing, trade, energy, the surge in the US$, China COVID policy, etc. I am not saying that these things are not important, since of course they are (see Appendix charts). But for investors, there is a remarkable consistency to the patterns shown below: **equities tend to bottom several months (at least) before the rest of the victims of a recession.**

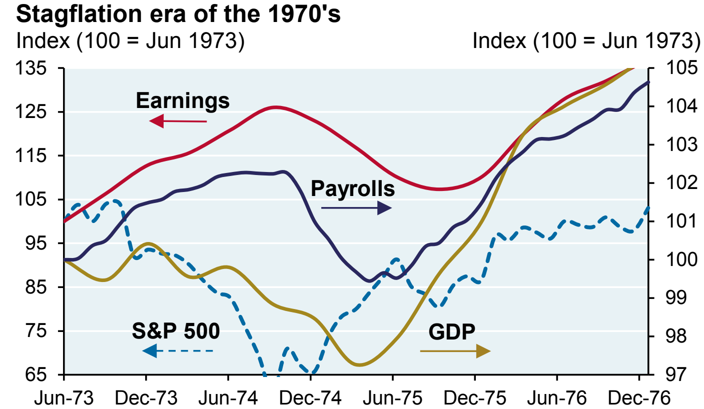
Let's start with the Eisenhower recession, which is notable for the lack of monetary and fiscal stimulus deployed in what at the time was a pretty severe recession. Equities bottomed in December 1957, while earnings did not bottom until a year later. GDP and payrolls also didn't start to improve until the middle of 1958. You will see the same pattern during the 1970's stagflation, the 1980's double dip recession, the S&L crisis of the 1990's, the Global Financial Crisis and the COVID pandemic.

Eisenhower recession



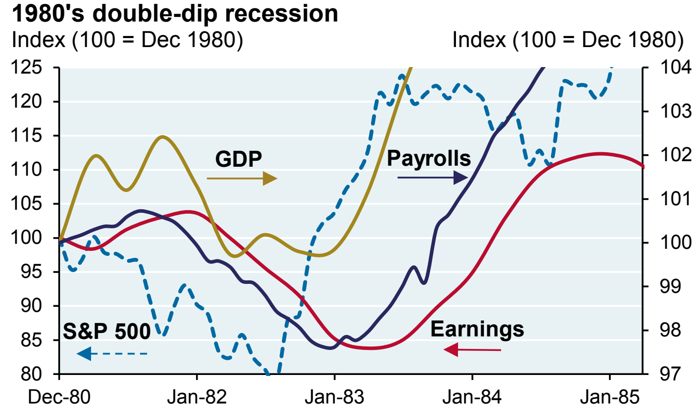
Source: BEA, Bloomberg, Robert J. Schiller, JPMAM. 2022. Note: Earnings is represented by S&P 500 EPS rolling 4Q avg.

Stagflation era of the 1970's



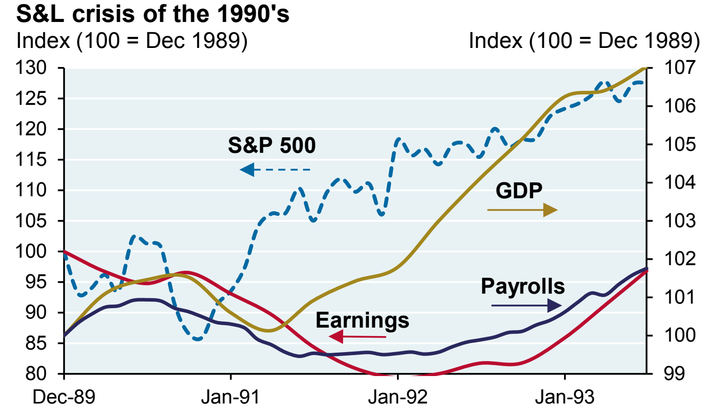
Source: BEA, Bloomberg, Robert J. Schiller, JPMAM. 2022. Note: Earnings is represented by S&P 500 EPS rolling 4Q avg.

1980's double-dip recession



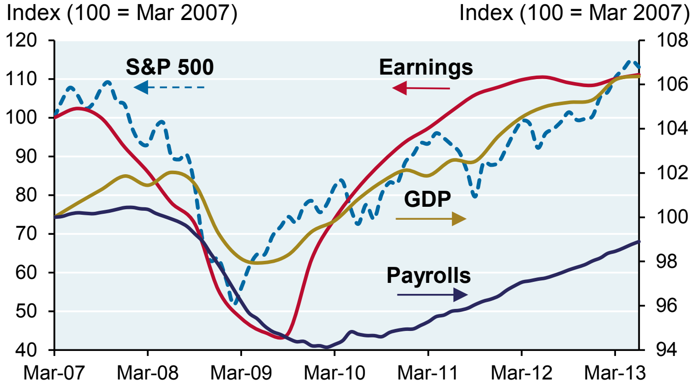
Source: BEA, Bloomberg, Robert J. Schiller, JPMAM. 2022. Note: Earnings is represented by S&P 500 EPS rolling 4Q avg.

S&L crisis of the 1990's



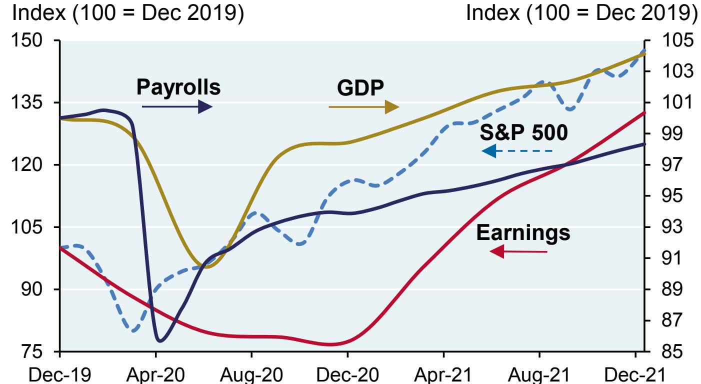
Source: BEA, Bloomberg, S&P Dow Jones, JPMAM. 2022. Note: Earnings is represented by S&P 500 EPS rolling 4Q avg.

Global financial crisis



Source: BEA, Bloomberg, S&P Dow Jones, JPMAM. 2022. Note: Earnings is represented by S&P 500 EPS rolling 4Q avg.

Global COVID pandemic

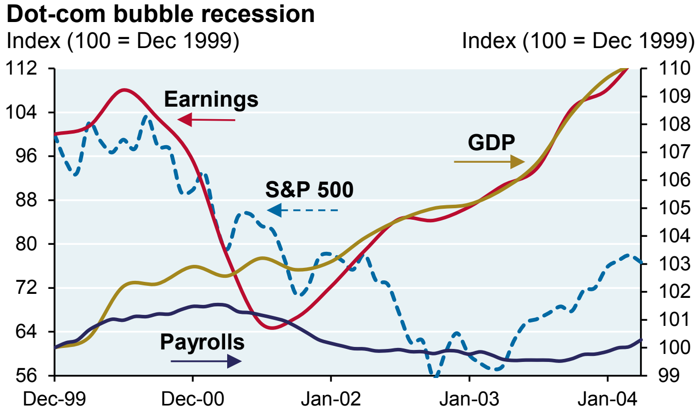


Source: BEA, Bloomberg, S&P Dow Jones, JPMAM. 2022. Note: Earnings is represented by S&P 500 EPS rolling 4Q avg.

The Dotcom collapse is the outlier: the earnings decline *preceded* the equity market decline, there was barely a recession at all, and the mini-recession of 0.3% preceded the equity market bottom by more than a year.

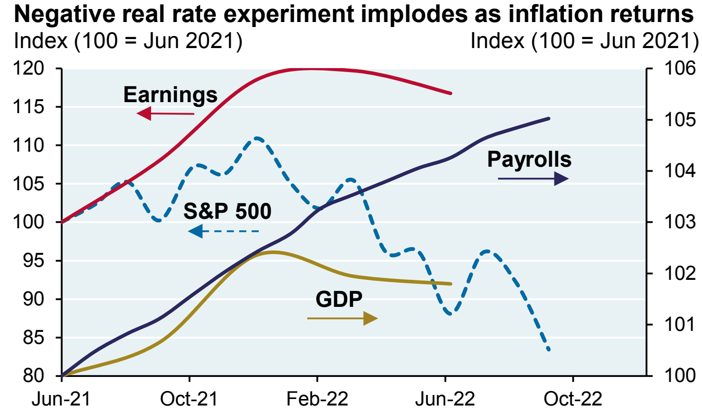
As for the latest bear market, it appears on the right. **I see no reason why this cycle will not end up looking like most of the other ones.** If so, the bottom in equities will occur even as news on profits, GDP and payrolls continues to get worse. When will that be? We will be watching the ISM manufacturing survey very closely. It has a good track record of roughly coinciding with equity market bottoms, as shown in the table. I would consider 3200-3300 on the S&P 500 index good value for long term investors, if such levels were reached sometime this fall/winter.

Dot-com bubble recession



Source: BEA, Bloomberg, S&P Dow Jones, JPMAM. 2022. Note: Earnings is represented by S&P 500 EPS rolling 4Q avg.

Negative real rate experiment implodes as inflation returns



Source: BEA, Bloomberg, S&P Dow Jones, JPMAM. 2022. Note: Earnings is represented by S&P 500 EPS rolling 4Q avg.

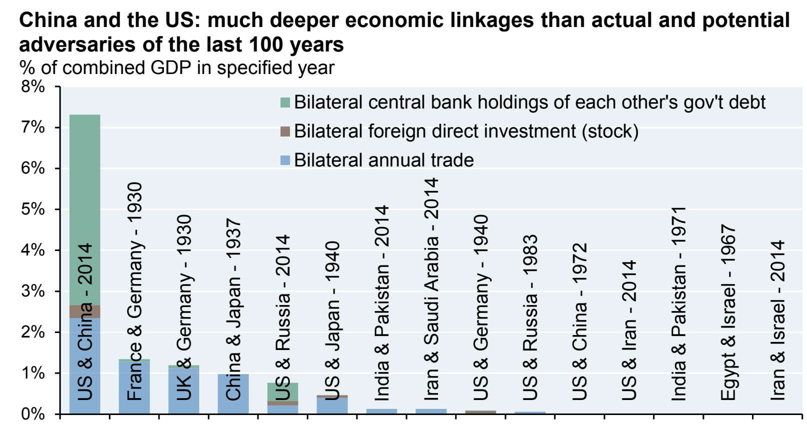
Equity market vs ISM manufacturing bottom

Recession	Equity market bottom	ISM Manufacturing bottom	Months in between
Eisenhower	12/31/1957	1/31/1958	+1
Stagflation era of the 1970's	9/30/1974	1/31/1975	+4
1980's double-dip recession	7/31/1982	5/31/1982	-2
S&L crisis of the 1990's	10/31/1990	1/31/1991	+3
Dot-com bubble	9/30/2002	10/31/2001	-11
Global financial crisis	2/28/2009	12/31/2008	-2
Global COVID pandemic	3/31/2020	4/30/2020	+1

Source: Bloomberg, JPMAM. 2022.

Thucydides Trap update: US semiconductor policy on China deepens the rift

In May 2018, I published the chart below on economic ties between the US and China as a counterpoint to Graham Allison's "Thucydides Trap" book. Allison's work analyzed rising empires competing for power with incumbents. By Allison's account, in 12 of 16 historical examples, competing empires ended up in military conflict, and Allison sees the US-China relationship as a rerun of these precedents. My chart was meant to highlight the unique economic ties between the US and China when compared to historical adversaries. As things stand now, certain fragments of the US-China relationship support my thesis: US imports from China in 2021 reached $540 billion (close to the pre-trade war peak in 2018), and China still holds ~$1 trillion of US Treasuries and Agencies. However, the latest developments on US semiconductor policy do not support it, and represent the most comprehensive change in US-China trade policy in decades.



Source: JPMAM, UNCTAD, World Bank, UN, US Treasury, Baribieri/Keshk COW Trade data, US Trade Repr. Office, Setser (CFR), Bank of England, St. Louis Fed, Eichengreen (Berkeley), Howson (Princeton), East-West Center, O'Neil (CNA), Ritschl (LSE), Accominotti (LSE), Wilkins (FIU), Villa (CEPII). 2016.

The Trump administration took steps against ZTE and Huawei but left open the possibility of future engagement, perhaps in exchange for Chinese cooperation in other geopolitical areas. **The latest moves by the Biden administration appear to close those doors, and for a very long time**. A summary of the latest US actions[1]:

- The new semiconductor policies focus on four areas in which the US has a current strategic advantage over China: AI chip designs, electronic design automation software, semiconductor manufacturing equipment and related equipment components
- **There are four interlocking elements of the new policy**: (1) impede China's AI industry by restricting access to high-end AI chips; (2) block China from designing AI chips domestically by cutting off China's access to US-made chip design software; (3) block China from manufacturing advanced chips by cutting off access to US-built semiconductor manufacturing equipment; and (4) block China from domestically producing semiconductor manufacturing equipment by cutting off access to US-built components
- China's fusion of military and civil activities make it difficult to target the former without affecting the latter (prior bans on the sale of high-end Intel Xeon chips to China's military didn't work, since shell companies reportedly acted as an intermediary; Chinas military is reportedly still actively using US chip technology[2])
- The new policy: high-end AI chips can no longer be sold to any entity operating in China, whether that is the Chinese military, a Chinese tech company or a US company operating a data center in China. The new rules set a performance standard of what kind of chips can be sold; anything above that level requires an export license from the Dep't of Commerce which may be subject to "presumption of denial"

[1] "*Choking Off China's Access to the Future of AI*", Gregory Allen, Director, AI Governance Project and Senior Fellow, Strategic Technologies Program, Center for Strategic and International Studies, October 11, 2022

[2] "*Managing the Chinese Military's Access to AI Chips*", June 2022, Center for Security and Emerging Technology

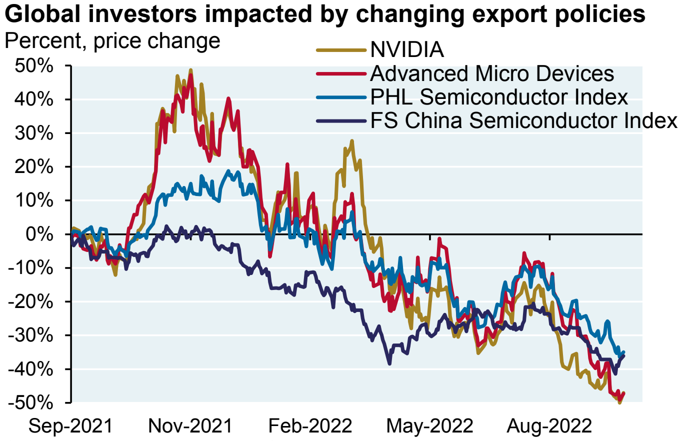
- The US is invoking something called the "foreign direct product rule". The best way to explain it is to give an example of how it works. **Any chip manufacturing operation anywhere in the world that seeks to build high end Chinese chip designs will risk losing its access to US semiconductor manufacturing equipment**. As a result, Chinese chip design companies will not be able to outsource manufacturing abroad for advanced AI and supercomputing chips, and for the 28 Chinese organizations on the BIS Entity List, they will be blocked from outsourcing the manufacturing of any types of chips at all. [Note: Almost every advanced semiconductor fabrication facility in the world is critically dependent on US technology companies for initial purchase and ongoing onsite advice, troubleshooting and repair]
- New licensing requirements for logic chip equipment sales for chips at 16 nanometers (nm) or less ends up blocking the sale of equipment to China that is several years old and already in use. For DRAM (short term memory) the limit will be 18 nm, and for NAND (long term memory) the limits are 128 layers and higher. Translating the semiconductor jargon: the new policies threaten the viability of some of China's largest memory chip companies (some of whom have been hoarding as much US made equipment as they can)
- These policies also require all "US persons" (citizens, residents and green card holders) to obtain a license to continue working on development, production or use of integrated circuits at certain Chinese semiconductor facilities

The scale and scope of these restrictions appear to be unprecedented. While they only apply to a subset of high performance AI-related chips now (such as those sold by NVIDIA which accounts for 95% of AI chip sales in China), the new chip performance benchmarks are being held constant. **In other words, over time, more of the semiconductor market will be subject to these restrictions.** These new policies complement the recently passed CHIPS Act and its $52 billion for US semiconductor research, manufacturing and workforce development.

What might happen now? US National Security Advisor Jake Sullivan gave a speech last month that suggests that this may not be a one-time thing[3]: "Earlier this year, the United States and our allies and partners levied on Russia the most stringent technology restrictions ever imposed on a major economy. These measures have inflicted tremendous costs, forcing Russia to use chips from dishwashers in its military equipment. **This has demonstrated that technology export controls can be more than just a preventative tool. If implemented in a way that is robust, durable, and comprehensive, they can be a new strategic asset in the US and allied toolkit to impose costs on adversaries, and even over time degrade their battlefield capabilities**".

Next up: possible restrictions on US entities investing in Chinese technology companies as the focus shifts from the transfer of technology to the transfer of capital[4].

Global investors impacted by changing export policies



Source: Bloomberg, JPMAM. October 17, 2022.

[3] "*Remarks by National Security Advisor Jake Sullivan at the Special Competitive Studies Project Global Emerging Technologies Summit*", September 16, 2022

[4] "*White House Weighs Order to Screen US Investment in Tech in China*", WSJ, September 8, 2022

The Pitcairn Problem: the limited relevance of most small countries with high shares of renewable energy

More reruns: yet another article on tiny countries with high shares of renewable power generation as paragons of the future that are "leading the way" on sustainability without any mention of the factors that limit their relevance for larger developed and developing economies. The latest piece is on Uruguay, from the New York Times[5]. What's missing is the broader context of how to understand Uruguay, Iceland, Norway, Costa Rica and other "Pitcairn" examples[6].

- Such countries generally have small shares of global GDP, small populations and lower population density. Low density countries face fewer challenges in terms of siting low density wind and solar power
- They tend to be much smaller in terms of land area, an important consideration when thinking about the cost of transmission investment to load centers required for onshore and offshore wind, and solar power
- They often have lower economic complexity (a measure of a country's ability to produce a wide range of complex products across industries), which requires less developed energy systems
- Most have abundant hydroelectric resources which contribute the lion's share of electricity generation. Developed countries have already built out most of their suitable hydroelectric resources
- Some have unique geothermal resources (Iceland, Costa Rica, New Zealand), or sugarcane-based biomass whose energy return on investment ("EROI") is 7x higher than corn-based ethanol (Guatemala and Uruguay)
- Uruguay is interesting in its use of biomass for backup power when wind conditions are low, and in this regard it shares a lot in common with Denmark, another small country with excellent coastal wind resources (40% capacity factors, similar to Uruguay) that uses biomass (manure, wood waste, energy crops and industrial feedstock) as a replacement for thermal power. Both small countries also benefit from proximity to much larger ones for grid stabilization services (Uruguay and Brazil, Denmark and Germany)

The combination of these attributes generally makes the Pitcairn group of countries much less relevant for larger, industrialized, urbanized countries. Most of the latter are pursuing a renewable future based more on wind and solar power, which requires raw materials, project siting, transmission investment and plenty of backup thermal power. More on all of this in next year's energy paper.

Energy profiles	high renewable share countries								large developed countries							large developing countries						
	Uruguay	Iceland	Costa Rica	Norway	New Zealand	Mozambique	Denmark	Nepal	US	Germany	Japan	Italy	Spain	Canada	United Kingdom	China	India	Mexico	Brazil	Russian Federation	Indonesia	South Korea
Primary energy per capita (GJ/cap)	63	612	44	378	165	14	115	21	280	152	141	107	117	364	107	109	25	52	59	215	30	245
CO2 emissions per capita (tCO2/cap.)	1.8	5.0	1.6	6.2	6.4	0.2	4.8	0.5	13.9	7.5	8.5	5.3	5.2	13.8	5.0	7.4	1.8	2.9	2.0	10.9	2.1	11.6
Electricity per capita (TWh/cap.)	3.9	56.3	2.3	28.5	9.2	0.2	5.0	0.2	12.9	6.8	8.0	4.6	5.6	17.3	4.5	5.4	1.2	2.6	2.9	7.0	1.0	11.3
Electricity generation																						
Hydroelectric	30%	69%	71%	92%	54%	87%	0%	100%	7%	4%	9%	18%	13%	59%	2%	17%	10%	8%	64%	21%	7%	1%
Wind	40%	0%	12%	6%	5%	0%	57%	0%	8%	23%	1%	7%	21%	5%	25%	6%	4%	6%	9%	0%	0%	1%
Solar	3%	0%	1%	0%	0%	0%	4%	0%	3%	8%	8%	9%	8%	1%	4%	3%	3%	4%	2%	0%	0%	3%
Biomass	20%	0%	2%	0%	2%	1%	21%	0%	1%	9%	3%	7%	2%	2%	13%	1%	1%	1%	9%	0%	0%	1%
Geothermal	0%	31%	14%	0%	19%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	1%	0%	0%	6%	0%
Total renewable share	**94%**	**100%**	**100%**	**98%**	**80%**	**88%**	**82%**	**100%**	**20%**	**45%**	**20%**	**42%**	**45%**	**67%**	**44%**	**28%**	**18%**	**20%**	**84%**	**21%**	**13%**	**6%**
Nuclear	0%	0%	0%	0%	0%	0%	0%	0%	19%	11%	4%	0%	22%	15%	16%	5%	3%	3%	2%	21%	0%	28%
Natural gas	0%	0%	0%	1%	14%	12%	4%	0%	39%	17%	39%	48%	26%	11%	36%	3%	5%	64%	9%	40%	19%	28%
Coal	0%	0%	0%	0%	5%	0%	11%	0%	20%	25%	31%	5%	2%	6%	2%	60%	74%	3%	2%	16%	66%	36%
Oil	6%	0%	0%	0%	0%	0%	1%	0%	1%	1%	3%	4%	4%	1%	0%	0%	0%	9%	2%	1%	2%	1%
Share of global gdp	0.1%	0.0%	0.1%	0.5%	0.3%	0.0%	0.4%	0.0%	24%	4%	5%	2%	1%	2%	3%	18%	3%	1%	2%	2%	1%	2%
Land area thousand sq km	175	101	51	364	263	786	40	143	9,147	349	365	296	500	8,966	242	9,425	2,973	1,944	8,358	16,377	1,878	98
Industry share of final energy	43%	43%	24%	31%	29%	16%	17%	9%	18%	25%	29%	22%	24%	24%	18%	49%	38%	32%	35%	28%	37%	26%
Electricity share of final energy	21%	66%	24%	46%	26%	7%	24%	17%	23%	22%	30%	21%	24%	22%	20%	27%	23%	24%	26%	17%	17%	23%
Population (mil.)	3	0	5	5	5	32	6	30	337	83	125	59	47	38	67	1426	1408	127	214	145	274	52
Population density per square mile	50	9	261	43	49	104	352	529	91	605	854	509	243	11	719	385	1109	167	65	22	371	1340
Renewable share of Primary Energy	57%	92%	51%	72%	40%	77%	38%	77%	11%	19%	12%	18%	22%	30%	18%	15%	9%	11%	46%	7%	10%	4%
Economic complexity (0-100 scale)	52	N/A	64	73	61	13	83	N/A	92	98	100	89	76	68	93	88	66	86	55	N/A	50	98

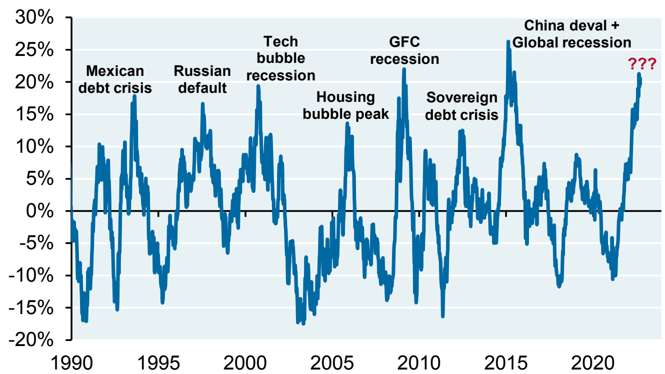
Source: BP, Enerdata, Irena, World Bank, Harvard, UN, IMF, CEIC, JPMAM. 2021.

[5] "*What Does Sustainable Living Look Like? Maybe Like Uruguay*", NYT, October 7, 2022

[6] Pitcairn Island, current population 47, where HMS Bounty mutineers settled in 1790

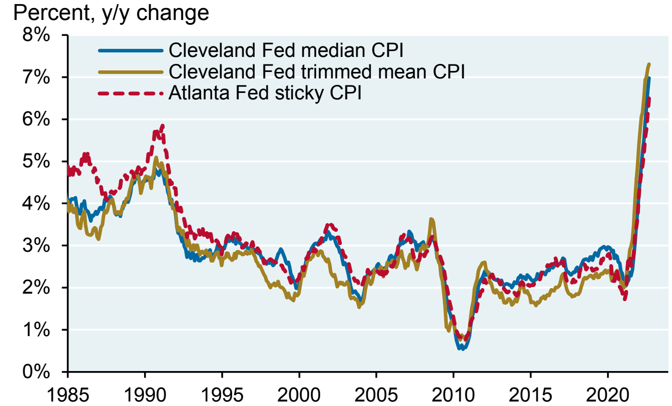
Appendix charts: market indicators are generally downbeat

US dollar surge similar to levels at which market crises occurred, %, y/y change



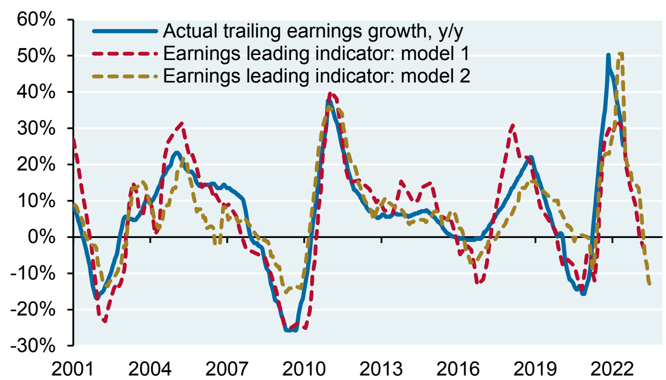
Source: Bloomberg, JPMAM. October 18, 2022.

US consumer price inflation measures
Percent, y/y change



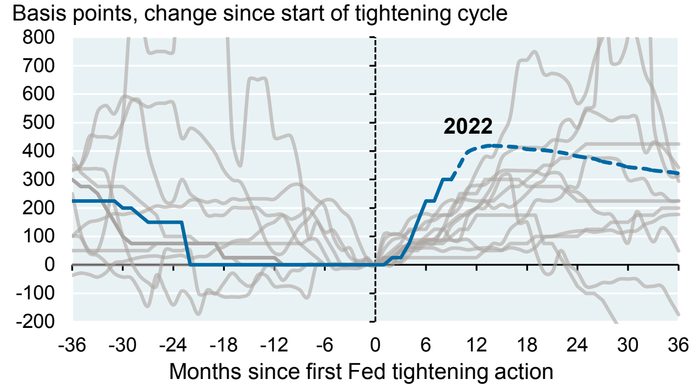
Source: Bloomberg, JPMAM. September 2022.

Leading earnings indicators point to downside ahead
Percent



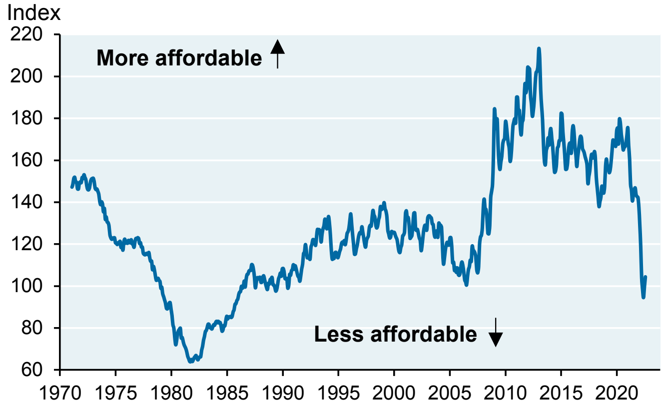
Source: Morgan Stanley US Equity Strategy. August 29, 2022.

Fed tightening cycles, 1958-2022
Basis points, change since start of tightening cycle



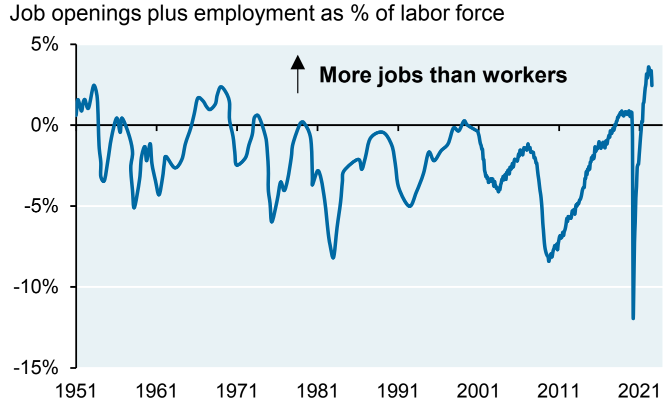
Source: Bloomberg, Factset, Fed, JPMAM. October 2022. Dotted line = expectations from Overnight Interest Swaps. Grey lines = previous cycles.

US housing affordability index
Index



Source: National Assoc. of Realtors, JPMAM. August 2022.

Largest worker shortage in the post war era
Job openings plus employment as % of labor force



Source: BLS, JPMAM. August 2022.

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