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Global Markets Division

Macro Analysis

Short Position on Mortgage Lenders

Investment Horizon: 9 - 12 months

Vienna, June 24

Team Overview

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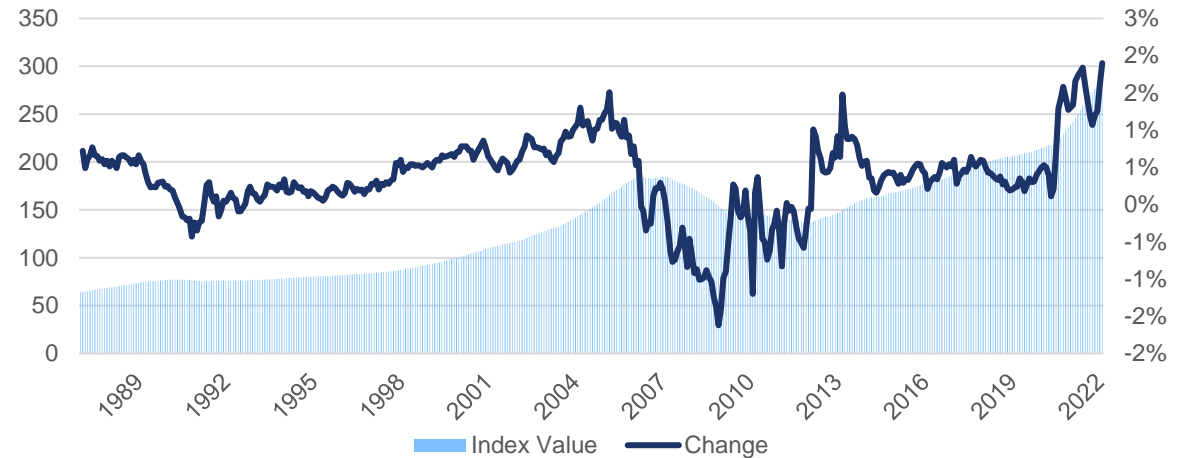
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Implications of a steadily rising Housing Market

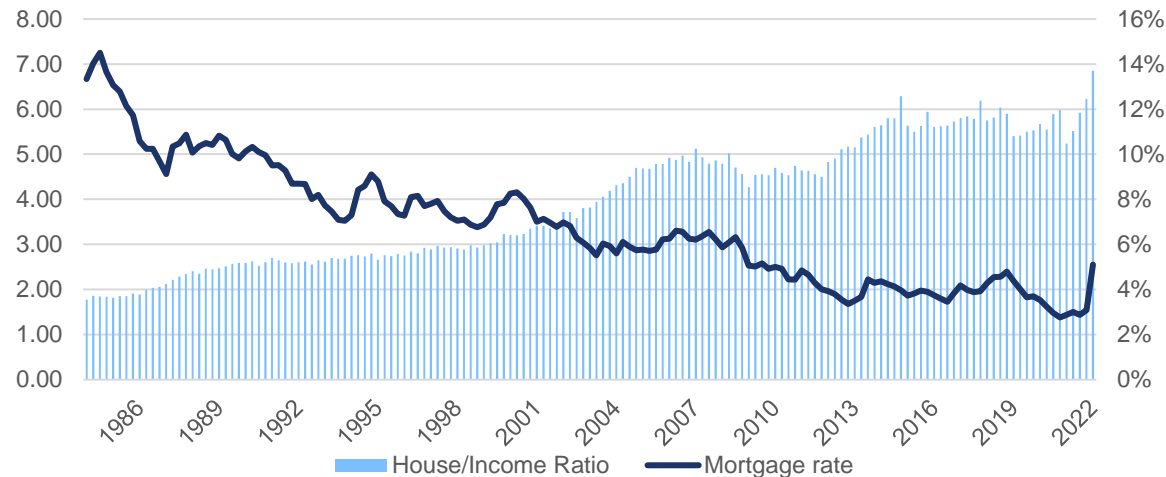
Overview

- Case Shiller Index shows **substantial increase in house prices** over the years
- Covid 19 and quantitative easing boosted price levels further
- The **ratio of housing prices and income continuously increasing** over the whole timeframe (1984-2022), extending even further since Covid-19
 - Wages cannot keep up with prices
- At the moment **house to income ratio is proportional**
 - Higher risk for households to not be able to pay back debt
- **Mortgage applications show an inverse relationship to mortgage rates** which leads to decreasing application numbers

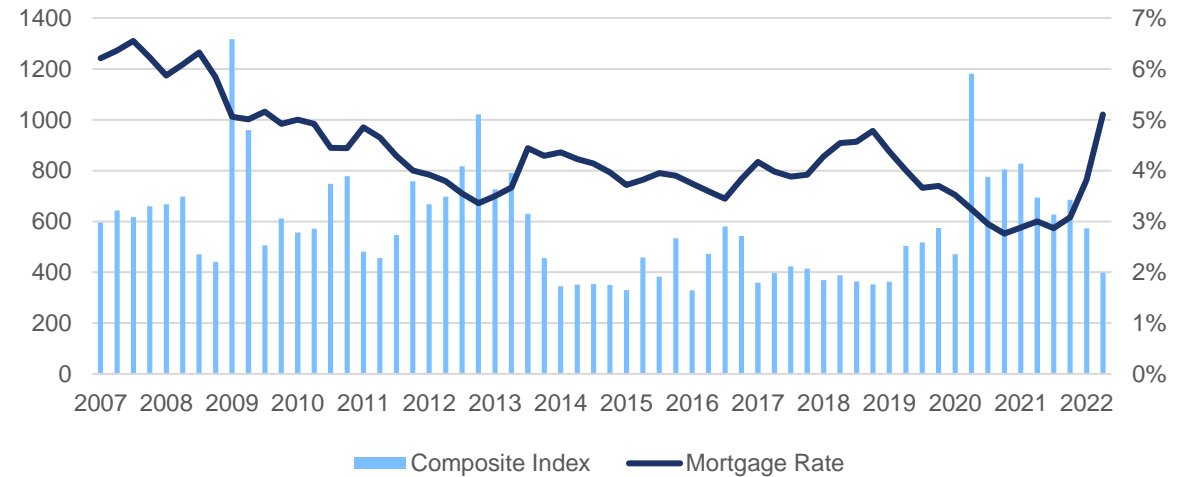
Case Shiller Index



Relationship Mortgage Rates to relative house prices



Mortgage Applications Index vs Mortgage Rates

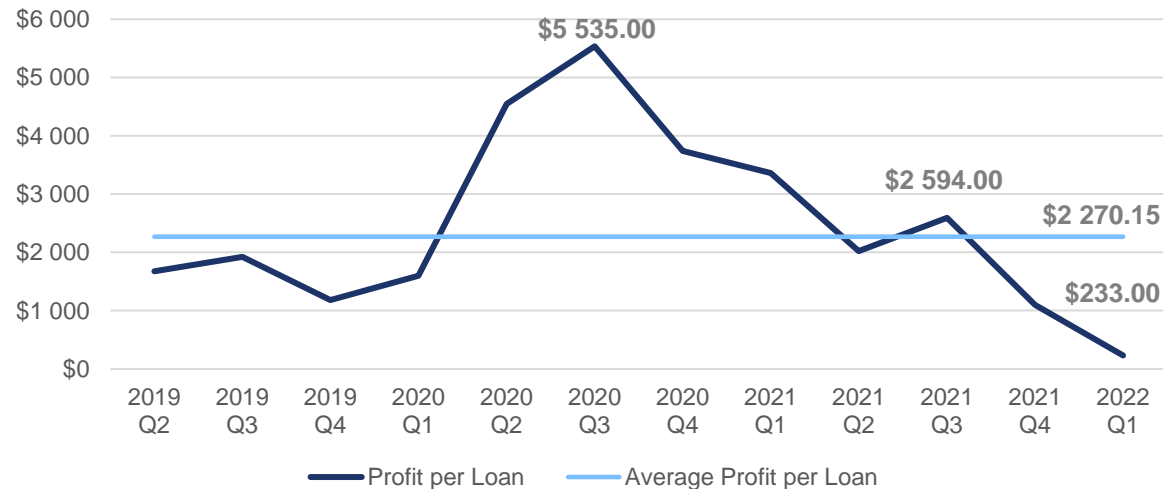


Development of the Mortgage Market since Covid accelerated the demand

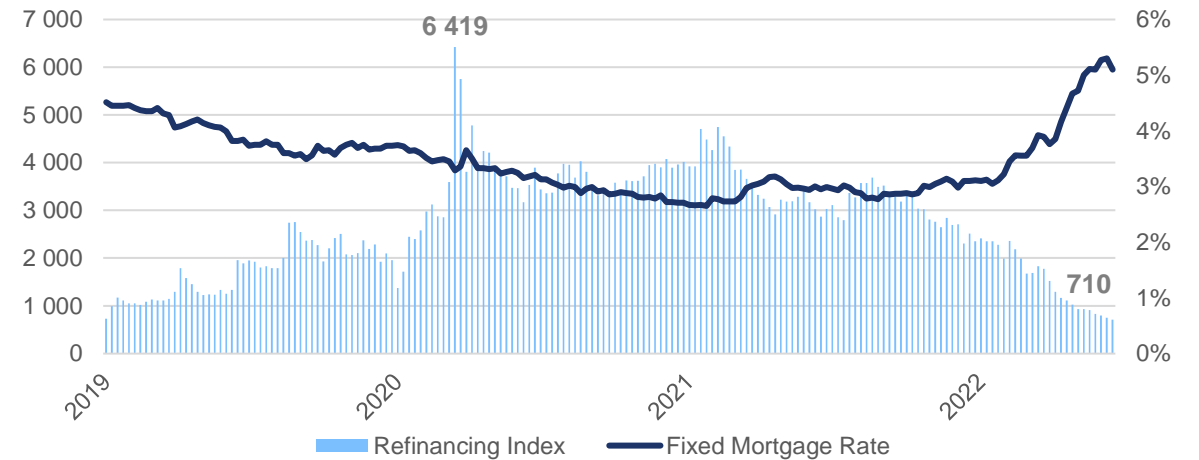
Overview

- Rising interest rates make **mortgage refinancing's unappealing**
- In 2020/2021 **refinancing's made up 70% of all new mortgage applications**, with the substantial decrease (-89%) of the 2020 high in demand for refinancing's they have also a **significant impact on the overall applications**
- Profit per loan is ~ **90% under the average profit** of the period
 - Since 2021 Q3 we can see a sharp decline
- Of the overall market only **11% of all mortgages have an adjustable rate**

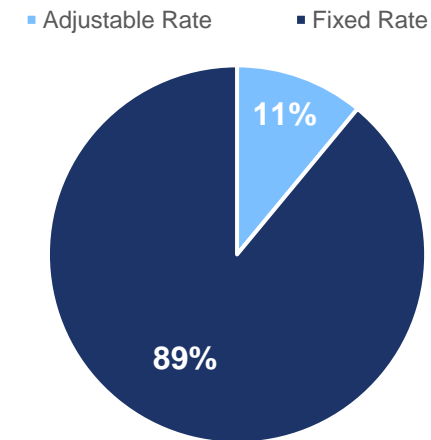
Profitability of Mortgage Loans



Refinancing Index



Share of adjustable mortgages in the overall mortgage market

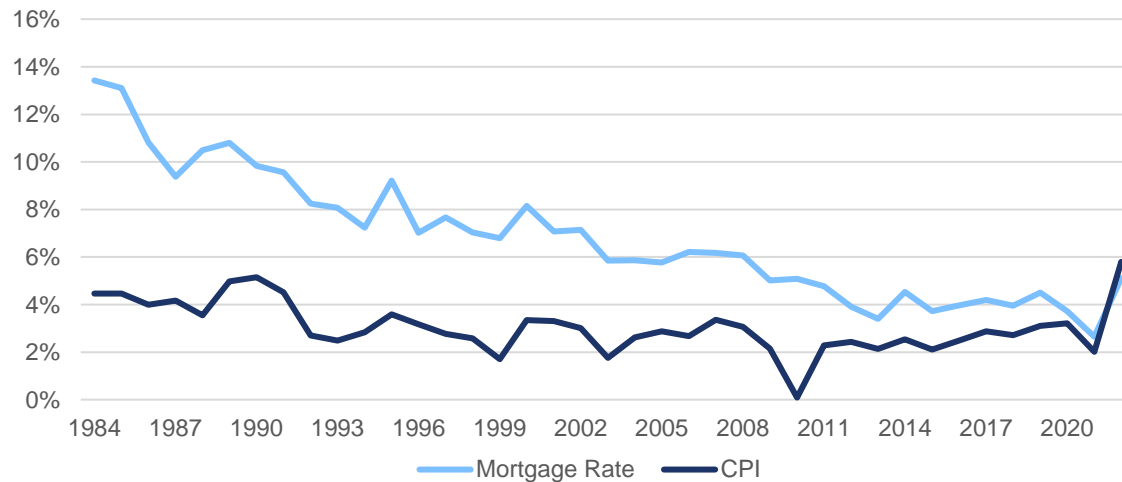


The Fed's policy in reaction to the current macroeconomic situation

Inflation

- **Pressure for mortgage lenders** as inflation erodes purchasing power, leading mortgage lenders to raise mortgage rates
- May CPI 8.6% Y/Y vs. April CPI 8.3% Y/Y (vs. *March CPI 8.5% Y/Y*)
- Housing +0.9% m/m & +6.9% y/y
- Rent inflation +0.31% m/m & +5.5% y/y
- **Main drivers:** Supply chain disruptions, Russian invasion of Ukraine and accumulated consumer demand for goods
- Further **developments in Ukraine and of Covid are crucial**

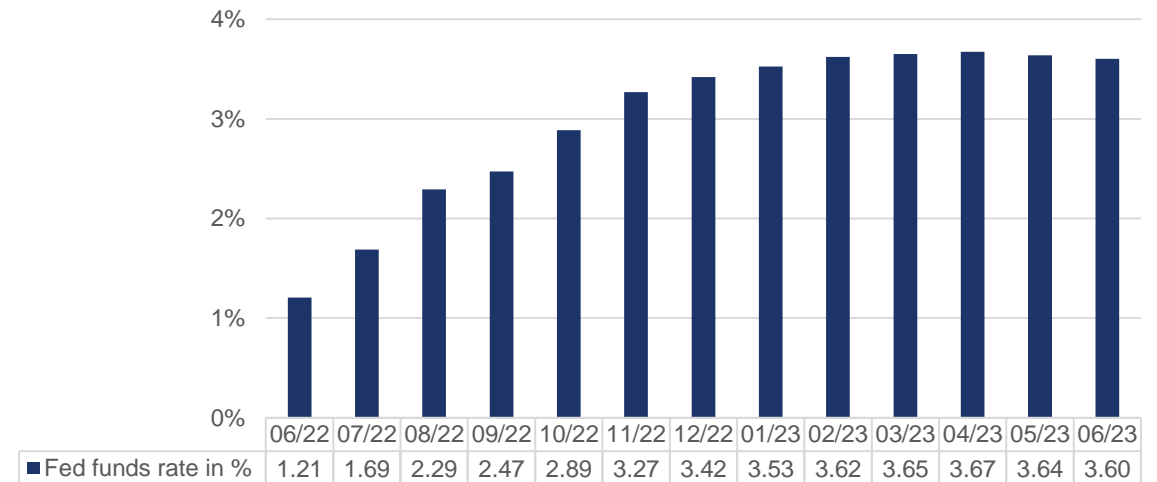
30 year fixed US Mortgage Rate and US CPI



Fed Monetary Policy

- Federal Reserve created **excessive amounts of liquidity**
- Last hike: 75 bps (50 bps in April 2022)
- Fed funds target rate at 1.5% - 1.75%
- Market expectation: above **3% at year end**
- Quantitative tightening (rates upwards)
- Reduction of **\$9 trillion balance sheet**
- First selloff: **reduction of mortgage-backed securities** by \$17.5 billion

Fed Funds Futures

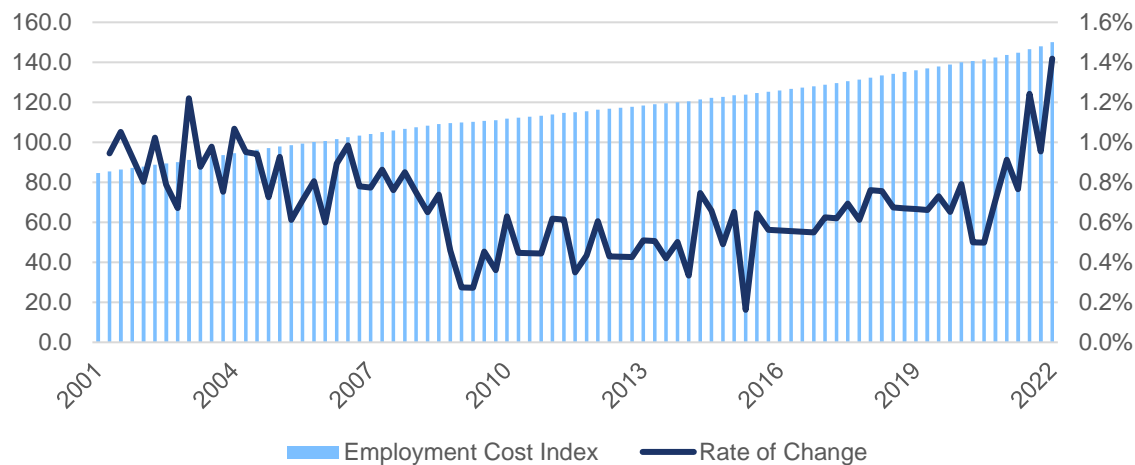


Tight labor market has wide effects on the economy

Economic Growth

- **GDP growth declined** in the first quarter of 2022 by 1.4%
 - Trade imbalance, less fixed investments, defense spending
- **Slowing growth expected** due to upcoming rate hikes
- Wages have risen with highest rate since 2006 due to an extremely tight labor market
- **Employment Cost Index** shows the **change in total employee compensation** each quarter

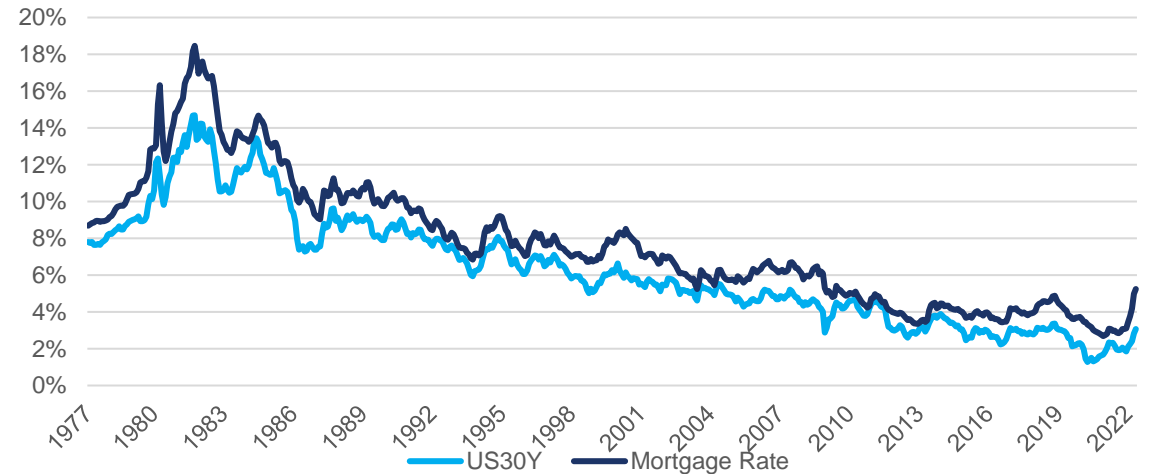
Employment Cost Index



Bonds

- **Strong correlation** (~ 0.97) between 30-year fixed Mortgage Rate and 30-year Treasury Yield
- **Mortgages are a riskier asset** than US treasury bonds, therefore higher interest
 - Similar maturity, but **mortgages depend on individual repayments** whereas US treasury bonds are backed by the government (interest rate risk)
- 30-year treasury yield reached 3.28% for the first time since 2018

30-year fixed Mortgage Rate and US30Y



Fed funds rate increase leads to mortgage rate hike

Regression Models

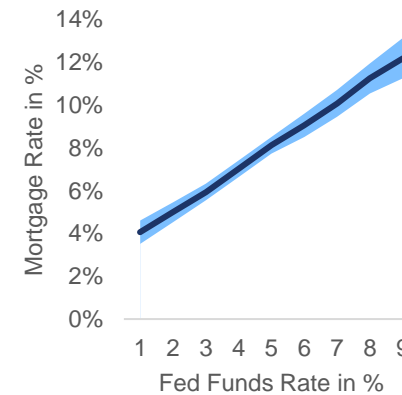
- Data: yearly, 1984-2022
- Expectations** for Fed funds rate: around 3% at year end
- Model 1: Simple Linear **OLS Regression** Model
- Model 2: VECM (= Cointegrated Vector Autoregressive Model)
 - Non-stationarity & cointegration** of the variables (rank=1)
 - Order of 2 chosen based on information criteria & statistical significance
 - Residuals checks: normally distributed, homoskedasticity, no autocorrelation

Vector Error Correction Model (Lag 2)

$$1. \Delta \text{Mortgage Rate} = \text{Intercept}_1 + \beta_1 * \text{ECT} + \beta_{11,(T-1)} * \Delta \text{Mortgage Rate}_{(T-1)} + \beta_{12,(T-1)} * \Delta \text{Fed Funds Rate}_{(T-1)} + \beta_{11,(T-2)} * \Delta \text{Mortgage Rate}_{(T-2)} + \beta_{12,(T-2)} * \Delta \text{Fed Funds Rate}_{(T-2)} + \epsilon_1$$

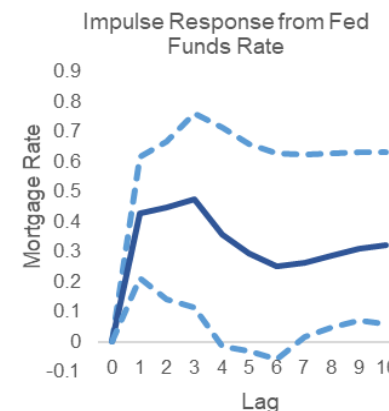
Mortgage Rate	Coefficient Estimate	Std. Error	Parameter Significance
Intercept	-0.42	0.21	p-value: <0.05 ✓
ECT	0.04	0.08	P-value: >0.1
Mortgage Rate _(T-1)	-0.81	0.21	p-value: <0.001 ✓
Fed Funds Rate _(T-1)	0.38	0.14	p-value: <0.01 ✓
Mortgage Rate _(T-2)	-0.32	0.21	p-value: >0.1
Fed Funds Rate _(T-2)	0.14	0.17	P-value: >0.1

Simple Linear Regression



- Coefficient** estimates statistically **significant**
- Mortgage rate increases by 0.8 percentage points whenever Fed funds rate increases by 1 percentage point
- Adjusted R-Squared = 0.83
- Autocorrelated residuals issue
- Spurious regression/ stationarity issue

VECM Interpretation



- Short-term **Granger Causality**
- Impulse Response Function results: significant and **lasting impact of shocks from Fed funds rate on mortgage rate**
- VAR upper limit forecasts: Fed funds rate 2.3%; **Mortgage rate 5.4% followed by 6.8%**

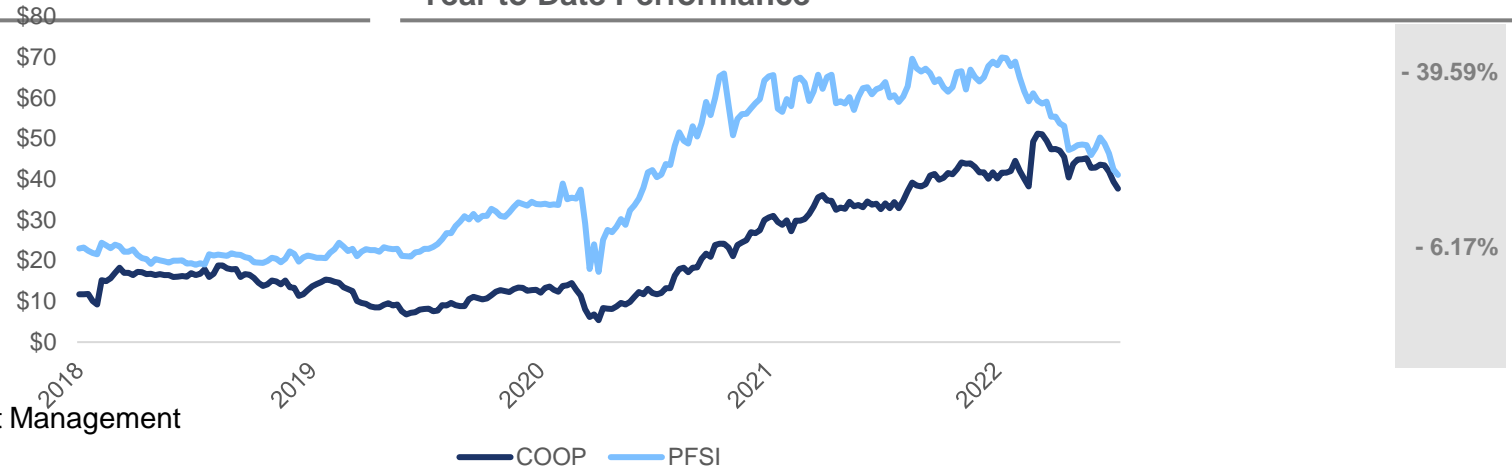
Mortgage Lenders

For now, making up almost 10% of the market

Overview

- Industry: **Financial Services**
 - Sector: Mortgages
- Mr Cooper Group Inc.**
 - Based in Texas, United States since 1889
 - Operations in Servicing and Originations
- PennyMac Financial Services Inc.**
 - Based in California, United States since 2008
 - Operations in Servicing, Originations and Investment Management

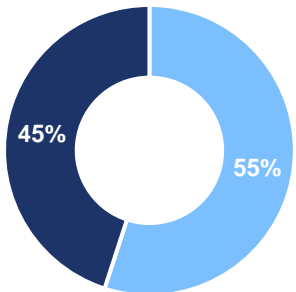
Year to Date Performance



Split up of the Revenues

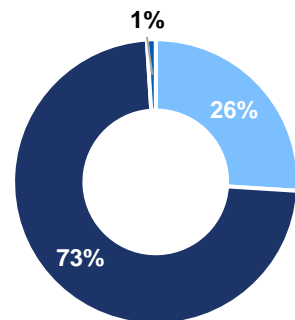
Mr. Cooper Group Inc.

- Servicing
- Originations



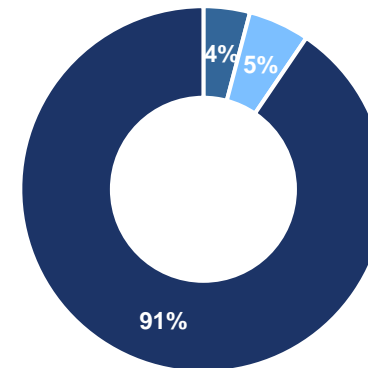
PennyMac Financial Services Inc.

- Servicing
- Originations
- Investment Management



Market Share

- PennyMac Financial Services
- Mr. Cooper Group Inc.
- Rest of the Market

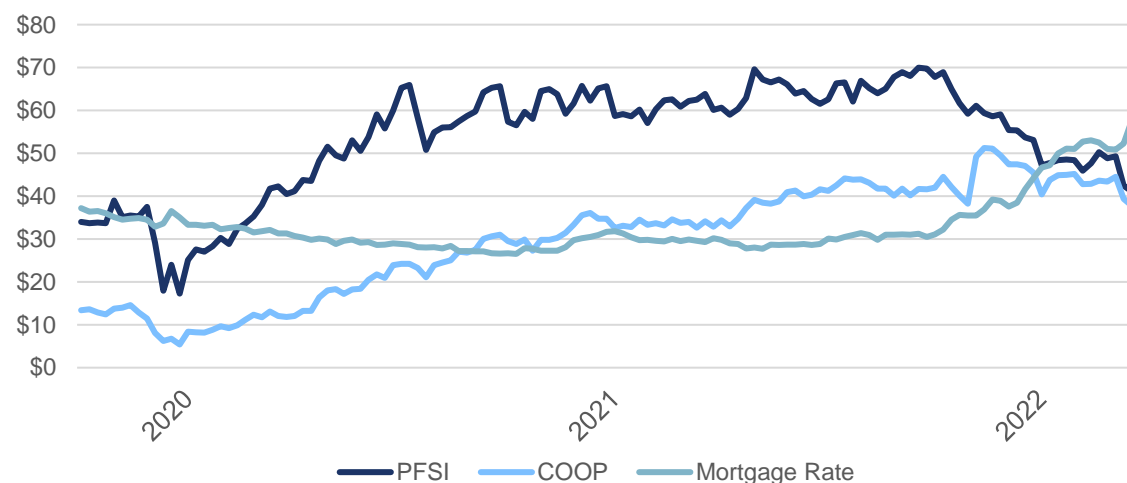


Rising pressure for companies in the lending sector

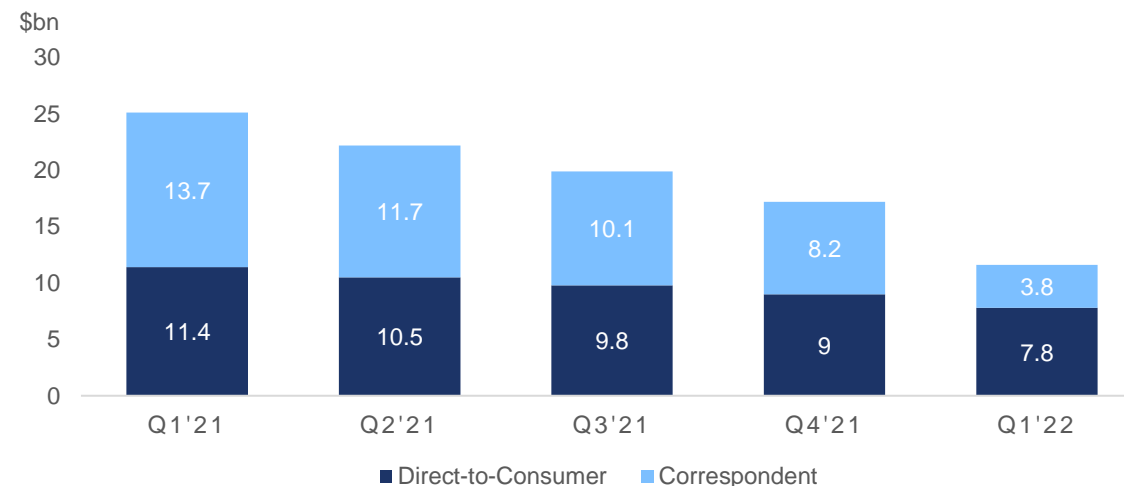
Overview

- We can see an **inverse relationship** between the mortgage rates and the mortgage lenders
- We can already see that **hedging activities and other losses** in Q1'22 amount to 50% of the total of 2021
- Q1'22 of COOP already shows substantial **decrease in loan/mortgage volumes**

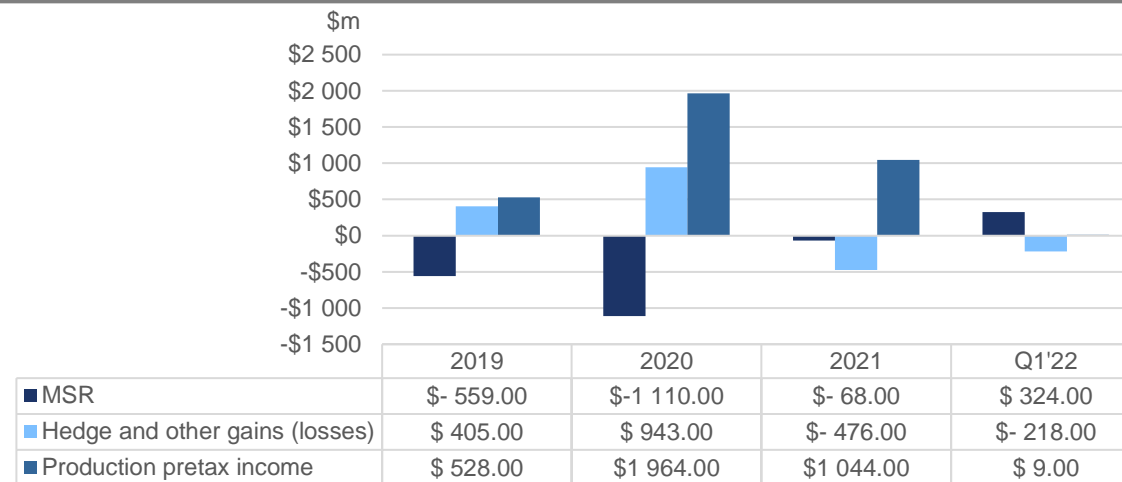
Share price plotted with the 30-year Mortgage Rate



Funded Volume Mr. Cooper



MSR Valuation Changes and Offsets PennyMac



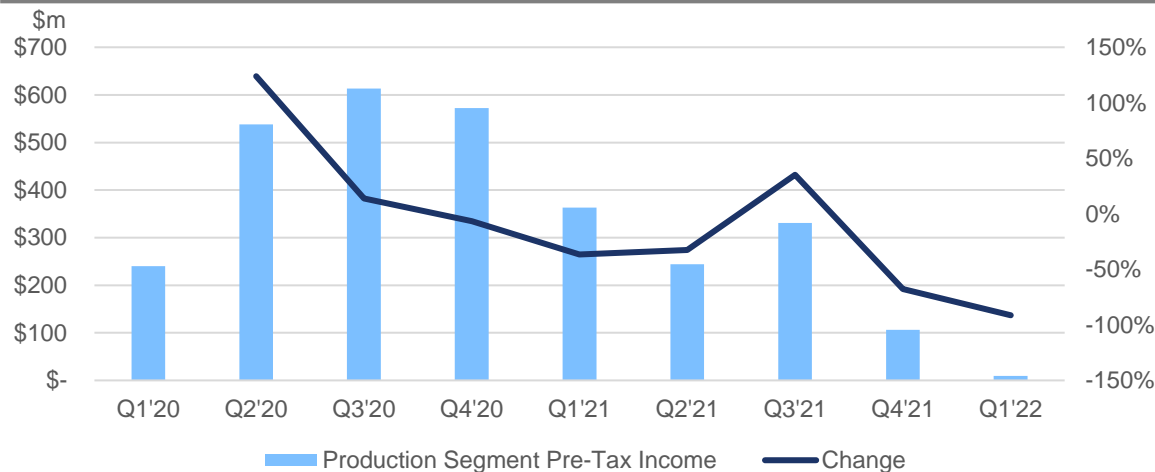
Mortgage Lenders

No matter where you look, it's downwards sloped

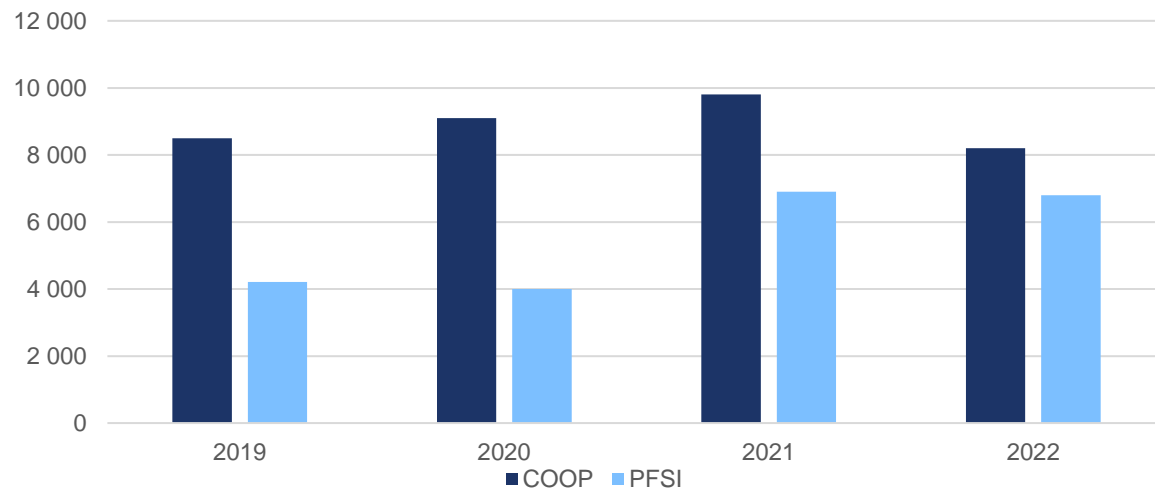
Overview

- Production Segment **Pre-Tax Income for PFSI** is currently at \$9.1m, down from \$362.9m one-year prior
- Mr. Cooper is already **reducing their headcount** because they expect rising pressure in the following quarters (earnings transcript)
- Especially for PennyMac we can see a strongly **decreasing return on equity**, from 55.6% to 23%

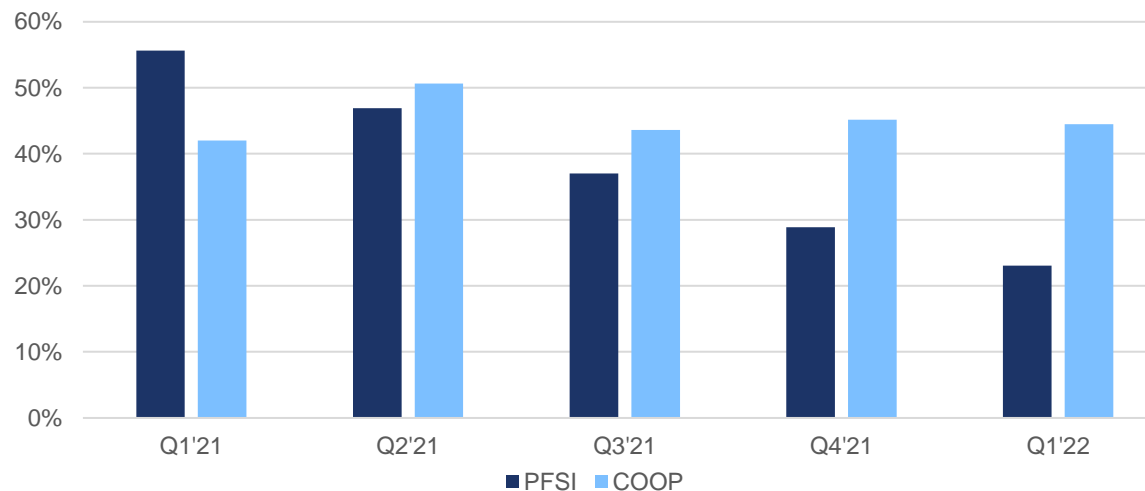
Production Segment Pre-Tax Income PennyMac



Mr. Cooper and PennyMac employee count over the years



Return on Equity of PennyMac and Mr. Cooper



To sum it up...

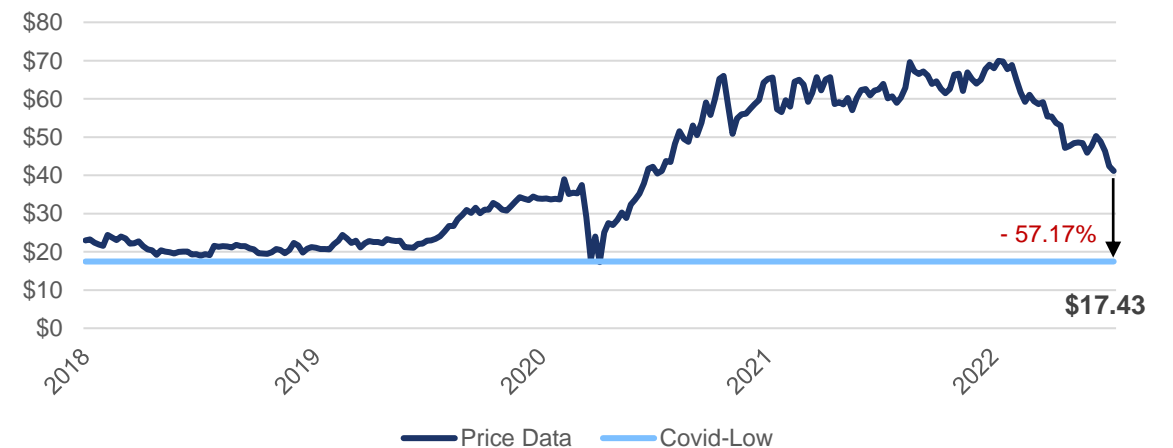
Overview

- Current **application rate are at Pre-Pandemic Levels**
- Purchasing power of U.S. households decreases over time as **wages cannot keep up with rising house prices**
 - demand for mortgage loans decreases
- Expecting **further declines of applications**
 - as refinancings attractivity is decreasing further with rising rates
 - Visible **inverse relationship between mortgage rates and applications rates**
 - With rising inflation, **Fed Fund Rate and mortgage rates will increase**
- Further **decrease of applications** which are equivalent with **loss of revenue** lead to the assumption that the **share price plunge to the pre-Covid levels**, which would result in a loss of...
 - Mr. Cooper Corp. : **84.39%**
 - PennyMac Financial Services Inc. : **57.17%**
- The share price of both companies already show's **some signs of troubles** but with our mentioned developments we see **further headwinds for both lenders**, which should add even **more pressure on their share prices**

Mr. Cooper Group Inc.



PennyMac Financial Services Inc.



Appendix

Sources

Source Name	Link	Date of Retrieval
PFSI Investor Relations	https://ir.pennymacfinancial.com/Overview/CorporateProfile/default.aspx	07.05.2022
COOP Investor Relations	https://investors.mrcoopergroup.com/CorporateProfile/default.aspx	07.05.2022
Capital,.com	https://capital.com/trading/platform/trade	11.05.2022
St. Louis Fed (Economical Data)	https://fred.stlouisfed.org	05.05.2022
WSJ (Financial Statements)	https://www.wsj.com/market-data/quotes/	05.05.2022
U.S. Bureau of Labor Statistics	https://www.bls.gov/news.release/empsit.nr0.htm	05.05.2022
CNBC	https://www.cnbc.com/2022/05/04/fed-raises-rates-by-half-a-percentage-point-the-biggest-hike-in-two-decades-to-fight-inflation.html	05.05.2022
Trading Economics	https://tradingeconomics.com/united-states/existing-home-sales#:~:text=for%20nd%20Month-,Existing%20home%20sales%20in%20the%20US%20fell%202.7%25%20mom%20to,to%20forecasts%20of%205.8%20million	05.05.2022
Forbes	https://www.forbes.com/advisor/investing/why-is-inflation-rising-right-now/#:~:text=Elevated%20inflation%20has%20been%20driven,do%20on%20the%20inflation%20front	05.05.2022
Forbes	https://www.forbes.com/sites/chrisarosa/2022/03/16/whats-driving-inflation-and-is-it-sustainable/?sh=5a6222d935b3	05.05.2022
CME Group	https://www.cmegroup.com/trading/interest-rates/countdown-to-fomc.html	22.06.2022