The Berlin Stock Exchange in the “Great Disorder”

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and

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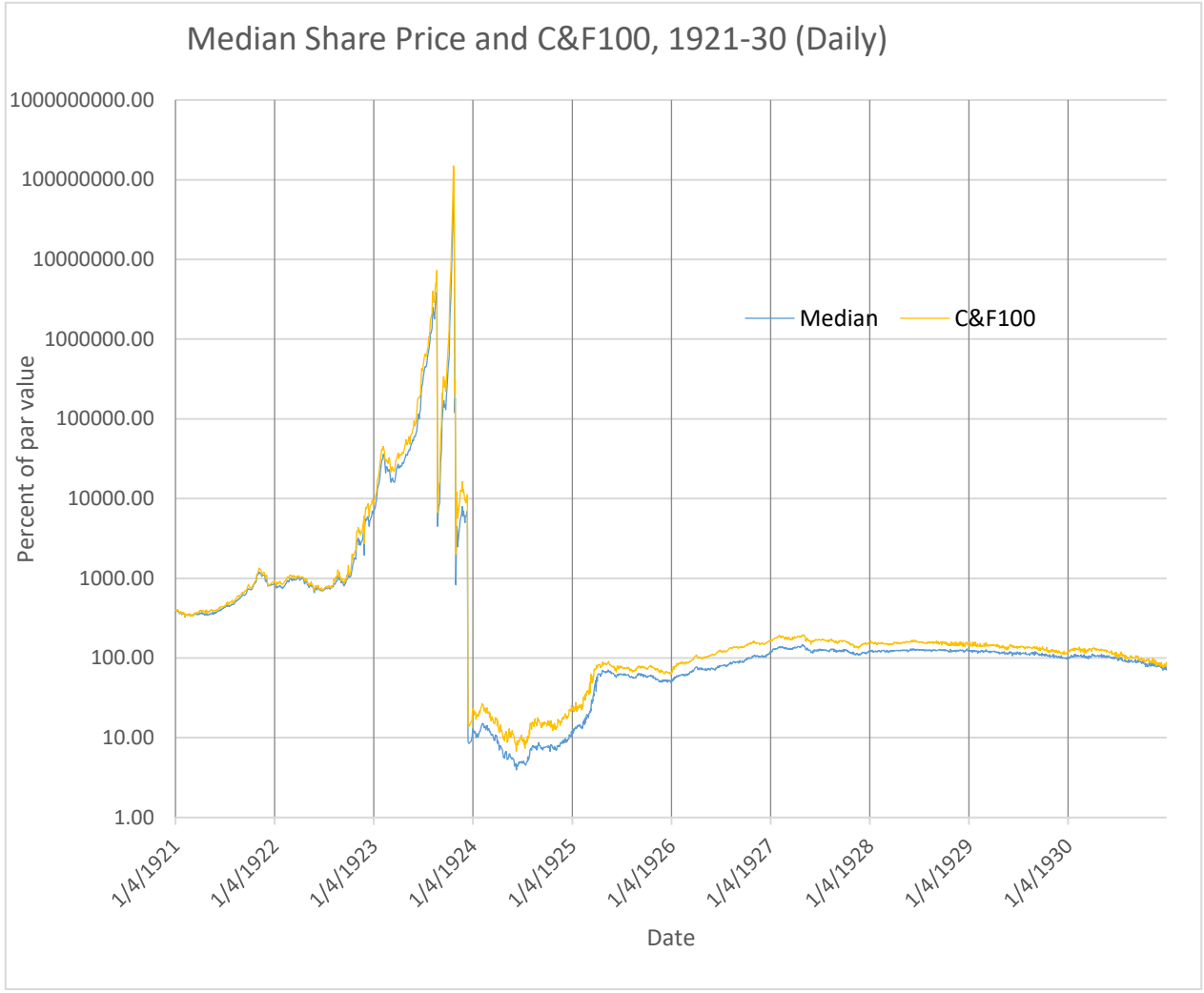
Plan for the talk

- **Background on “The Great Disorder”**
- **Microstructure of the Berlin Stock Exchange**
- **Data & Methods**
- Results:
    1. Market Activity
    2. Order Imbalance
    3. Direction of Trade—excess supply v. demand
    4. Volatility of returns
    5. Market illiquidity—Roll measure

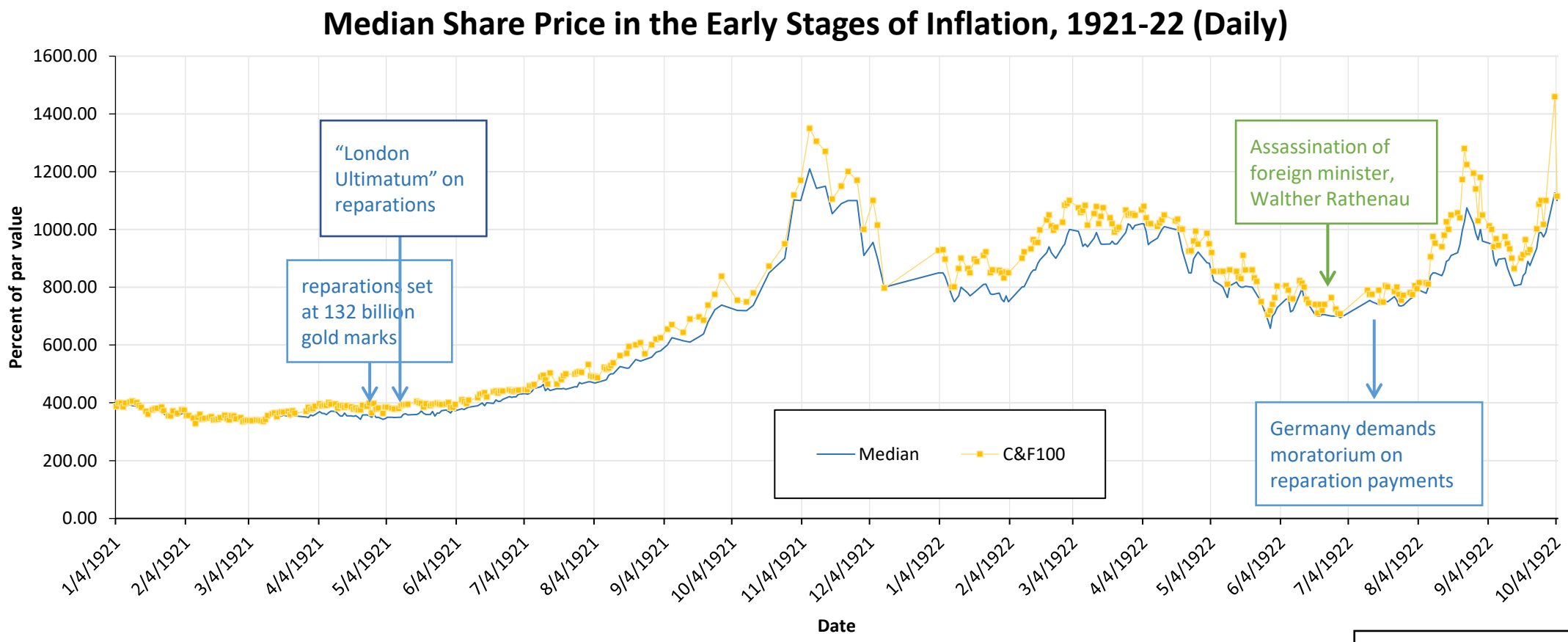
“The Great Disorder”

From the end of World War I to the Great Depression

- Political upheaval:
  - Abdication of Kaiser Wilhelm II
  - Founding of the Weimar Republic
  - Rise of the Nazi party
- Economic upheaval:
  - Massive war debt and reparations
  - Loss of productive capacity (and land)
- Monetary upheaval:
  - Hyperinflation and its end
  - Reichsbank policy regime changes
- Financial upheaval:
  - Boom in corporate foundations
  - 1927 stock market “bubble” and collapse (Black Friday, 13. May 1927)

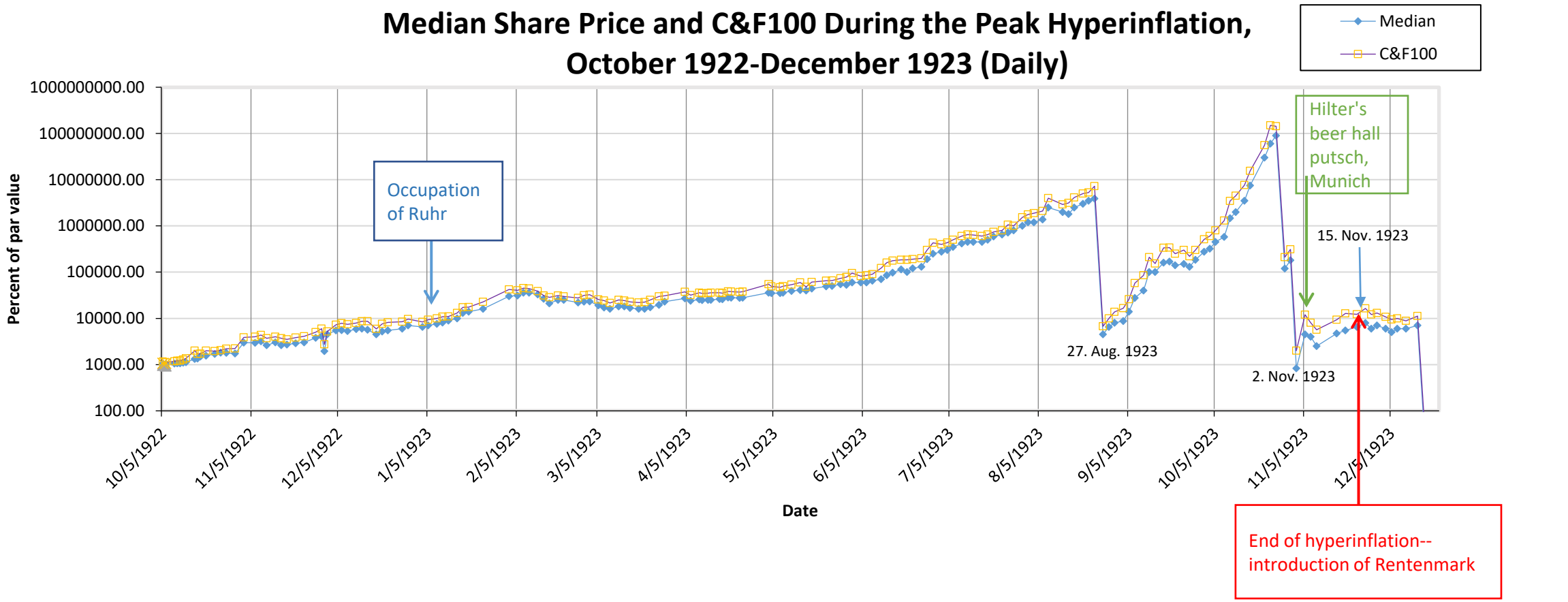


Early 20's Run-up to Hyperinflation

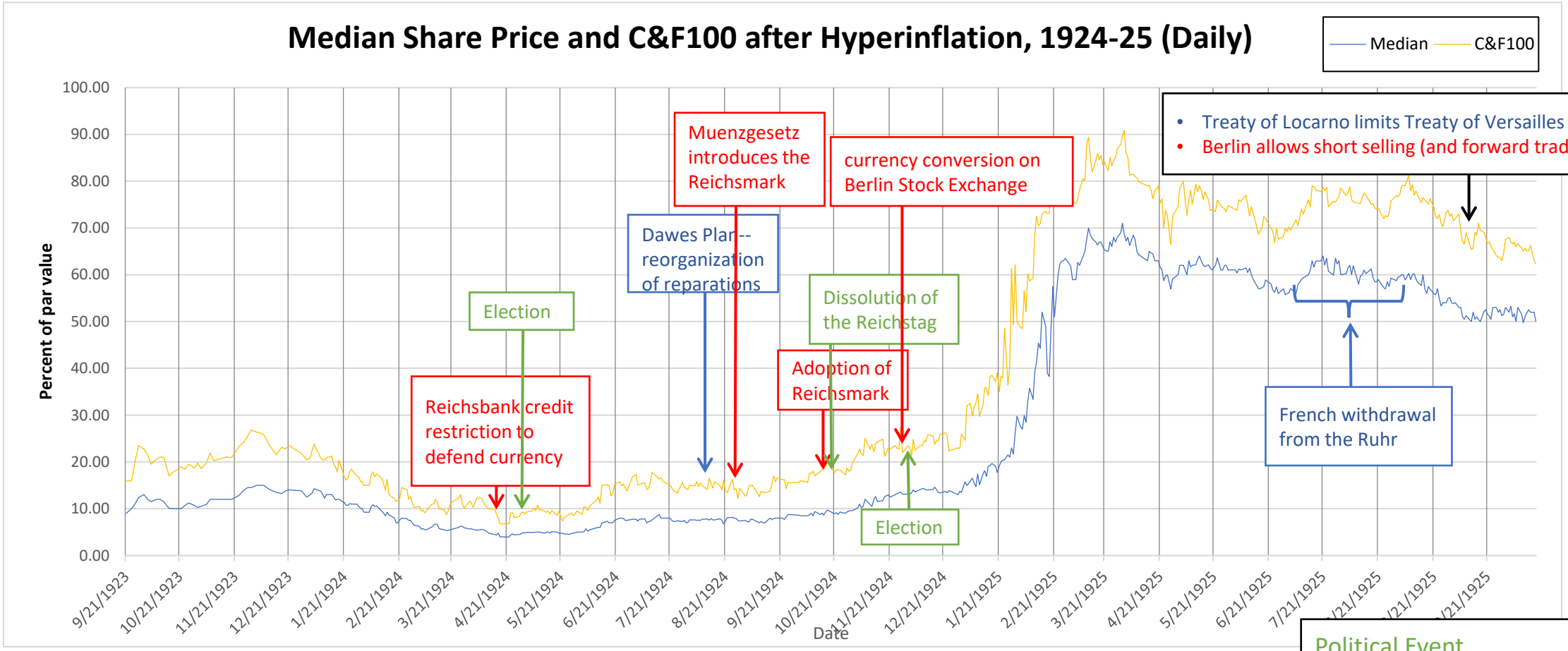


Political Event
Economic/Reparations Event
Financial/Monetary Event

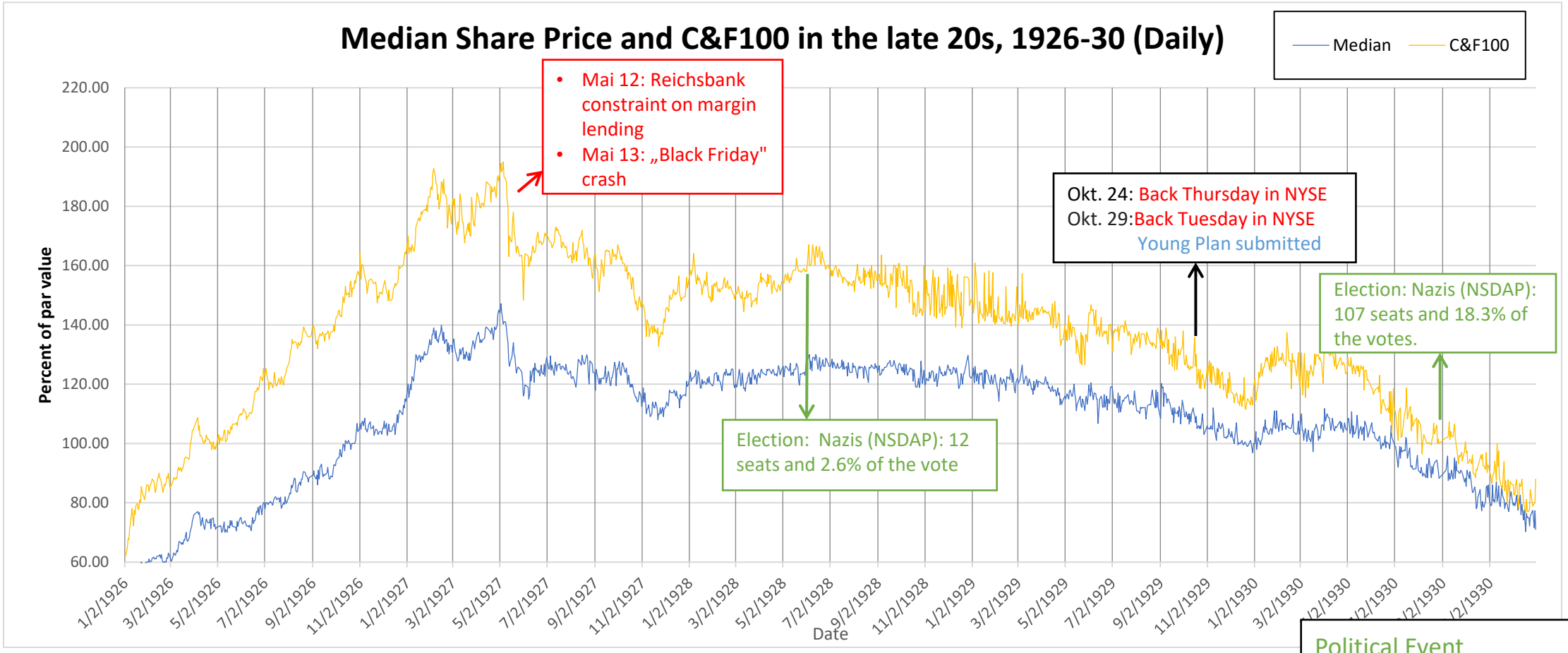
The Hyperinflation



Mid 20´s adjustment-revaluation period



Late 20's "Bubble"



Microstructure of the Berlin Stock Exchange in the 1920s

- Official market makers
- Call auction market for most shares
  - One market price per day
  - Standing quotation in case of order imbalance
  - No bid-ask spread
  - No trading volume recorded
- Several larger corporations with active markets did trade throughout the day

Data*

Use the “Kurszettel” from the Berliner Boersenzeitung

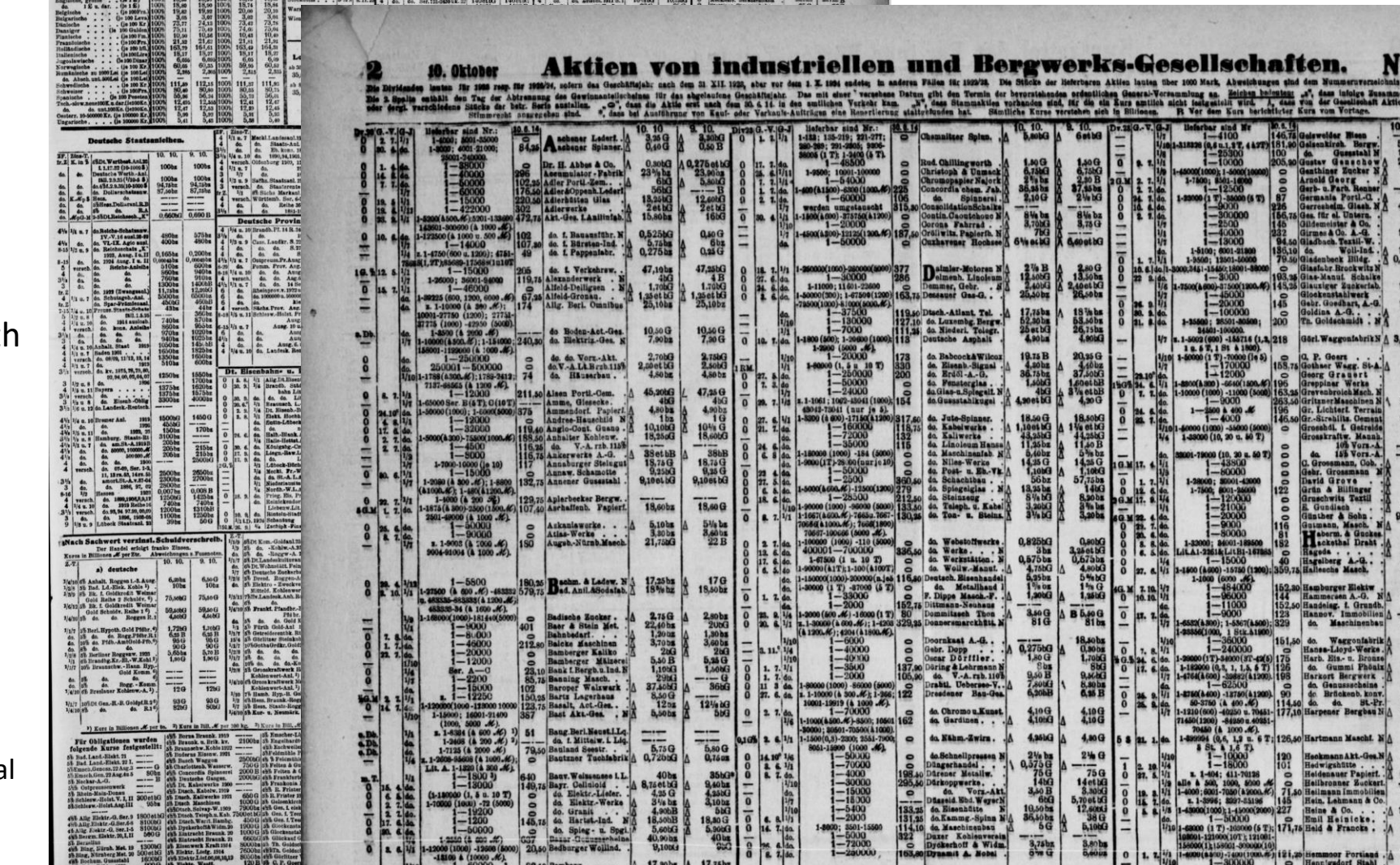
- Daily over 10 years - from January 1921 through December 1930
- Provides trading price or standing bid/ask quotation for all stocks with activity for a given day
  - 2,505,953 observations
  - 2,066,572 had a quoted price
  - 1,544,901 were actual trades
- NB: we have collected but not yet analyzed the data for 1931-39


Nr. 199 Kurszettel der Berliner Börsen-Zeitung Freitag, 10. Oktober 1924

Berliner Amtliche Notierungen.

a) Devisenkurse im Oktober 1924. (In Billionen.)

Bank-Diskont im Oktober 1924.


2 10. Oktober Aktien von industriellen und Bergwerks-Gesellschaften.

*Thanks to SAFE, University of Frankfurt for financial support for the data gathering

Data

Indicates order imbalance

- **BZ** = “Bezahlt”
  -> trading happened
  -> market cleared
  -> **clearing price**

Indicates market direction

- **G** = GELD
  -> gesucht
  -> indicates excess buy orders
  -> excess demand
  -> **bid price**

- **B** = Brief
  -> angebote
  -> indicates excess sell orders
  -> excess supply
  -> **ask price**

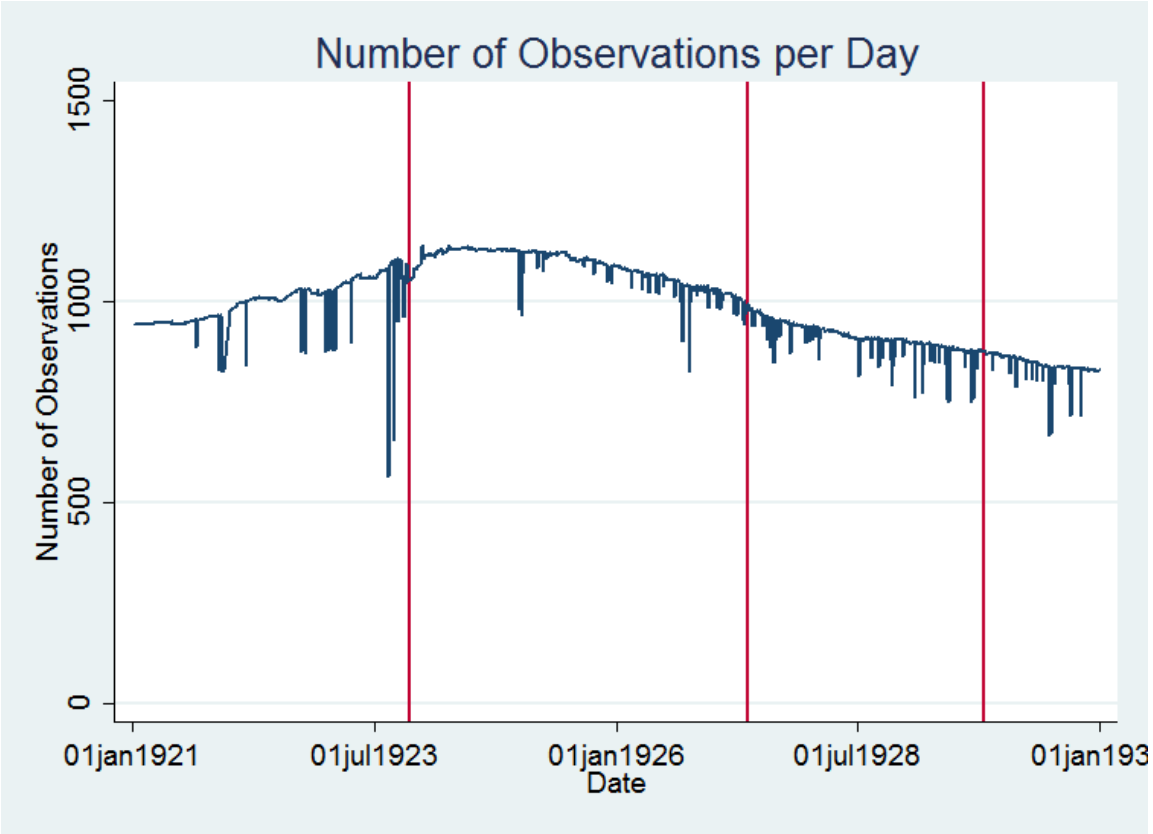
	Price	Trade information	Order Imbalance	Market Direction
88 bz	88	Bezahlt	Null	Neutral
93 bb	93	Bezahlt & Brief	Low	Excess Supply
95 bg	95	Bezahlt & Geld	Low	Excess Demand
98 etbb	98	etwas bezahlt & Brief	Medium	Excess Supply
101 etbg	101	etwas bezahlt & Geld	Medium	Excess Demand
104 B	104	Brief	High	Excess Supply
106 G	106	Geld	High	Excess Demand

Plan for the talk

- Background on “The Great Disorder”
- Microstructure of the Berlin Stock Exchange
- Data & Methods
- **Results:**
    1. **Market Activity**
    2. **Order Imbalance**
    3. **Direction of Trade—excess supply v. demand**
    4. **Volatility of returns**
    5. **Market illiquidity—Roll measure**

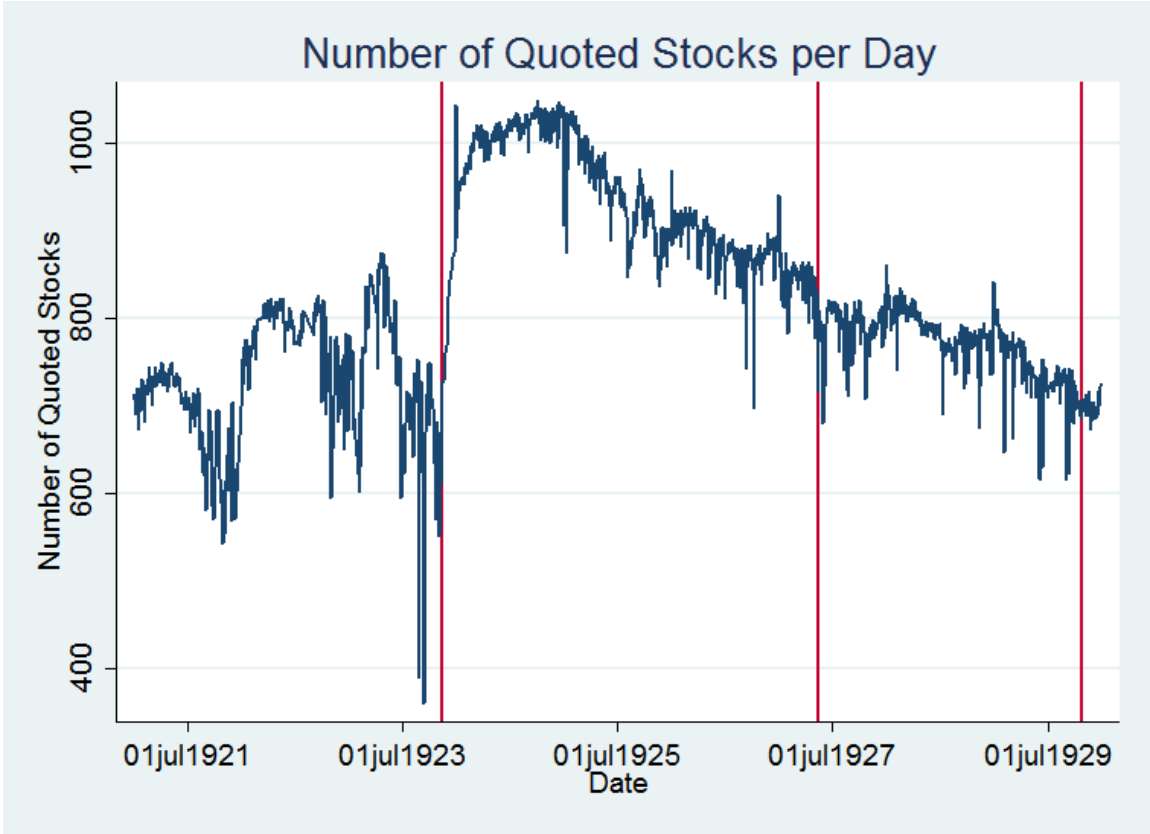
Market Size

- Total number of observed stocks each day



Market Volume

- Quoted stocks have either a market clearing transaction price or a standing quote (bid or ask)

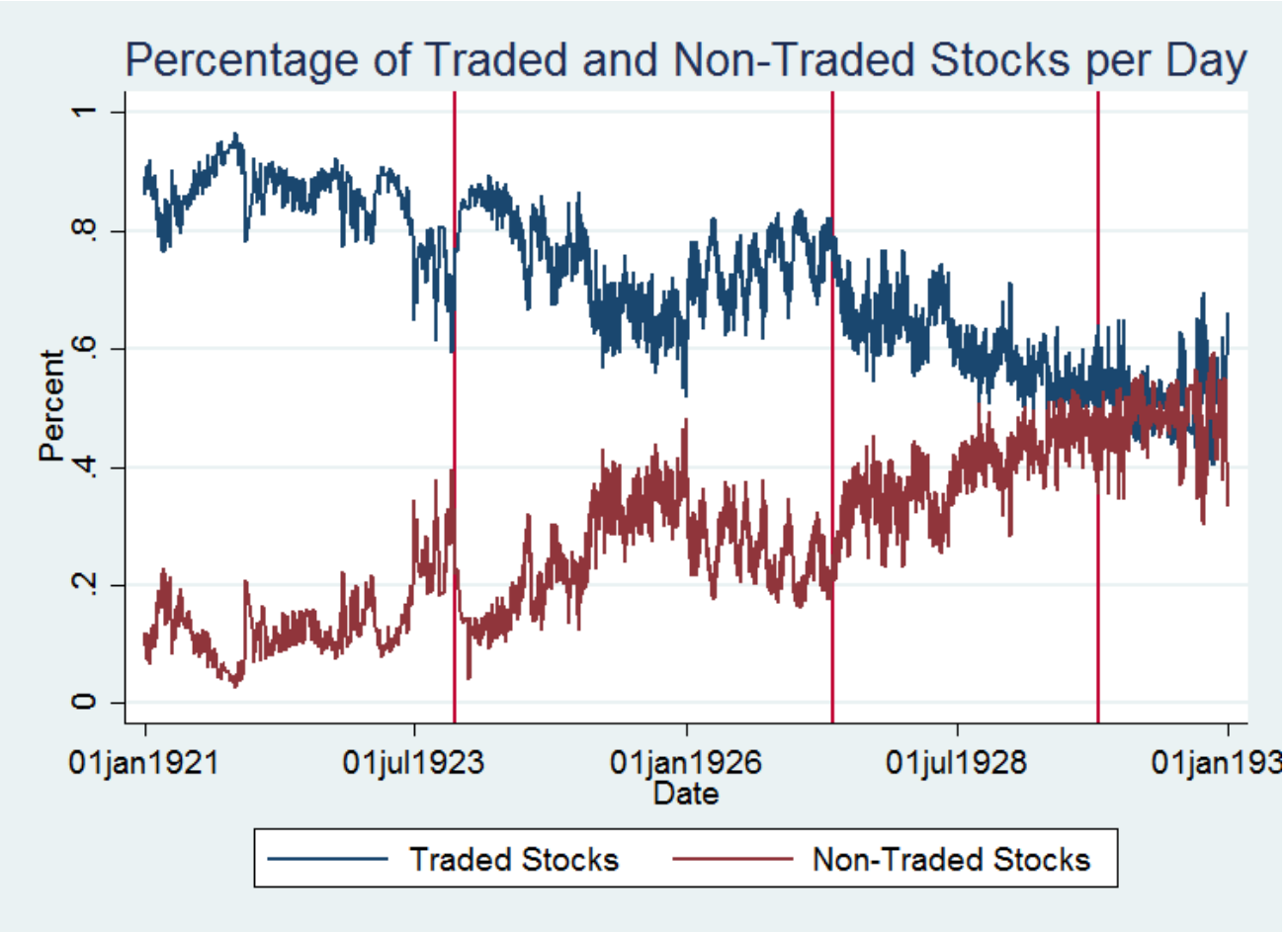


Order Imbalance

Listings give indication of trades or order imbalance

- “Bezahlt” indicates market clearing price
- G indicates excess buy orders, no trading
- B indicates excess sell orders, no trading

Computed in percent of total securities with observed prices or quotes for the given day.



Order Imbalance

Null – trading “Bezahlt”

= market cleared

Low – trading “Bezahlt” but there are shares remaining (buy or sell)

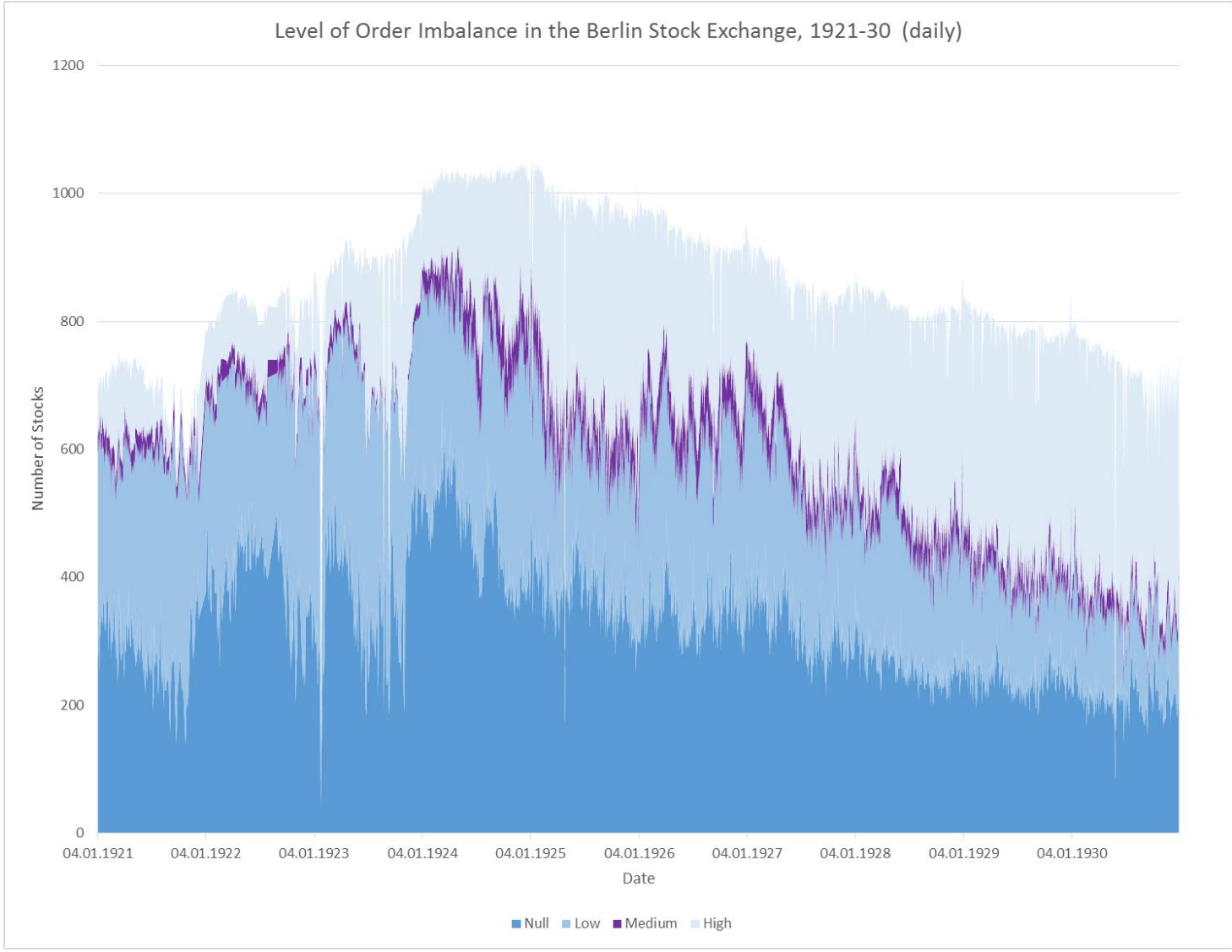
= market partially cleared but with some orders unfilled

Medium – low trading “Etwas Bezahlt”

= small amount cleared but significant orders remain unfilled

High – excess supply or excess demand

= no trading



Market Direction

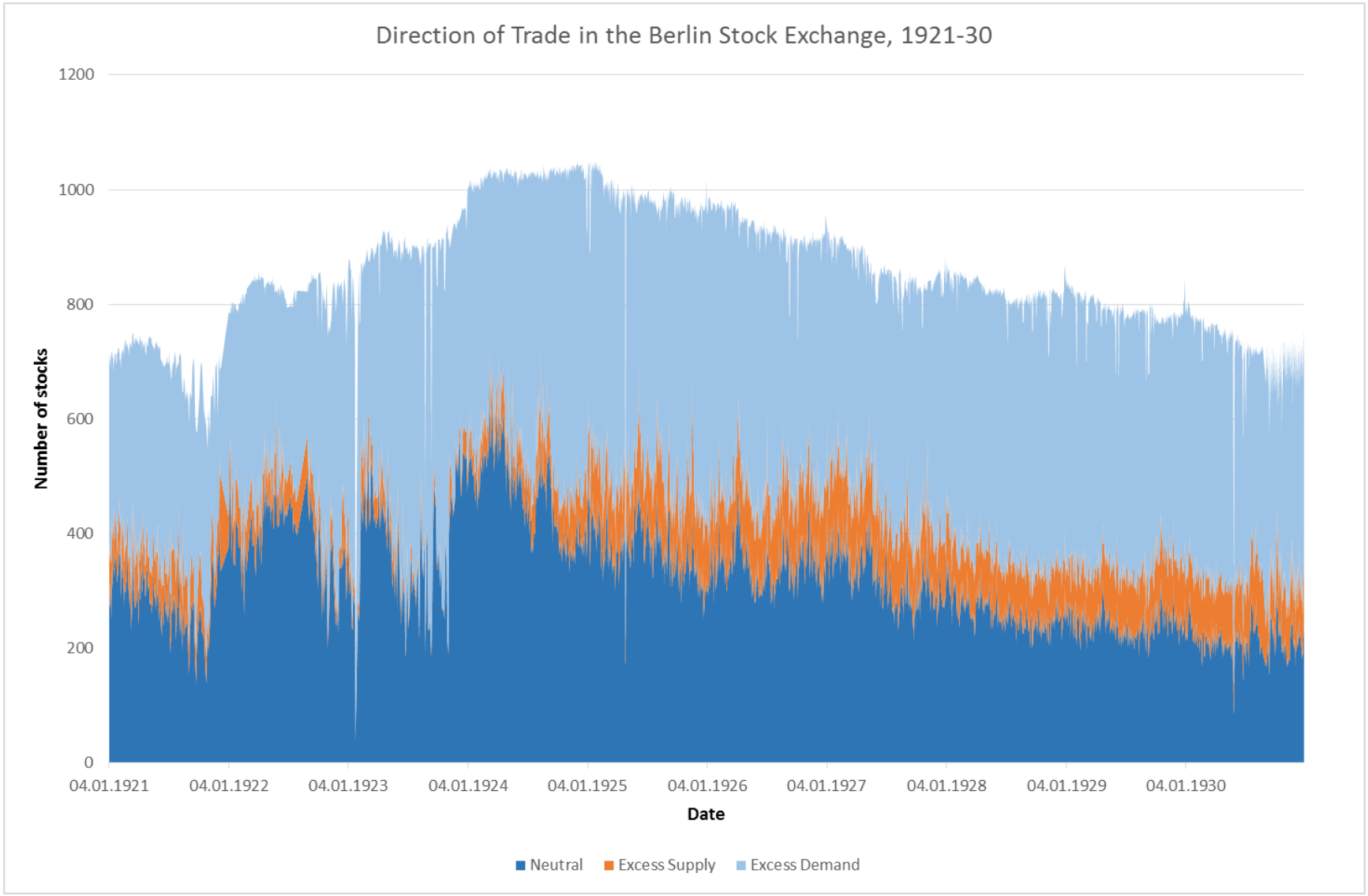
Excess Demand = excess buy orders “Geld”

Excess Supply= excess sell orders “Brief”

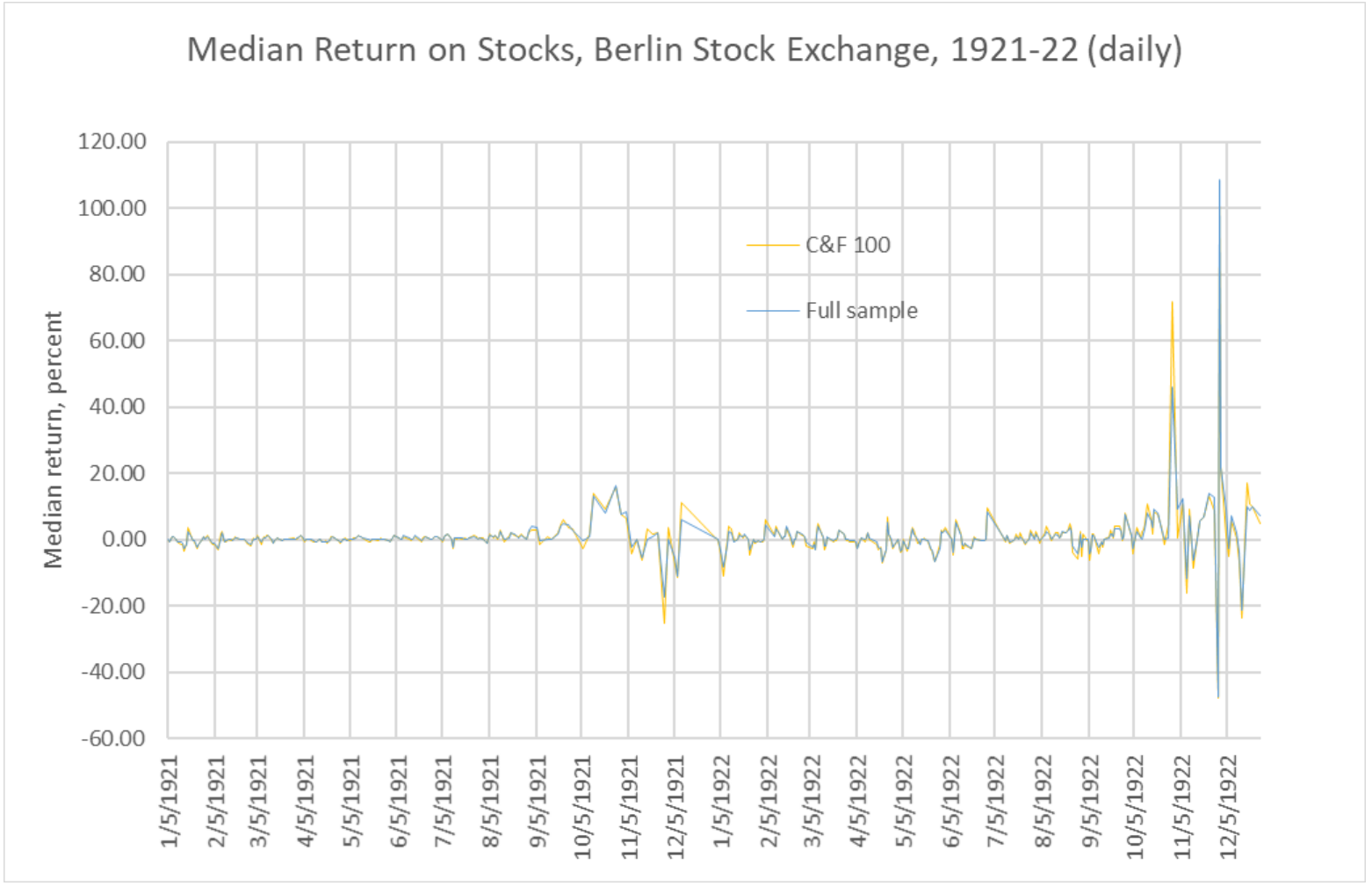
Neutral= market cleared

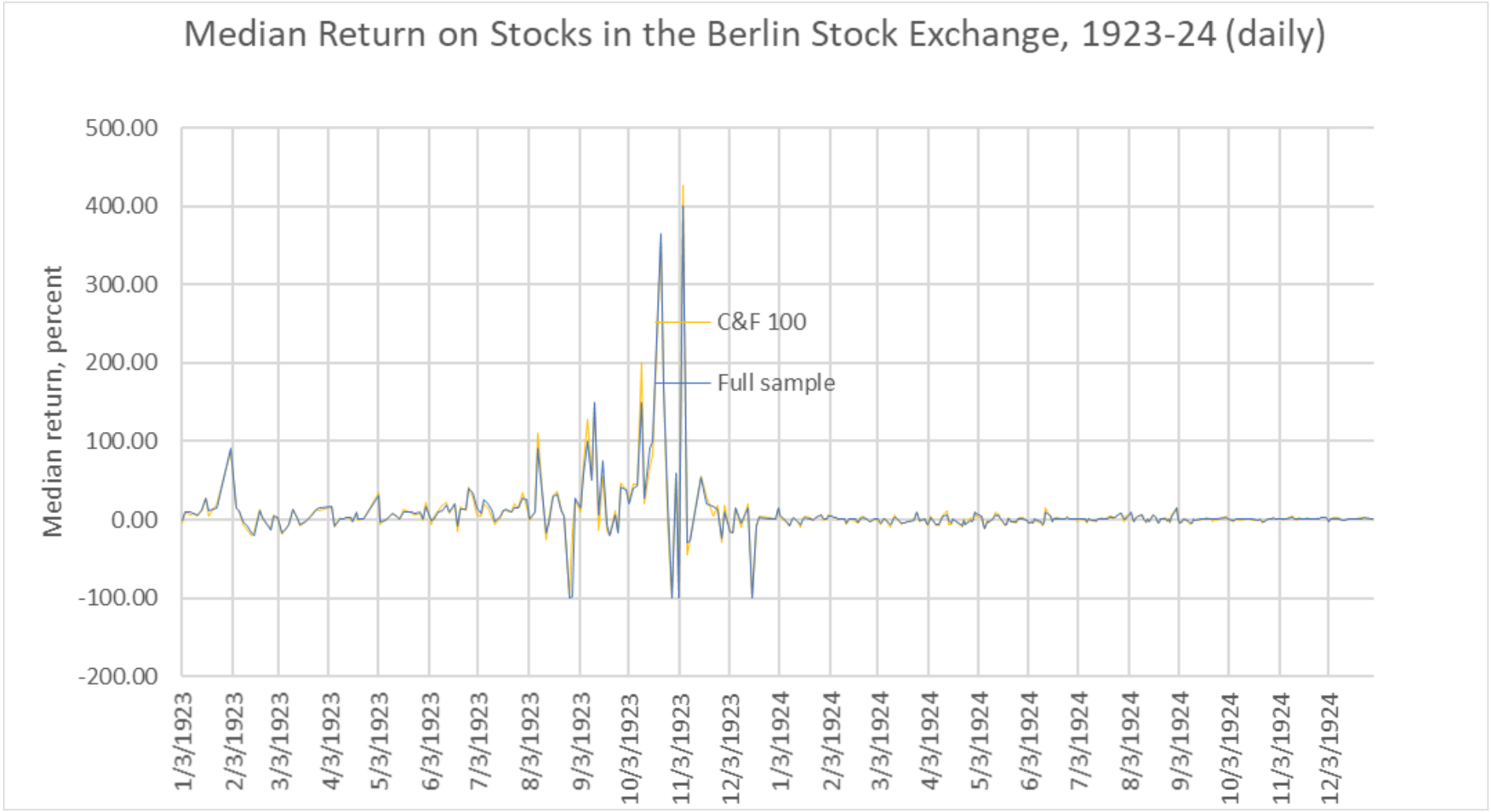
Demand exceeded supply most days

Especially strong during end of hyperinflation



Daily stock returns




Median Return on Stocks in the Berlin Stock Exchange, 1923-24 (daily)
Median return, percent
500.00
400.00
300.00
200.00
100.00
0.00
-100.00
-200.00
C&F 100
Full sample
1/3/1923
2/3/1923
3/3/1923
4/3/1923
5/3/1923
6/3/1923
7/3/1923
8/3/1923
9/3/1923
10/3/1923
11/3/1923
12/3/1923
1/3/1924
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3/3/1924
4/3/1924
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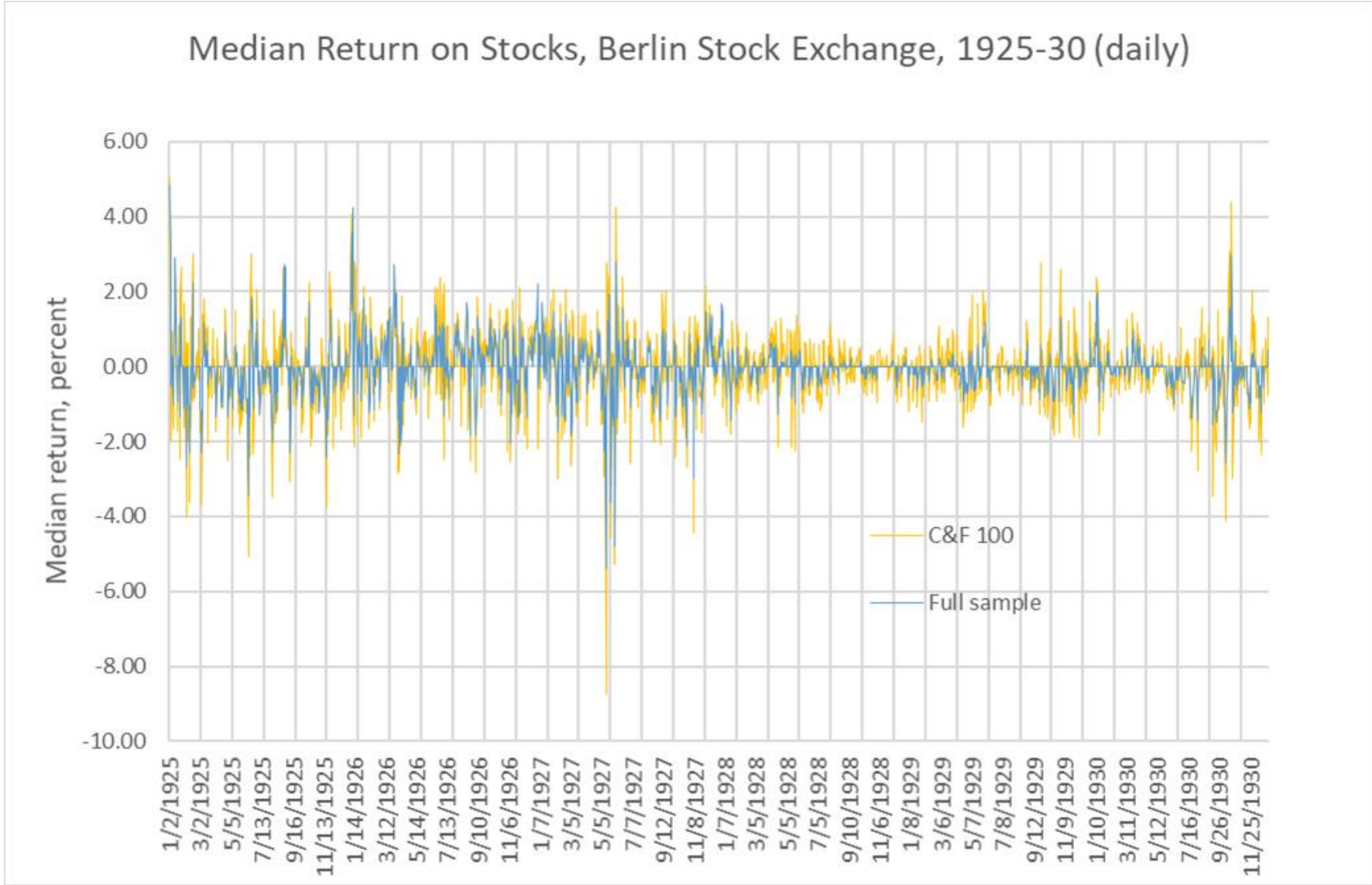
11/3/1924
12/3/1924


Median Return on Stocks, Berlin Stock Exchange, 1925-30 (daily)
Median return, percent
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
1/2/1925
3/2/1925
5/5/1925
7/13/1925
9/16/1925
11/13/1925
1/14/1926
3/12/1926
5/14/1926
7/13/1926
9/10/1926
11/6/1926
1/7/1927
3/5/1927
5/5/1927
7/7/1927
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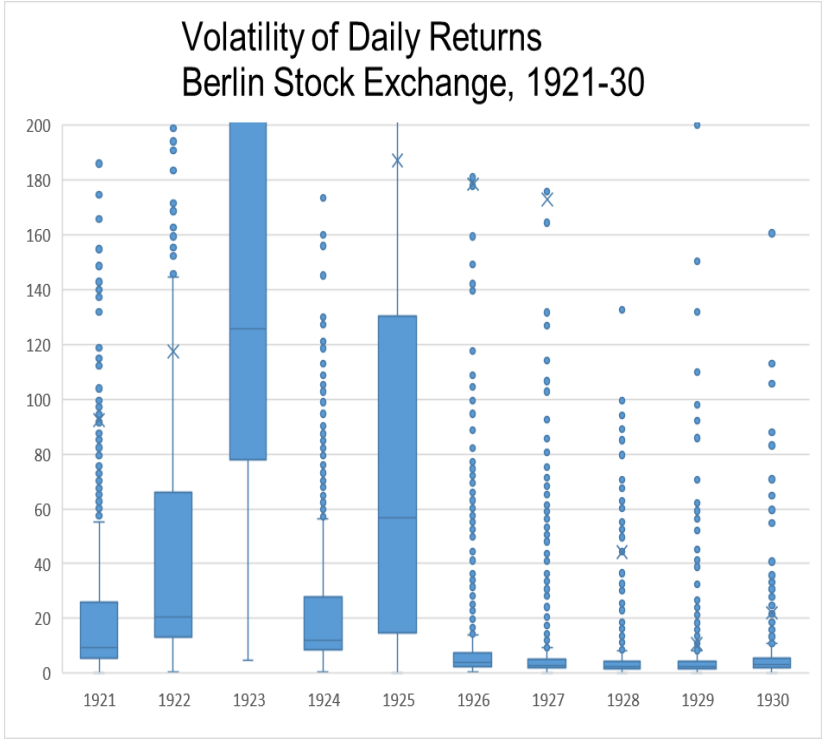
9/10/1928
11/6/1928
1/8/1929
3/6/1929
5/7/1929
7/8/1929
9/12/1929
11/9/1929
1/10/1930
3/11/1930
5/12/1930
7/16/1930
9/26/1930
11/25/1930
C&F 100
Full sample

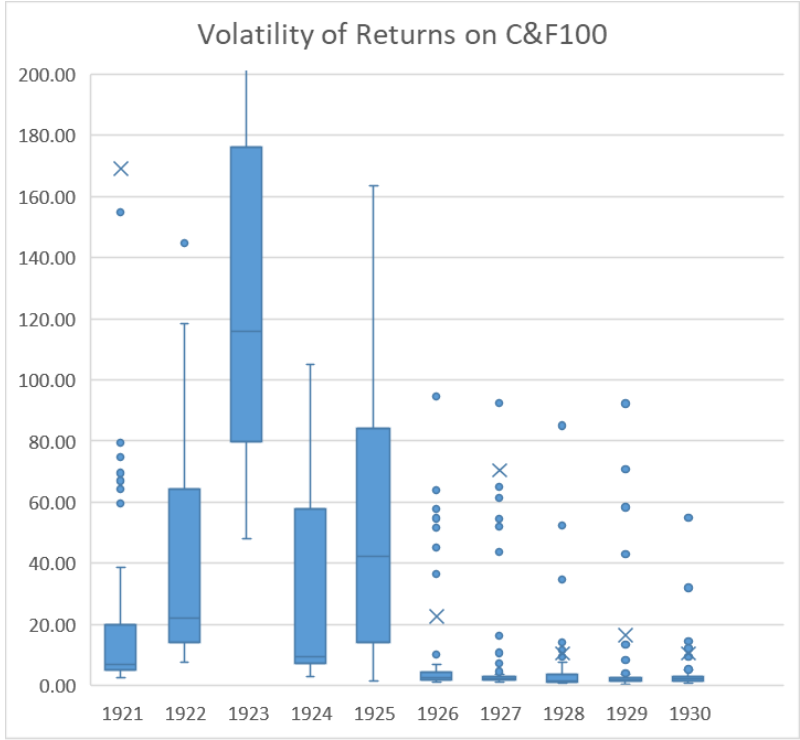
Volatility of Returns

Computed as standard deviation of daily returns for all stocks with a transaction price.

Truncated hyperinflation outliers in order to visualize other years.

Volatility is lower for the C&F100 stocks compared to the full sample.

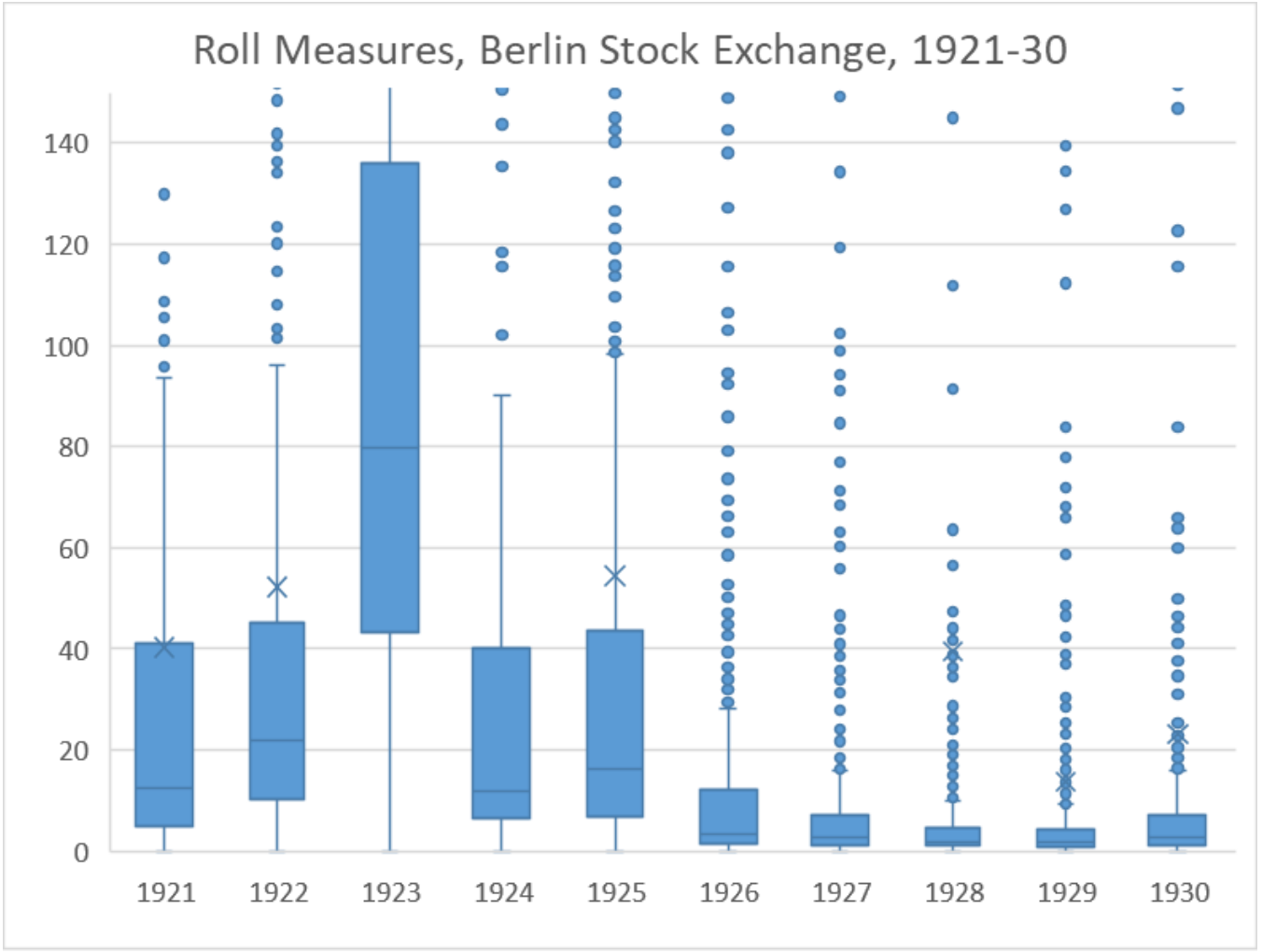




Market Liquidity

Distribution of Roll measures by stock

- Roll measure estimates bid-ask spread solely from transaction prices.
- Excludes cases of negative autocovariance
- Graph excludes extreme outliers (top 5 percent)
- Roll measures are lower for the C&F100 stocks compared to the full sample.
- Gehrig and Fohlin (2006): Same market under vastly different conditions -> much lower Roll measures



Cross Section of Illiquidity

Stocks characteristics relating to illiquidity (Roll measure)

- Pooled annual cross sections 1921-30
- Quantile regression with standard errors clustered on stock
- Share capital available (so far) for 75% of stocks.
- Results confirm Microstructure Theories
- Surprising “New Company”

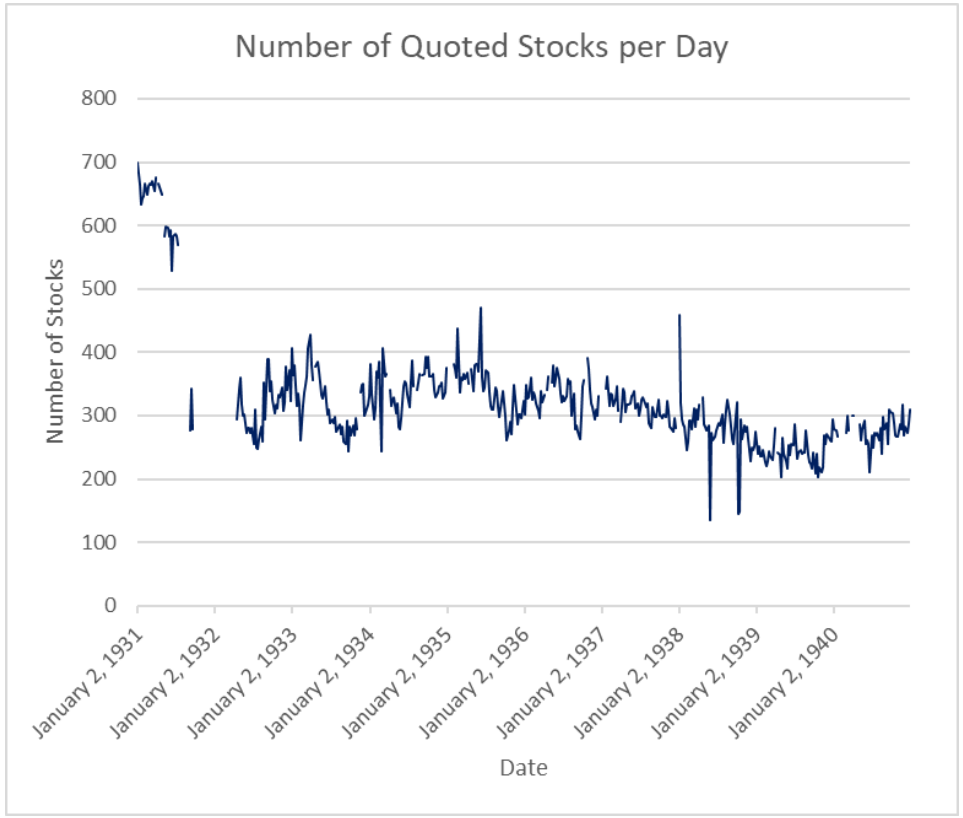
=> Functioning Market with high Volatility and Spread

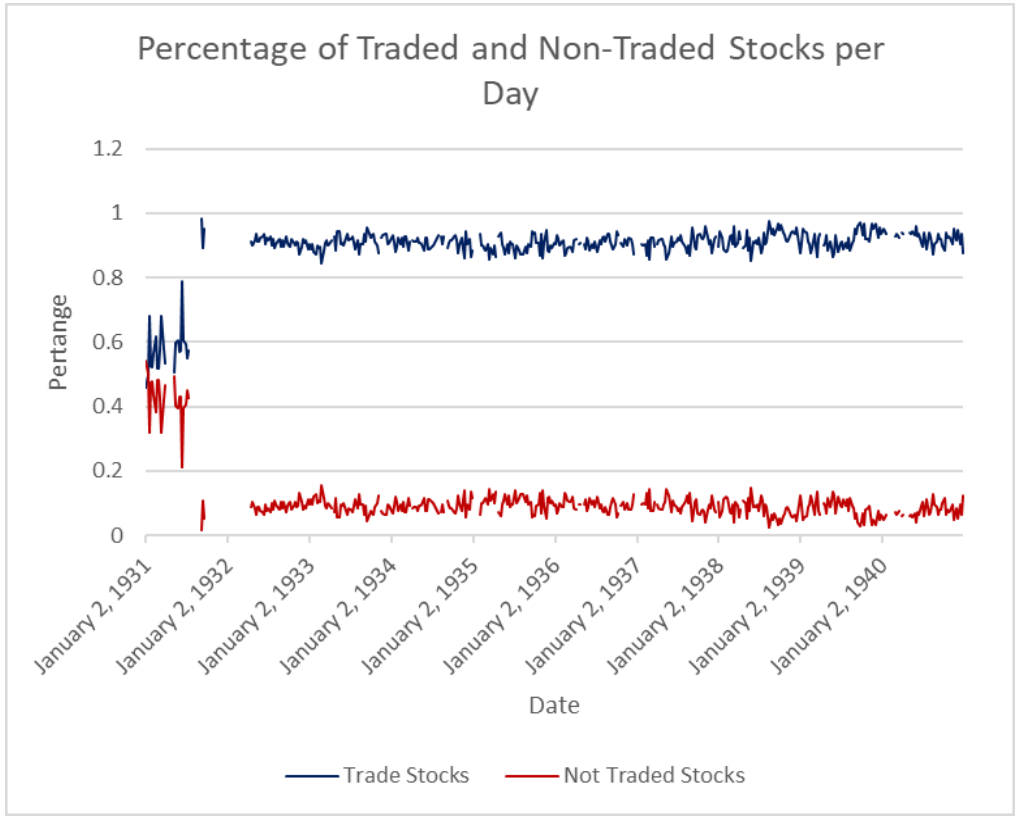
	Quantile	Quantile - Sample	Quantile 25%	Quantile	Quantile 75%
VARIABLES				with annual controls	
Median Price	0.00042	0.0005***	5.98e-05***	6.91e-05	8.75e-05
	(0.000365)	(0.000135)	(8.45e-06)	(0.000200)	(0.000198)
Volatility of Returns	0.186	0.204***	0.153***	0.183***	0.354***
	(0.128)	(0.000546)	(9.25e-05)	(0.00133)	(0.00216)
Traded	-0.030***	-0.032***	-0.00594	-0.0129***	-0.0321
	(0.01)	(0.003)	(0.004)	(0.001)	(0.090)
New Company	-2.297**	-1.332***	-0.120	-0.0738	-0.305
	(0.948)	(0.383)	(0.751)	(0.158)	(17.59)
Capital		-3.28e-07***			
		(3.89e-08)			
Constant	10.39***	10.39***	12.16***	5.252***	24.63
	(3.371)	(0.721)	(0.941)	(1.035)	(24.24)
Observations	7,058	5,259	7,058	7,058	7,058
R-squared	0.495	0.495		0.493	

Conclusions

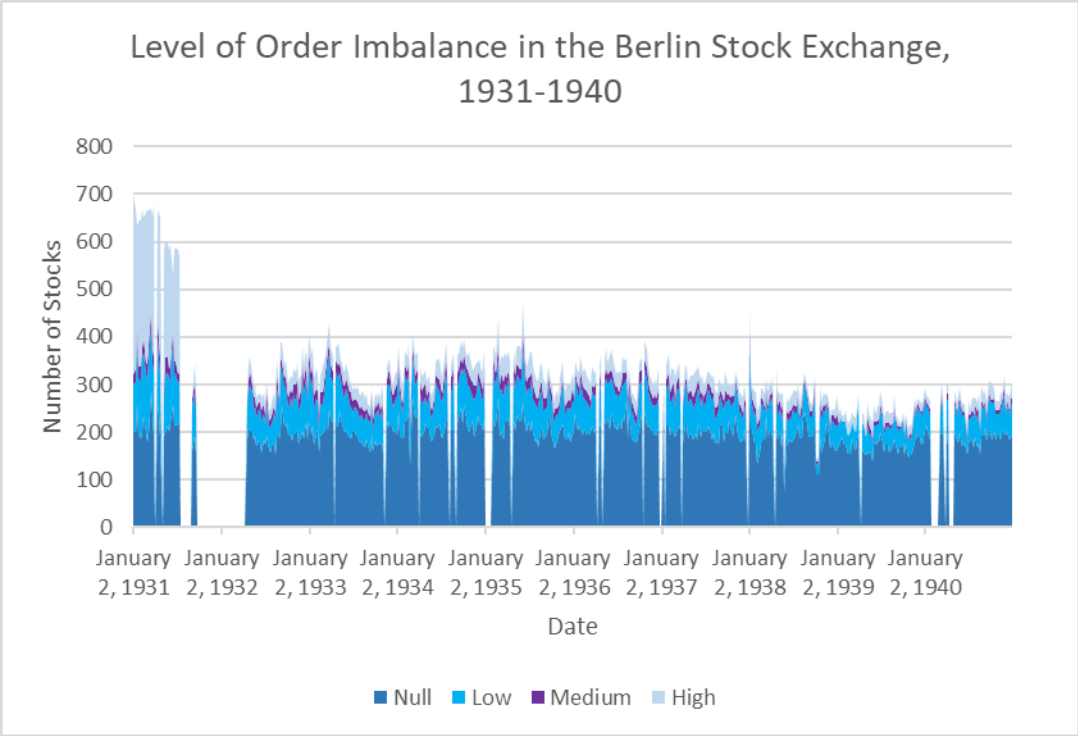
- First ever comprehensive daily stock price series for Germany 1920's
  - Berlin stock exchange during the Great Disorder was a functioning market, though with high volatility and high spreads
  - Stock spreads have a positive relationship with price and return volatility and a negative relationship with the number of trades and the amount of capital. Surprisingly, new companies do not seem to incur additional illiquidity.
- First paper on the German stock market using information on the trades
  - Market direction: demand exceeded supply, especially during the end of the hyperinflation.
  - Market imbalance:
    - Did not significantly affect the early 1920's nor the hyperinflation
    - the late 1920's "bubble" and crash experienced a high market imbalance and is even stronger for the 100 most traded stocks (C&F 100).
- Many more questions we can and plan to answer, e.g. Monetary policy
  - Hyperinflation, politiical uncertainty
  - Bubble in 1927?

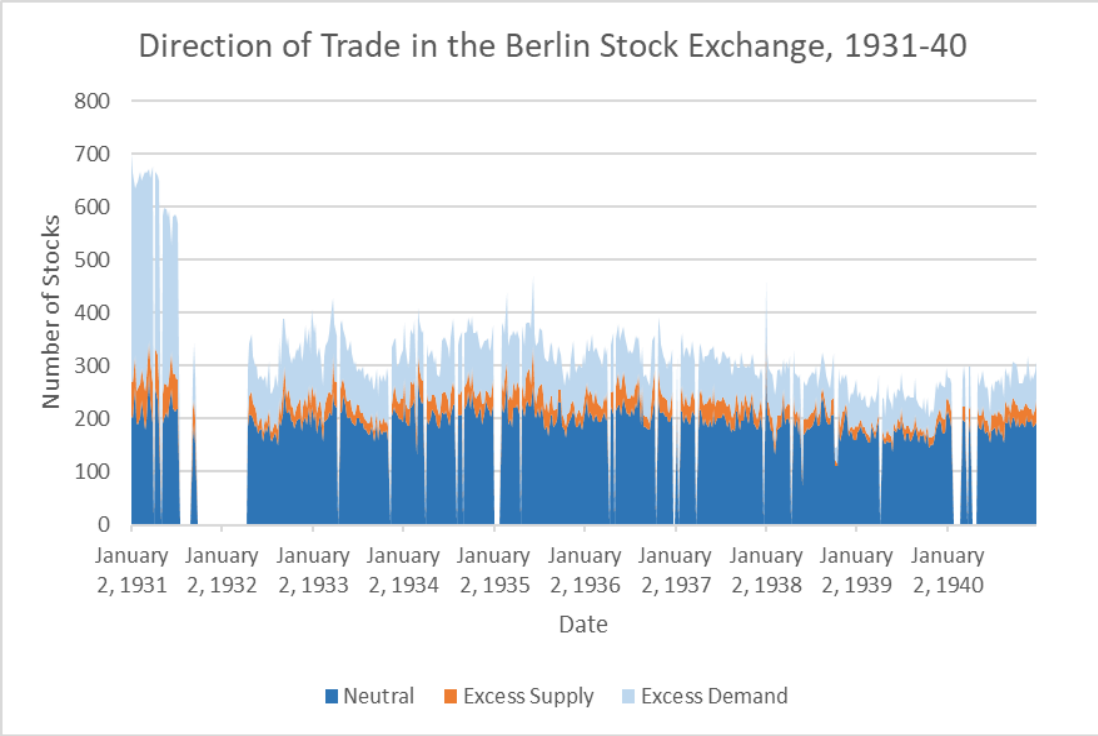
Next phase: The 1930s





Next phase: The 1930s





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