

Informed investors will demand more stocks the lower the price is

- ▶ Informed investors will demand more stocks the lower the price is
- If the stock price is high, uninformed investors may want to hedge their exposure

- ▶ Informed investors will demand more stocks the lower the price is
- ▶ If the stock price is high, uninformed investors may want to hedge their exposure
- Uninformed investors would like to participate in any future gains of the asset

- ▶ Informed investors will demand more stocks the lower the price is
- ▶ If the stock price is high, uninformed investors may want to hedge their exposure
- Uninformed investors would like to participate in any future gains of the asset, but limit losses

- ▶ Informed investors will demand more stocks the lower the price is
- ▶ If the stock price is high, uninformed investors may want to hedge their exposure
- Uninformed investors would like to participate in any future gains of the asset, but limit losses
- Uninformed investors would buy put options as a hedge

- ▶ Informed investors will demand more stocks the lower the price is
- ▶ If the stock price is high, uninformed investors may want to hedge their exposure
- Uninformed investors would like to participate in any future gains of the asset, but limit losses
- Uninformed investors would buy put options as a hedge
- ► Such hedges might be entered into at similar times by uninformed investors

- ▶ Informed investors will demand more stocks the lower the price is
- ▶ If the stock price is high, uninformed investors may want to hedge their exposure
- Uninformed investors would like to participate in any future gains of the asset, but limit losses
- Uninformed investors would buy put options as a hedge
- ► Such hedges might be entered into at similar times by uninformed investors, which may result in similar strike prices being chosen

- ▶ Informed investors will demand more stocks the lower the price is
- ▶ If the stock price is high, uninformed investors may want to hedge their exposure
- Uninformed investors would like to participate in any future gains of the asset, but limit losses
- Uninformed investors would buy put options as a hedge
- ► Such hedges might be entered into at similar times by uninformed investors, which may result in similar strike prices being chosen

► The seller of the put option may want to hedge their own exposure to the asset market

- ► The seller of the put option may want to hedge their own exposure to the asset market
- ▶ They can do so through  $\Delta$ -hedging

- ► The seller of the put option may want to hedge their own exposure to the asset market
- ▶ They can do so through  $\Delta$ -hedging
- ▶ The would short-sell  $\Delta_P = N\left(d_1\right) 1$  assets for each put option sold

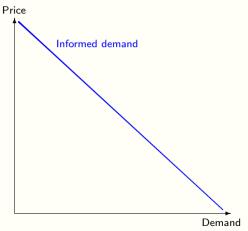
- ► The seller of the put option may want to hedge their own exposure to the asset market
- ▶ They can do so through  $\Delta$ -hedging
- ▶ The would short-sell  $\Delta_P = N(d_1) 1$  assets for each put option sold
- ightharpoonup This creates a negative demand, driven by the  $\Delta_P$  of the put option

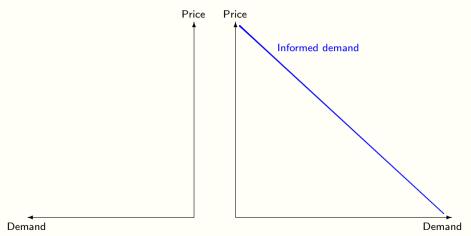
- ► The seller of the put option may want to hedge their own exposure to the asset market
- ightharpoonup They can do so through  $\Delta$ -hedging
- ▶ The would short-sell  $\Delta_P = N(d_1) 1$  assets for each put option sold
- lacktriangle This creates a negative demand, driven by the  $\Delta_P$  of the put option
- ► The higher the demand for put options, the more short-selling occurs

- ► The seller of the put option may want to hedge their own exposure to the asset market
- ightharpoonup They can do so through  $\Delta$ -hedging
- ▶ The would short-sell  $\Delta_P = N(d_1) 1$  assets for each put option sold
- lacktriangle This creates a negative demand, driven by the  $\Delta_P$  of the put option
- ▶ The higher the demand for put options, the more short-selling occurs
- ► The amount of short-selling will depend non-linearly on the current price of the asset

- ► The seller of the put option may want to hedge their own exposure to the asset market
- ightharpoonup They can do so through  $\Delta$ -hedging
- ▶ The would short-sell  $\Delta_P = N(d_1) 1$  assets for each put option sold
- lacktriangle This creates a negative demand, driven by the  $\Delta_P$  of the put option
- ▶ The higher the demand for put options, the more short-selling occurs
- ► The amount of short-selling will depend non-linearly on the current price of the asset







Copyright (©) by Andreas Krause



Copyright (©) by Andreas Krause



Copyright (C) by Andreas Kraus

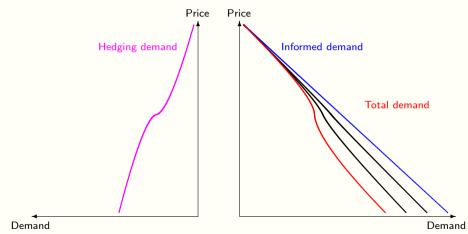


Copyright (C) by Andreas Kraus





Copyright (C) by Andreas Kraus



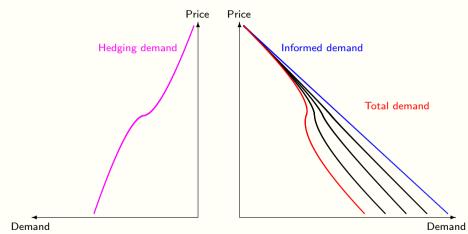
Copyright (C) by Andreas Krause



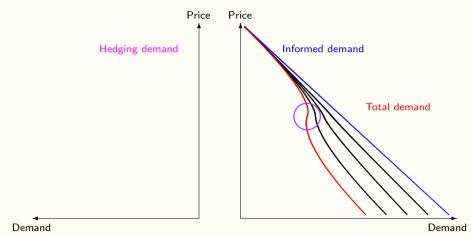
Copyright (C) by Andreas Krause



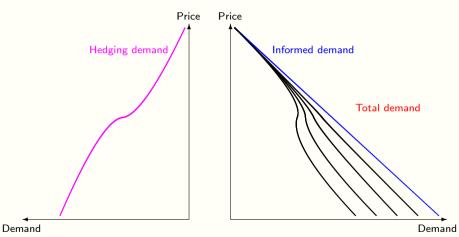
Copyright (C) by Andreas Kradse



Copyright by Andreas Kraus



Copyright (C) by Andreas Kraus

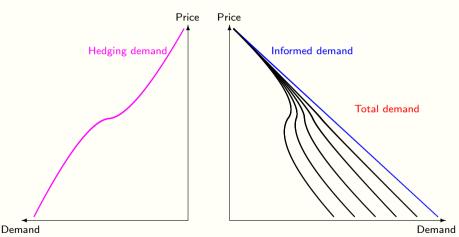


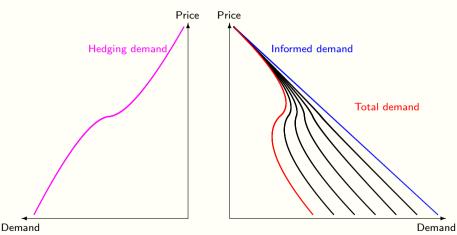
Copyright by Andreas Kraus

Slide 4 of 13

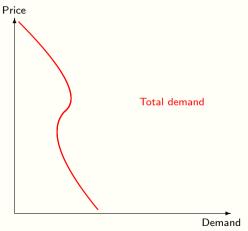


Copyright ( by Andreas Krause





## Increasing hedging demand

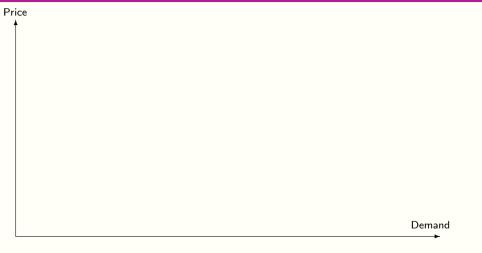


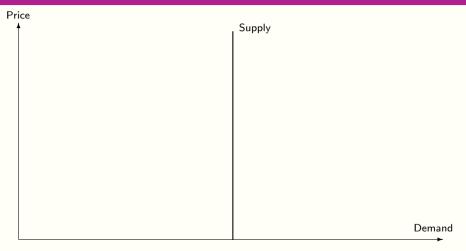
► The non-linear amount of short-selling can lead to a backward sloping demand curve

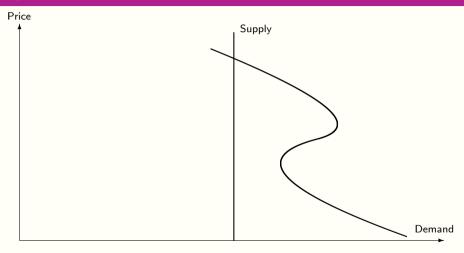
- ► The non-linear amount of short-selling can lead to a backward sloping demand curve
- ► This occurs if the hedging demand by uninformed investors is sufficiently large

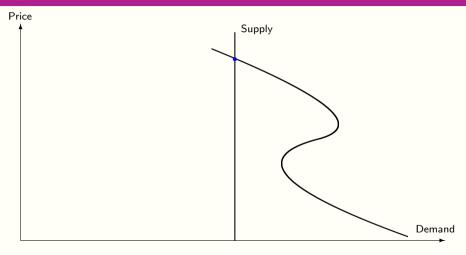
- ► The non-linear amount of short-selling can lead to a backward sloping demand curve
- ▶ This occurs if the hedging demand by uninformed investors is sufficiently large
- A backward-sloping demand curve has implications for the equilibrium prices

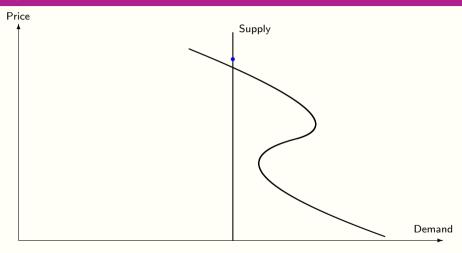
- ► The non-linear amount of short-selling can lead to a backward sloping demand curve
- ▶ This occurs if the hedging demand by uninformed investors is sufficiently large
- A backward-sloping demand curve has implications for the equilibrium prices

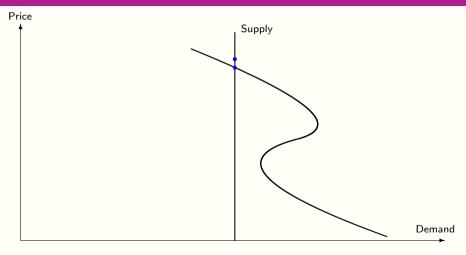


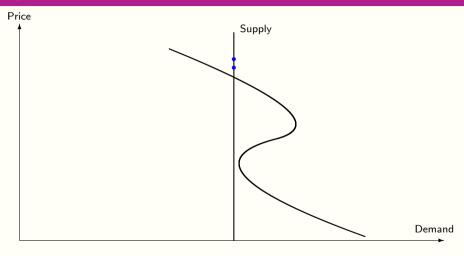


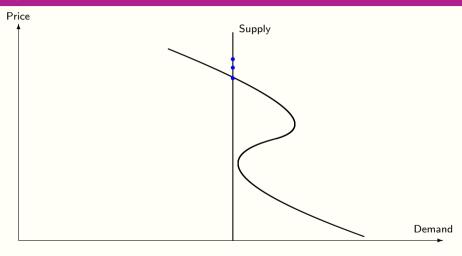


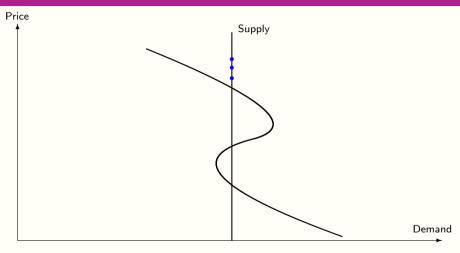


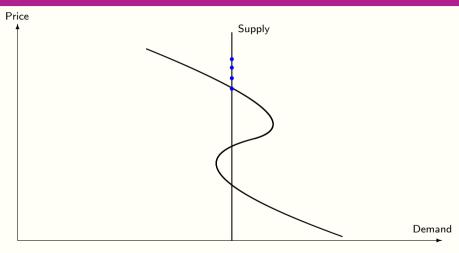


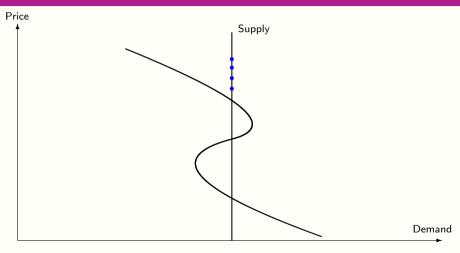


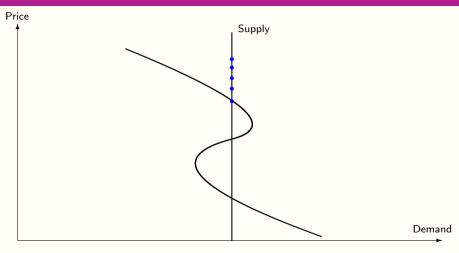


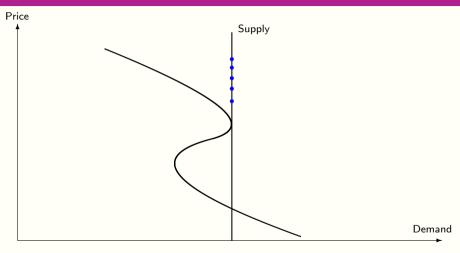


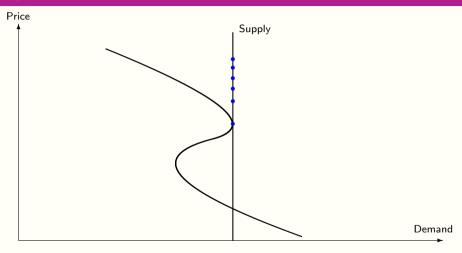


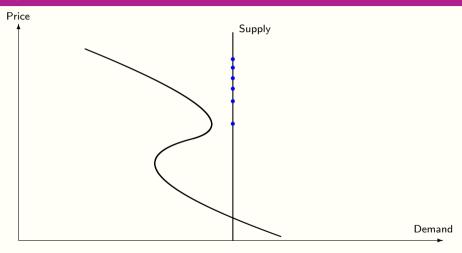


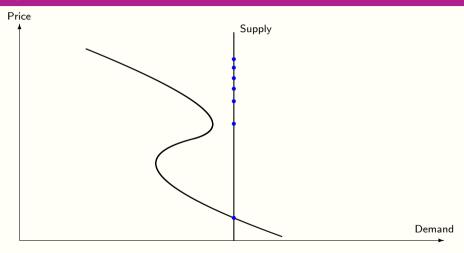


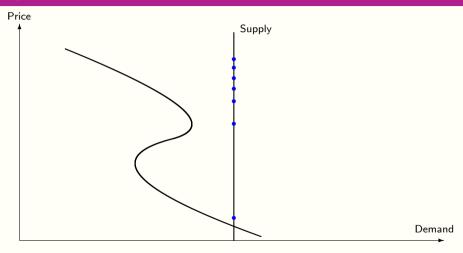


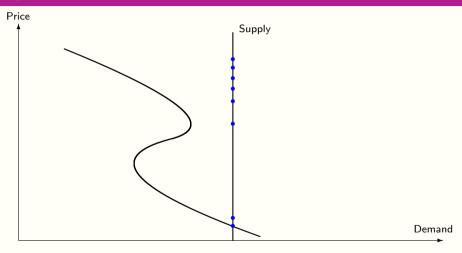


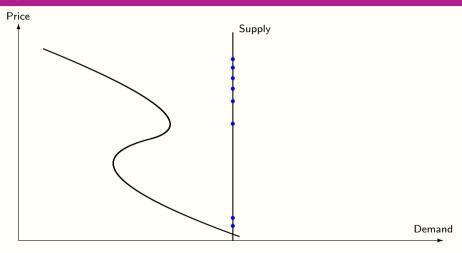


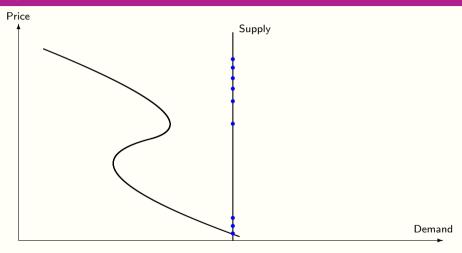


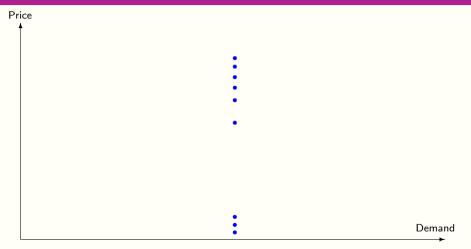


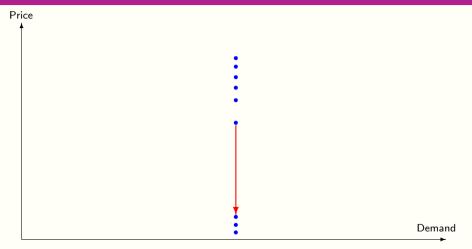


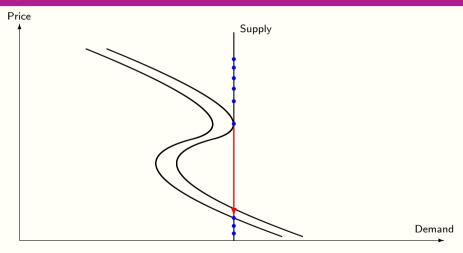


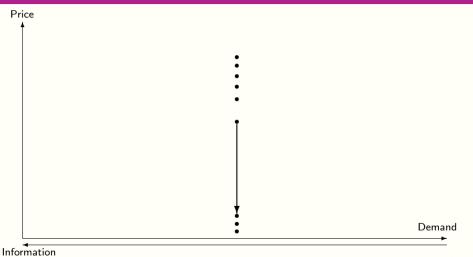




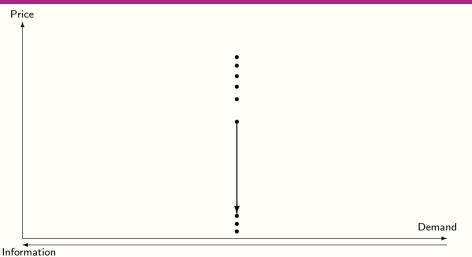








Slide 6 of 13



Slide 6 of 13

► If the total demand of informed investors is reducing, sudden large price drops can occur

- ► If the total demand of informed investors is reducing, sudden large price drops can occur
- Such price drops are not the result of significant changes in demand

- ▶ If the total demand of informed investors is reducing, sudden large price drops can occur
- ► Such price drops are not the result of significant changes in demand, a small change in demand can lead to a large price change

#### Market crashes can occur

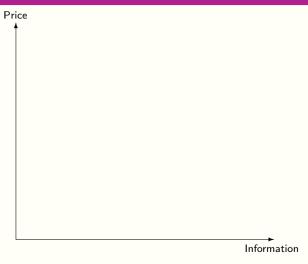
- ▶ If the total demand of informed investors is reducing, sudden large price drops can occur
- Such price drops are not the result of significant changes in demand, a small change in demand can lead to a large price change
- As demand increases with information becoming more positive, we can identify the level of demand with information

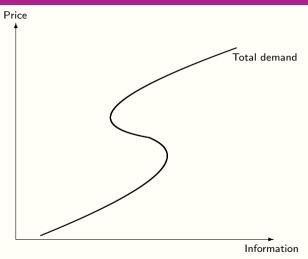
#### Market crashes can occur

- ▶ If the total demand of informed investors is reducing, sudden large price drops can occur
- ► Such price drops are not the result of significant changes in demand, a small change in demand can lead to a large price change
- ► As demand increases with information becoming more positive, we can identify the level of demand with information
- ⇒ A small change in information can cause a market crash

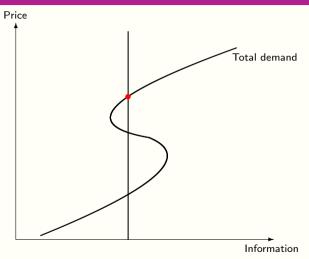
#### Market crashes can occur

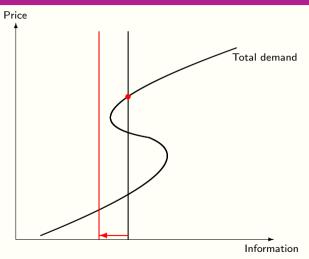
- ▶ If the total demand of informed investors is reducing, sudden large price drops can occur
- ► Such price drops are not the result of significant changes in demand, a small change in demand can lead to a large price change
- ► As demand increases with information becoming more positive, we can identify the level of demand with information
- $\Rightarrow$  A small change in information can cause a market crash



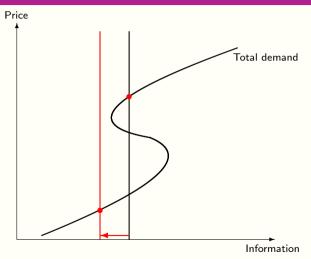


Copyright by Andreas Kraus

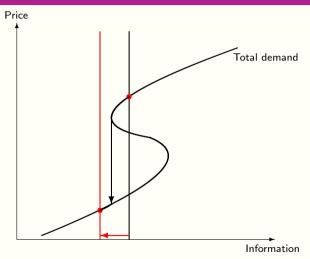


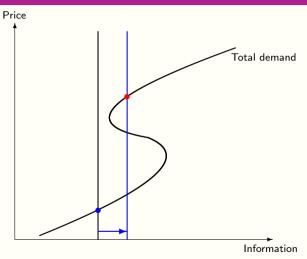


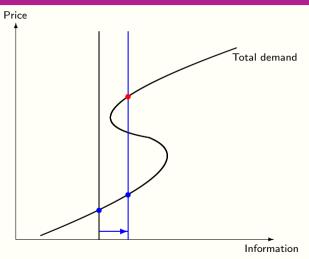
Copyright (C) by Andreas Kraus

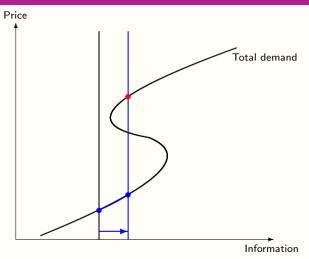


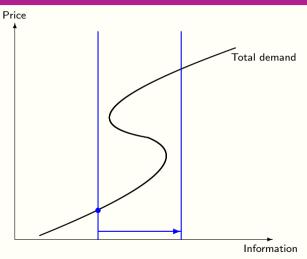
Copyright by Andreas Kraus

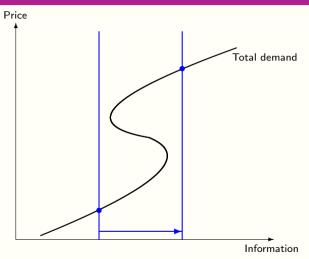


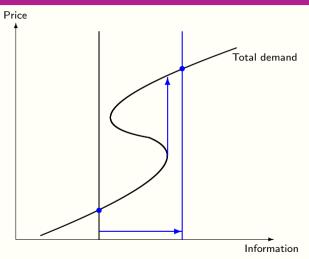


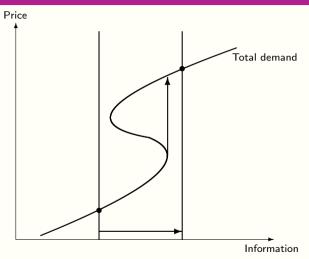












Hedging and market crashes

► Reversing the information that lead to a market crash does not lead the price to revert to their old level

- ► Reversing the information that lead to a market crash does not lead the price to revert to their old level
- ► Prices have reached a new lower equilibrium

- ► Reversing the information that lead to a market crash does not lead the price to revert to their old level
- ► Prices have reached a new lower equilibrium and small improvements in information will only lead to a small increase in prices

- ► Reversing the information that lead to a market crash does not lead the price to revert to their old level
- ► Prices have reached a new lower equilibrium and small improvements in information will only lead to a small increase in prices
- For prices to revert to their previous level, significantly improved information needs to be emerging

- ► Reversing the information that lead to a market crash does not lead the price to revert to their old level
- ► Prices have reached a new lower equilibrium and small improvements in information will only lead to a small increase in prices
- ► For prices to revert to their previous level, significantly improved information needs to be emerging

▶ If positive news are received, the demand of informed investors increases

► If positive news are received, the demand of informed investors increases, prices increase

- ► If positive news are received, the demand of informed investors increases, prices increase
- Uninformed investors may be concerned about losses if prices are high due to a bubble and commence hedging

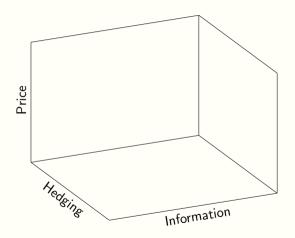
- ► If positive news are received, the demand of informed investors increases, prices increase
- Uninformed investors may be concerned about losses if prices are high due to a bubble and commence hedging
- ► The higher the price goes, the more hedging is conducted

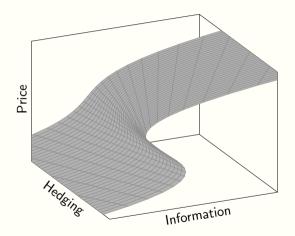
- ► If positive news are received, the demand of informed investors increases, prices increase
- Uninformed investors may be concerned about losses if prices are high due to a bubble and commence hedging
- ▶ The higher the price goes, the more hedging is conducted
- ▶ If bad information arrives, the demand by informed investors reduces

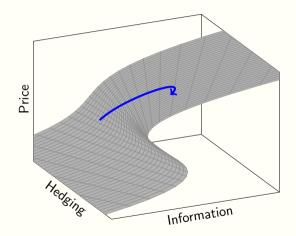
- ► If positive news are received, the demand of informed investors increases, prices increase
- Uninformed investors may be concerned about losses if prices are high due to a bubble and commence hedging
- The higher the price goes, the more hedging is conducted
- ► If bad information arrives, the demand by informed investors reduces, which may cause a market crash

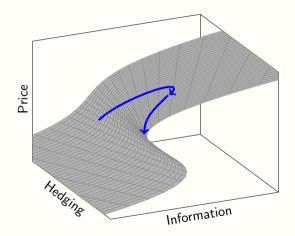
- ► If positive news are received, the demand of informed investors increases, prices increase
- Uninformed investors may be concerned about losses if prices are high due to a bubble and commence hedging
- ▶ The higher the price goes, the more hedging is conducted
- ▶ If bad information arrives, the demand by informed investors reduces, which may cause a market crash
- After a crash, hedging will reduce as uninformed investors are not concerned about further losses

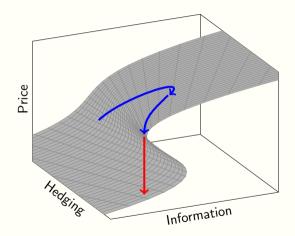
- ► If positive news are received, the demand of informed investors increases, prices increase
- Uninformed investors may be concerned about losses if prices are high due to a bubble and commence hedging
- ▶ The higher the price goes, the more hedging is conducted
- ▶ If bad information arrives, the demand by informed investors reduces, which may cause a market crash
- After a crash, hedging will reduce as uninformed investors are not concerned about further losses

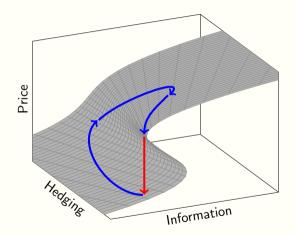


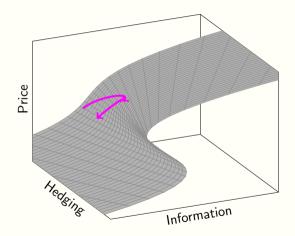


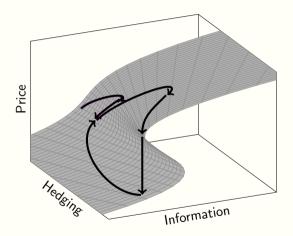












► The behaviour of uninformed investors <a href="hedging">hedging</a> their exposure can lead to market crashes

- ► The behaviour of uninformed investors hedging their exposure can lead to market crashes
- ► If hedging demand is sufficiently high, market crashes can occur without significant information being received

- ► The behaviour of uninformed investors hedging their exposure can lead to market crashes
- ► If hedging demand is sufficiently high, market crashes can occur without significant information being received
- The run-up the a market crash sees some negative information emerging

- ► The behaviour of uninformed investors hedging their exposure can lead to market crashes
- ► If hedging demand is sufficiently high, market crashes can occur without significant information being received
- ► The run-up the a market crash sees some negative information emerging, but not significant enough to justify a market crash

- ► The behaviour of uninformed investors hedging their exposure can lead to market crashes
- ► If hedging demand is sufficiently high, market crashes can occur without significant information being received
- ► The run-up the a market crash sees some negative information emerging, but not significant enough to justify a market crash
- ► The market moves from a high equilibrium to a low equilibrium once the information is sufficiently negative

- ► The behaviour of uninformed investors hedging their exposure can lead to market crashes
- ► If hedging demand is sufficiently high, market crashes can occur without significant information being received
- ► The run-up the a market crash sees some negative information emerging, but not significant enough to justify a market crash
- ► The market moves from a high equilibrium to a low equilibrium once the information is sufficiently negative
- Market jumps are unlikely to occur due to the hedging demand being low if the low equilibrium is reached

Copyright 🕝 by Andreas Krause

- ► The behaviour of uninformed investors hedging their exposure can lead to market crashes
- ► If hedging demand is sufficiently high, market crashes can occur without significant information being received
- ► The run-up the a market crash sees some negative information emerging, but not significant enough to justify a market crash
- ► The market moves from a high equilibrium to a low equilibrium once the information is sufficiently negative
- Market jumps are unlikely to occur due to the hedging demand being low if the low equilibrium is reached

Copyright by Andreas Krause

Hedging and market crashes

► If the low equilibrium is reached, hedging demand in some markets may still be high

- ► If the low equilibrium is reached, hedging demand in some markets may still be high
- ► In the foreign exchange market, investors in one country may see their currency as having low value

- ► If the low equilibrium is reached, hedging demand in some markets may still be high
- ► In the foreign exchange market, investors in one country may see their currency as having low value
- Investors in the other country will then see it as having high value

- ► If the low equilibrium is reached, hedging demand in some markets may still be high
- ► In the foreign exchange market, investors in one country may see their currency as having low value
- ▶ Investors in the other country will then see it as having high value
- ⇒ Who hedges might change

- ► If the low equilibrium is reached, hedging demand in some markets may still be high
- ► In the foreign exchange market, investors in one country may see their currency as having low value
- Investors in the other country will then see it as having high value
- ⇒ Who hedges might change, but high hedging demand may persist

- ► If the low equilibrium is reached, hedging demand in some markets may still be high
- ► In the foreign exchange market, investors in one country may see their currency as having low value
- Investors in the other country will then see it as having high value
- $\Rightarrow$  Who hedges might change, but high hedging demand may persist
- A market crash from the perspective of one country is a market jump from the perspective the other country

- ► If the low equilibrium is reached, hedging demand in some markets may still be high
- ► In the foreign exchange market, investors in one country may see their currency as having low value
- Investors in the other country will then see it as having high value
- ⇒ Who hedges might change, but high hedging demand may persist
- ► A market crash from the perspective of one country is a market jump from the perspective the other country
- ► The same applies in commodity markets

- ► If the low equilibrium is reached, hedging demand in some markets may still be high
- ► In the foreign exchange market, investors in one country may see their currency as having low value
- Investors in the other country will then see it as having high value
- ⇒ Who hedges might change, but high hedging demand may persist
- ► A market crash from the perspective of one country is a market jump from the perspective the other country
- ► The same applies in commodity markets with producers and users of the commodity

- ► If the low equilibrium is reached, hedging demand in some markets may still be high
- ► In the foreign exchange market, investors in one country may see their currency as having low value
- Investors in the other country will then see it as having high value
- $\Rightarrow$  Who hedges might change, but high hedging demand may persist
- ► A market crash from the perspective of one country is a market jump from the perspective the other country
- ► The same applies in commodity markets with producers and users of the commodity



#### Copyright © by Andreas Krause

Cover: Tobias Deml. CC BY-SA 4.0 https://creativecommons.org/licenses/by-sa/4.0. via Wikimedia Commons. https://uoload.wikimedia.org/wikinedia/commons/2/26/Gaming-Wall-Street\_BTS\_Prodicium-266.jog Back: Michael Vadon, CC BY 2.0 | https://creativecommons.org/licenses/by/2.02, via Wikimedia Commons, https://upload.wikimedia.org/wikipedia/commons/9/97/Manhattan(NYC-New-York-City)Skyline(31769153946).jpg

Andreas Krause Department of Economics University of Bath Claverton Down Bath BA2 7AY United Kingdom

E-mail: mnsak@bath.ac.uk