How inflation impacts economic measurement

Examples from Austrian GDP compilation

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Impact of inflation on macroeconomic measurement and analysis
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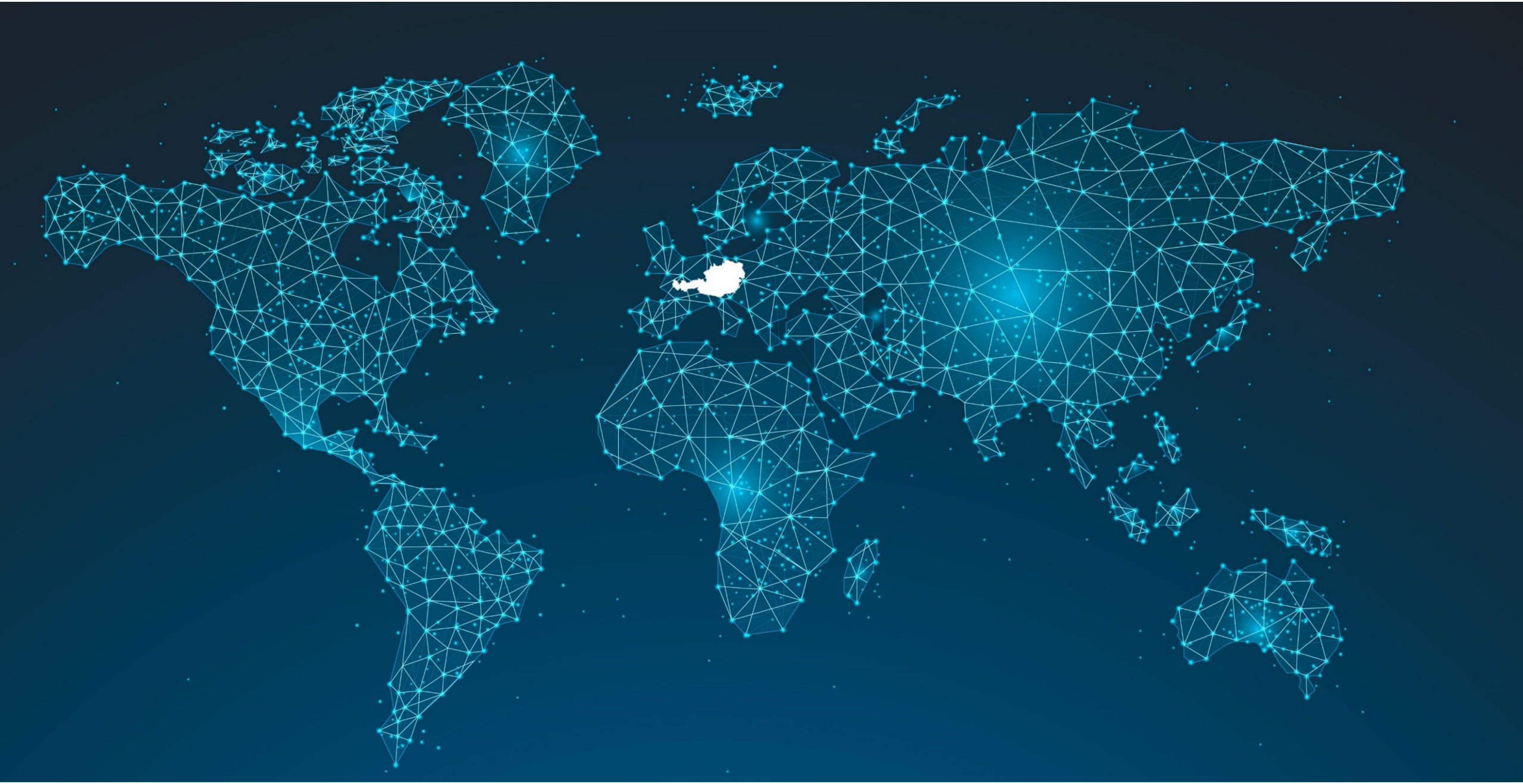
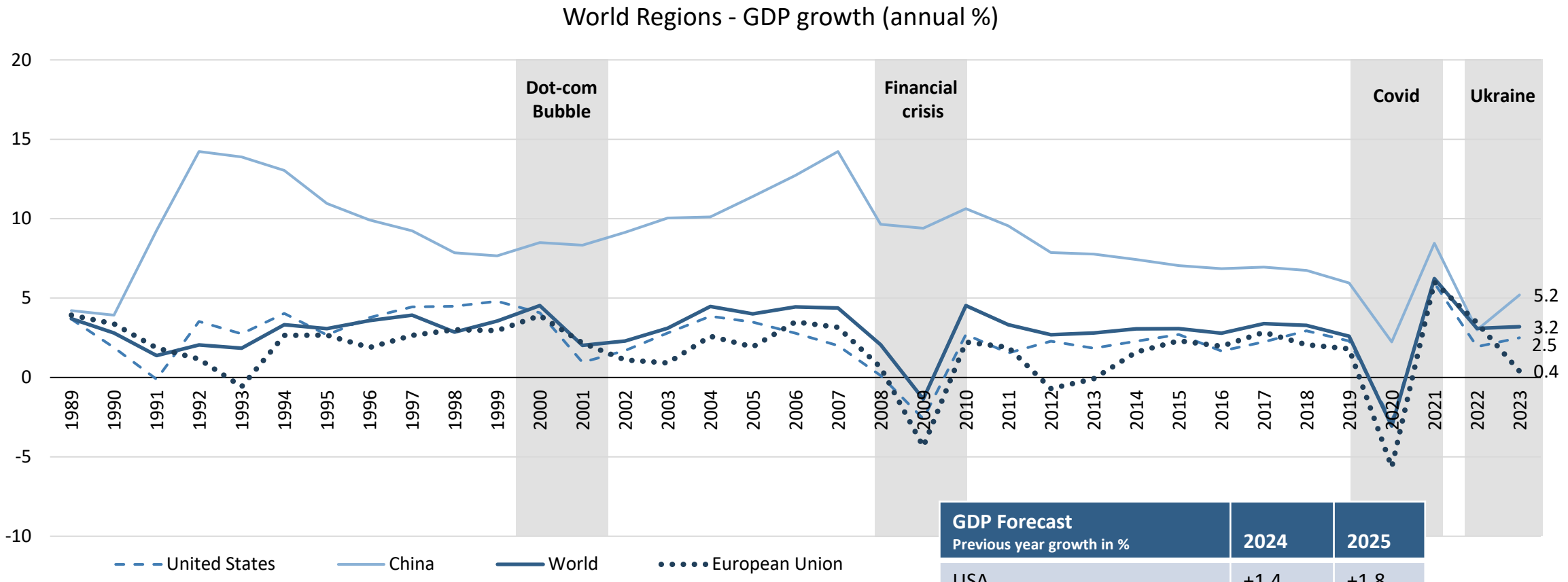


Economic development

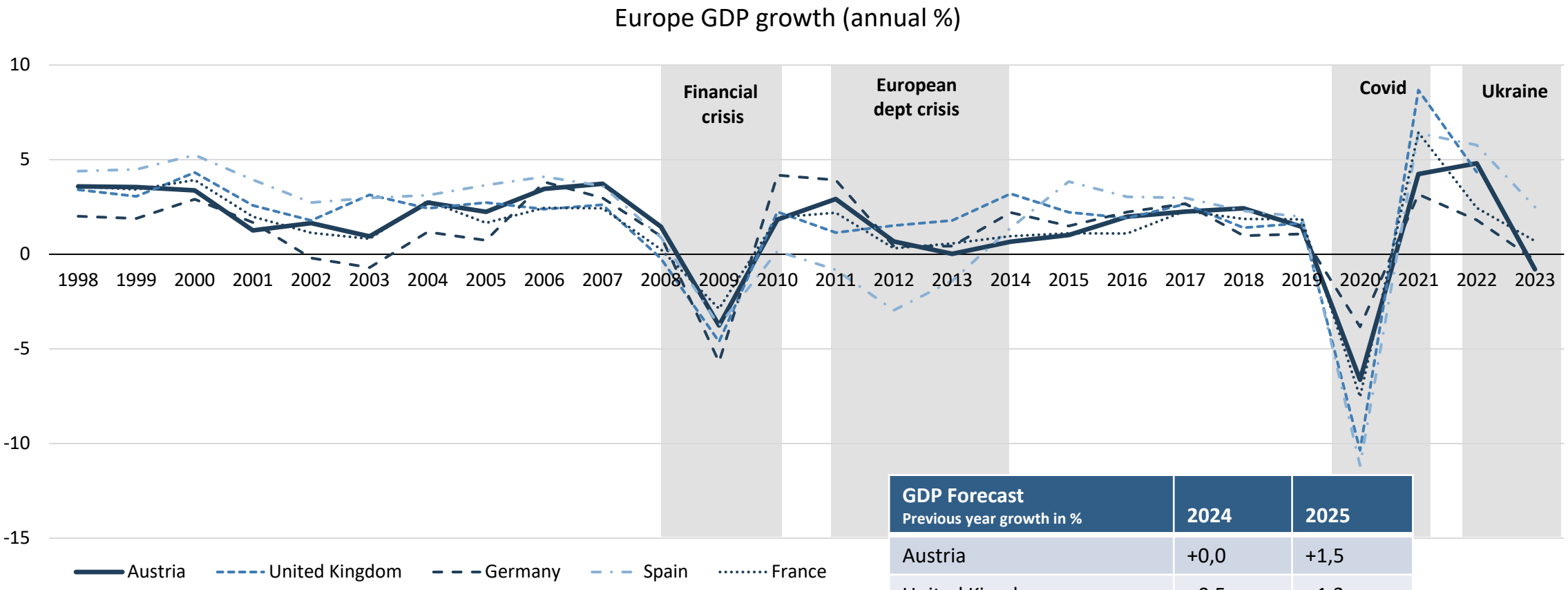
While GDPs stabilize worldwide, EU suffers economically



GDP Forecast Previous year growth in %	2024	2025
USA	+1,4	+1,8
China	+4,6	+4,1
World	+3,2	+3,2
European Union	+1,2	+1,7

S: IMF World Development Indicators

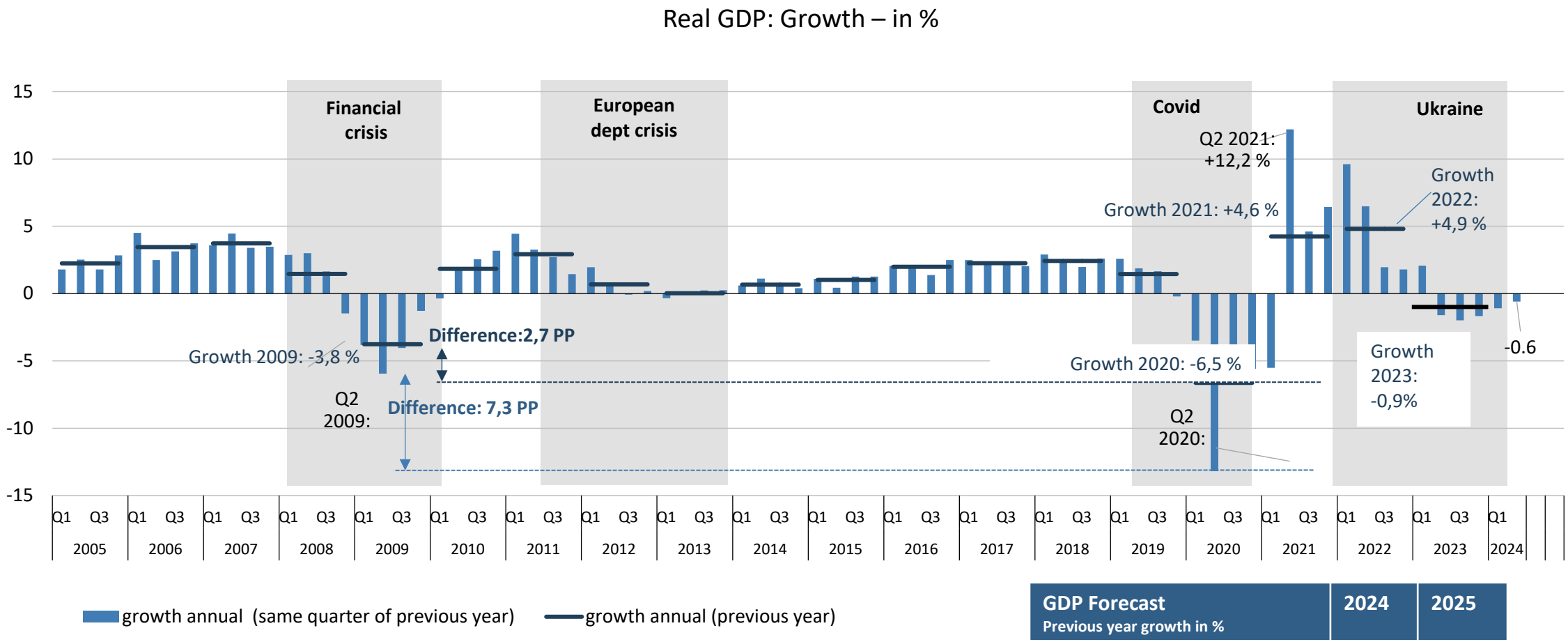
European economies show similar developments, even in crises



GDP Forecast Previous year growth in %	2024	2025
Austria	+0,0	+1,5
United Kingdom	+0,5	+1,3
Germany	+0,2	+1,3
Spain	+1,7	+2,0
France	+1,2	+1,4

S: Eurostat; Forecast: WIFO

Austria struggles in overcoming the recession

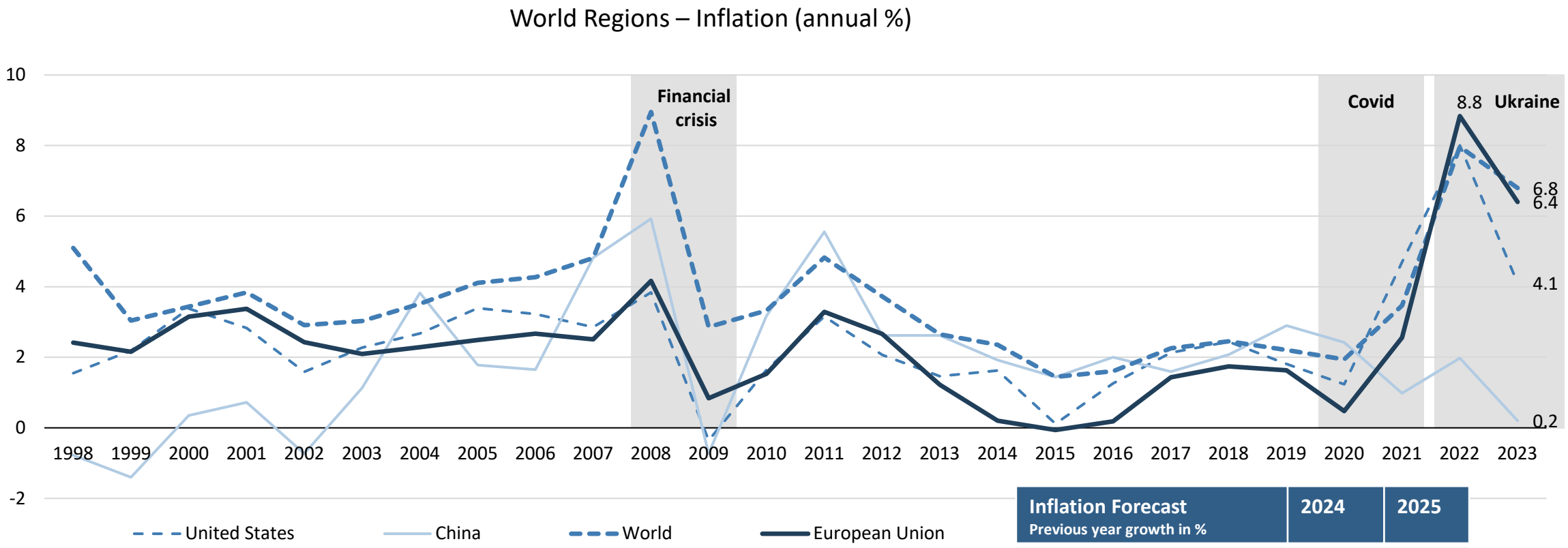


GDP Forecast Previous year growth in %	2024	2025
WIFO	+0,0	+1,5

Q: STATISTIK AUSTRIA, Quarterly National Accounts, WIFO, IHS

Inflation

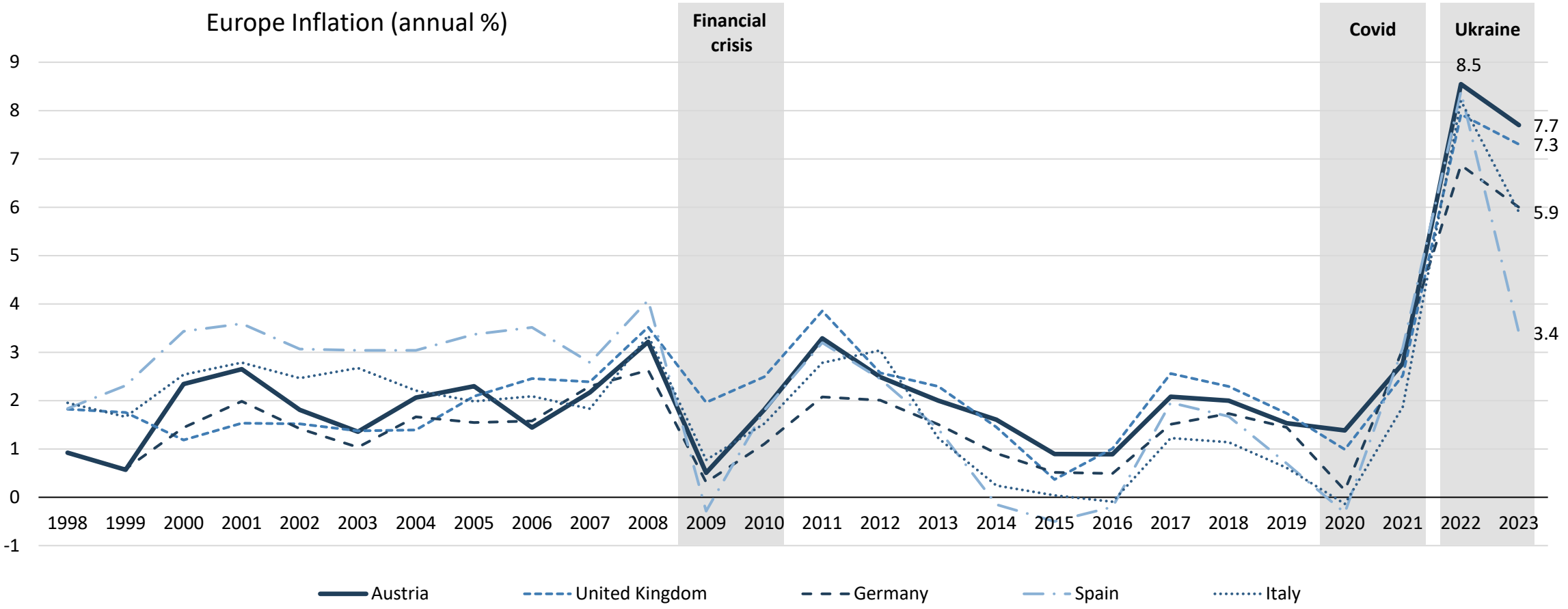
Covid recovery and Ukraine mark end of low inflation rates



Inflation Forecast Previous year growth in %	2024	2025
USA	+3,0	+2,2
China	+1,0	+2,0
World	+5,9	+4,5
European Union	+2,7	+2,4

S: IMF World Development Indicators

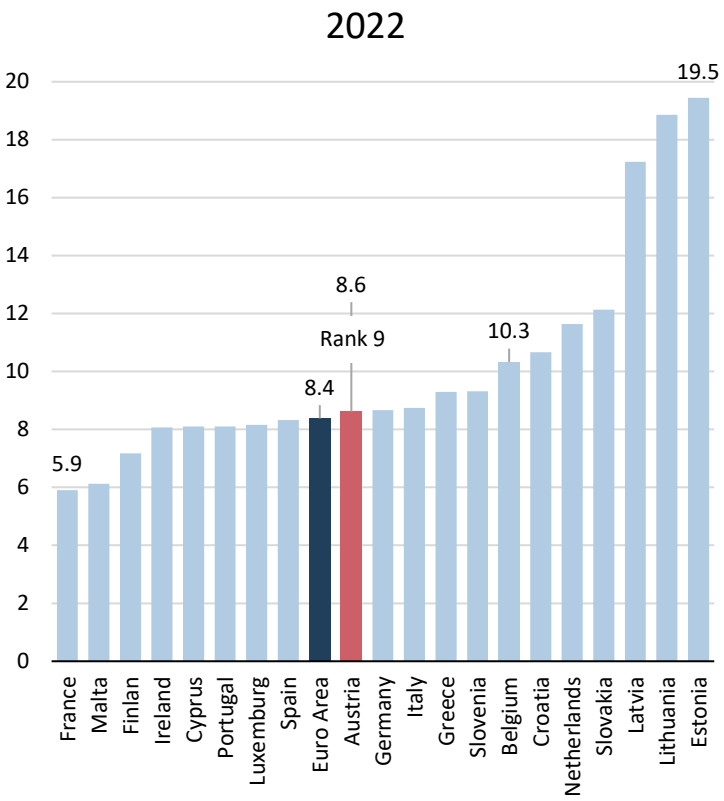
Europe is highly divergent in terms of inflation recovery

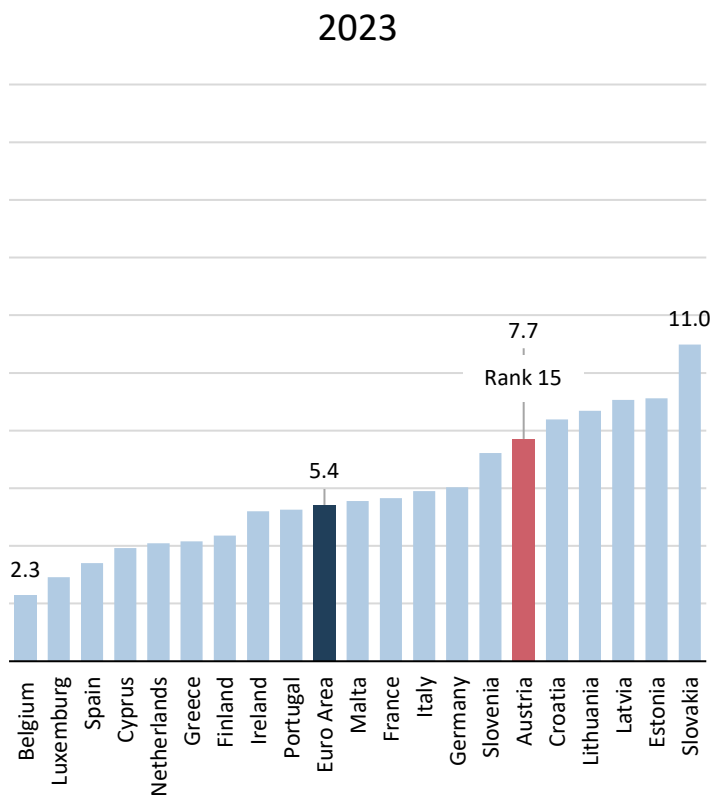


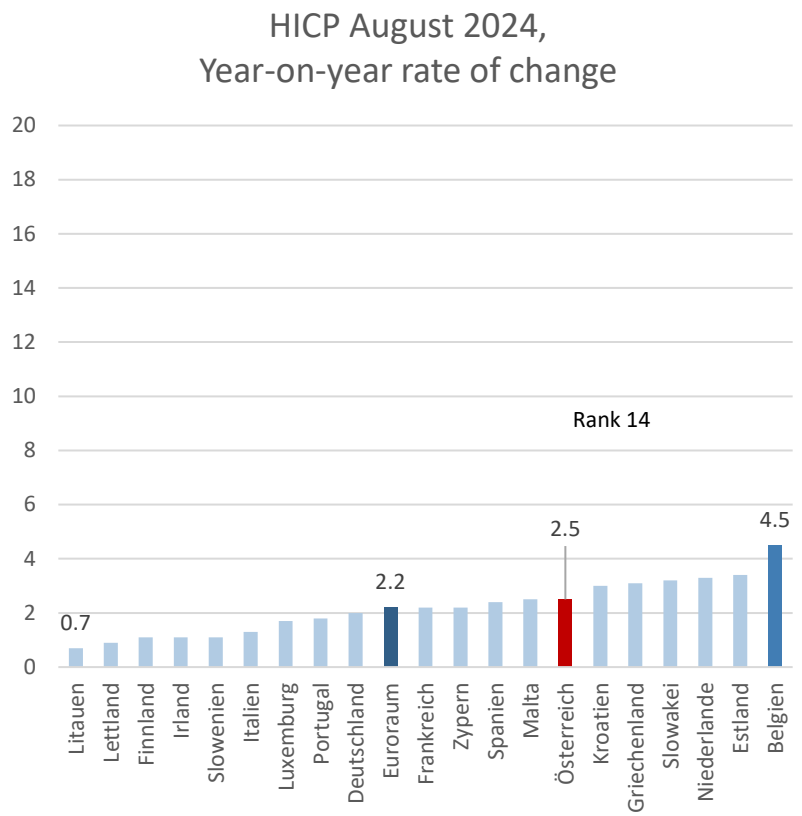
S: IMF World Development Indicators

Austria's ranking deteriorated despite falling inflation..

HICP All-Item rate of change to - previous year – in %



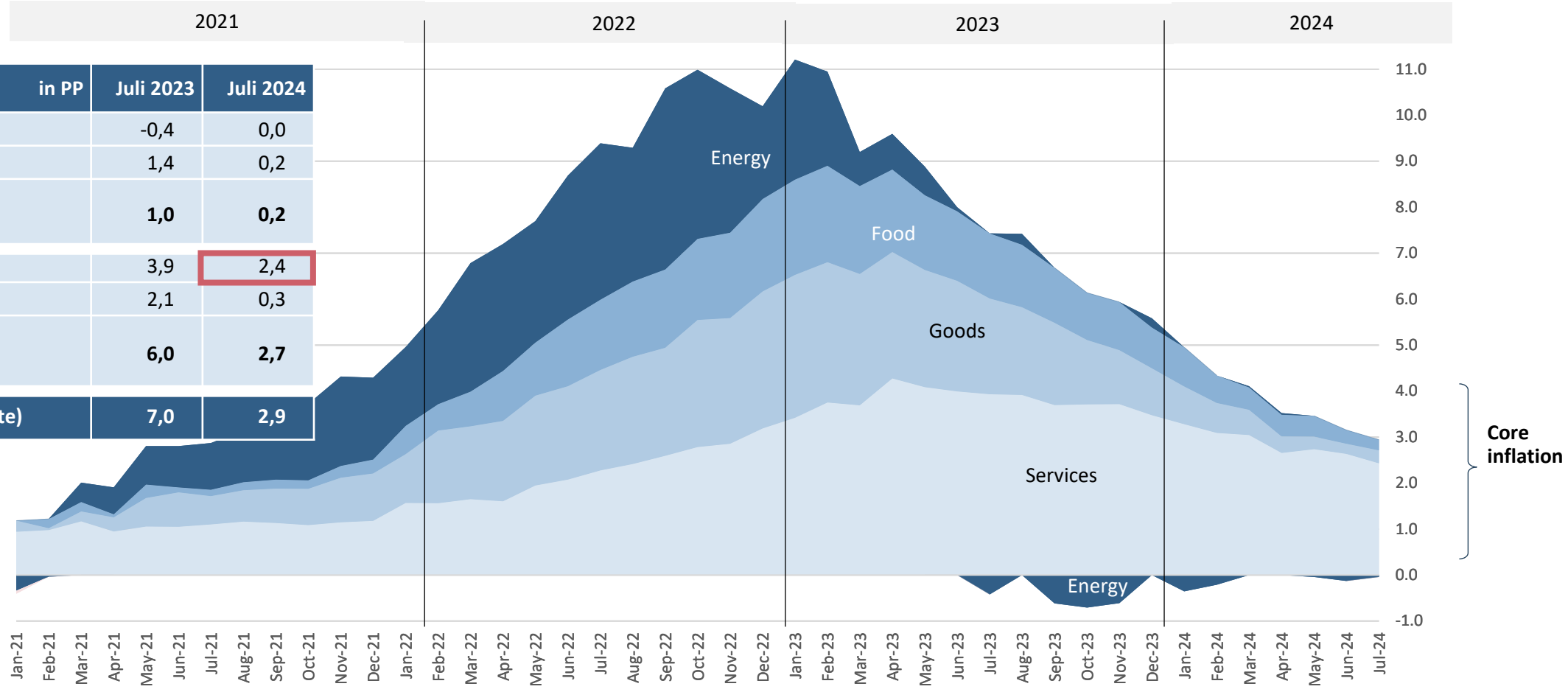




Q: Eurostat, HICP yearly average rate of change and flash estimate for April 2024

Services largely drive inflation in Austria in 2024

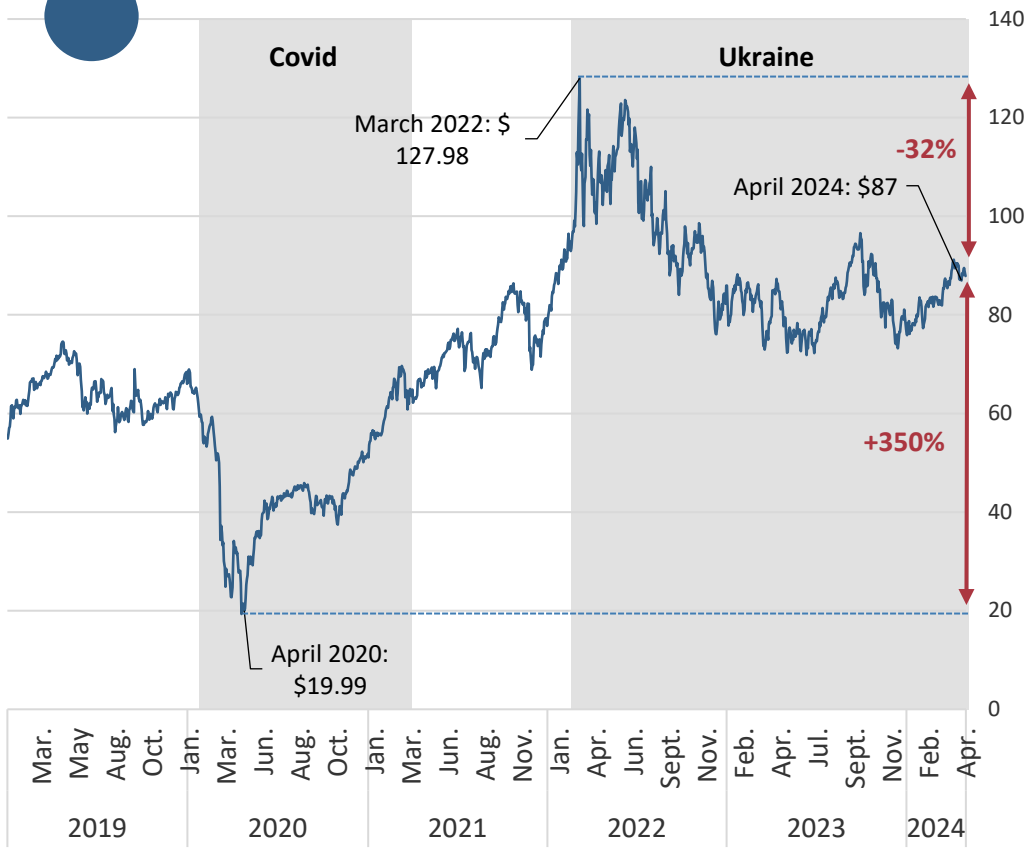
in PP	Juli 2023	Juli 2024
Energy	-0,4	0,0
Food	1,4	0,2
Energy + Food	**1,0**	**0,2**
Services	3,9	2,4
Goods	2,1	0,3
Services + Goods (core inflation)	**6,0**	**2,7**
Sum (Inflation rate)	**7,0**	**2,9**



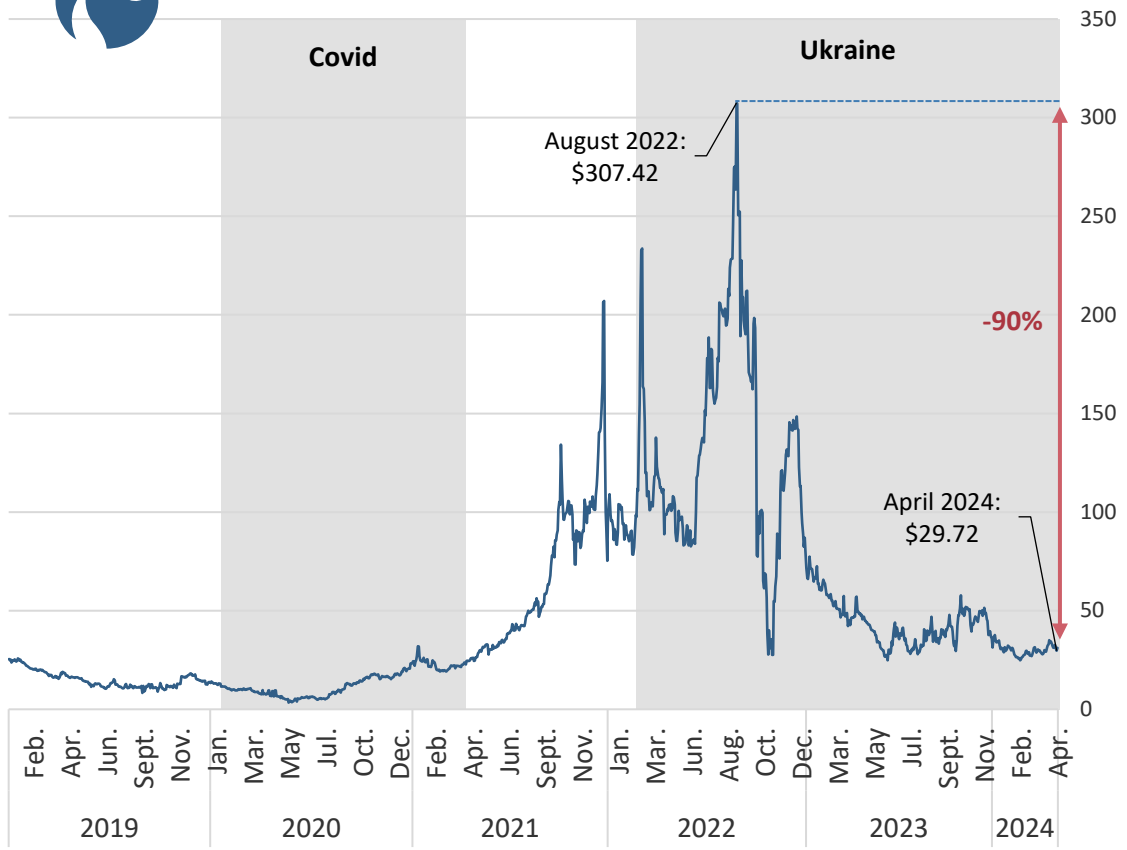
Q: STATISTIK AUSTRIA, eigene Berechnungen

Energy markets reduce inflationary pressures…

Oil price (Brent) per barrel in USD



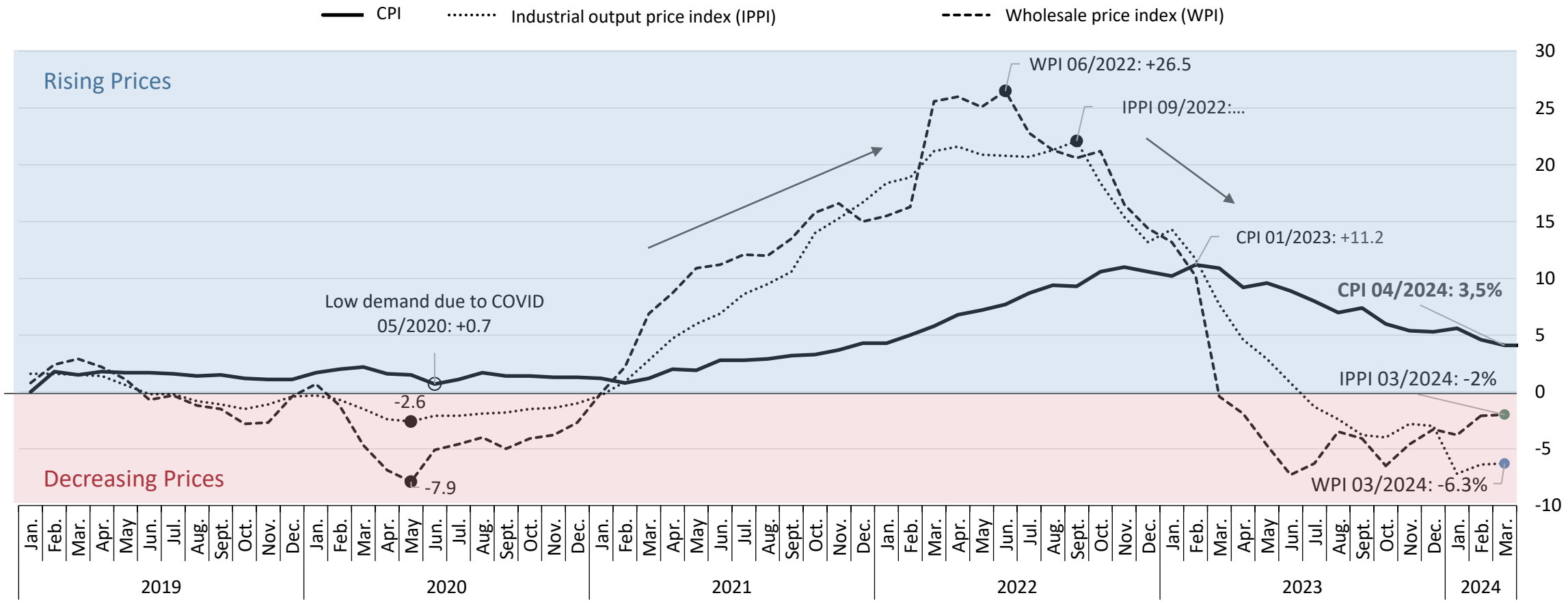
Gas Price TTF in USD



www.finanzen.net/rohstoffe

…with immediate impact on business prices, CPI to follow

Industrial output price index (IPPI), Wholesale price index (WPI), CPI rates of change (comp. to prev. year) – in %



Q: STATISTIK AUSTRIA, own calculations, *CPI Flash Estimate

Since spring 2021
- Demand recovery
- Supply chain issues
- Since Feb. 2022: Energy crisis

Since Summer 2022
- Decline of energy prices
- Base effects
- Economic slowdown

GDP Measurement

Issues in periods of high inflation

Case 1: Double Deflation

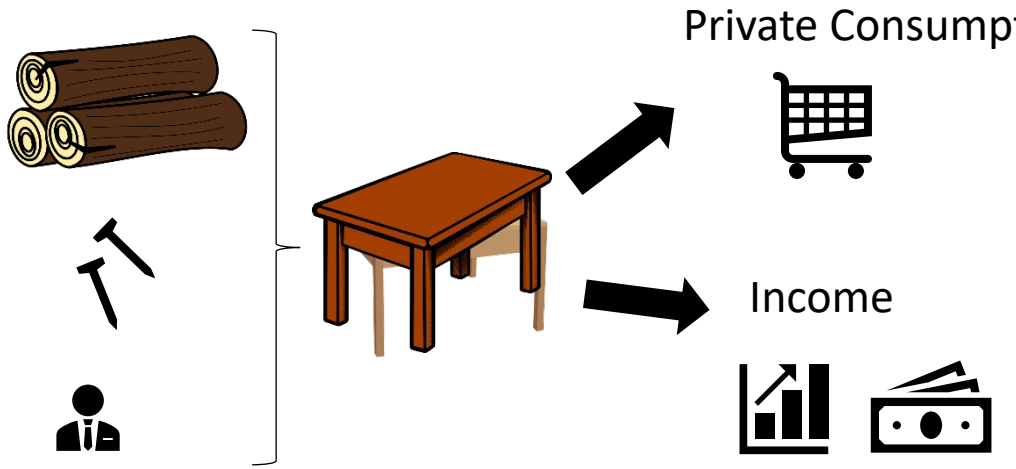
GDP - Approaches to measurement

Production Accounts		
GVA (Cabinet maker NACE C31)	Table	50€
GVA (Holzverarbeitung NACE C16)	Wood	35€
GVA (NACE M69)	Tax Consultancy	5€
Taxes on goods D21 (sales tax)		10€
GDP		**100€**

Expenditure Accounts	
Private Consumption	110€
Import (Screws/Nails/Tools)	10€
GDP	**100€**

Income /Distribution				
	Salaries	Gross operating surplus	Taxes	
Cabinet Maker NACE C31	20€	30€	10€	
Wood Processing NACE C16	20€	15€		
Tax Consultant NACE M69		5€		
	40€	50€	10€	**GDP= 100€**

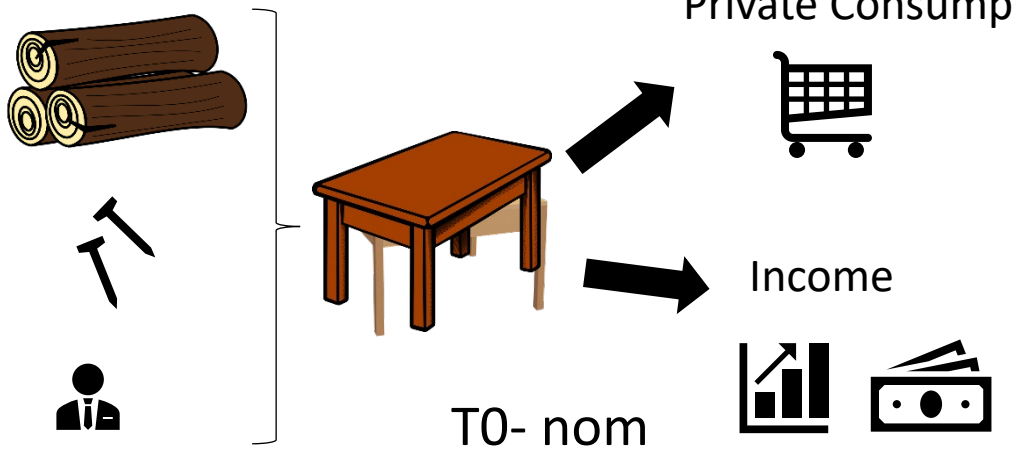
GDP Calculation of gross added value



Production Value Tables		100 €
Intermediate Consumption	Screws	10 €
	Wood	35 €
	Tax consultancy	5 €
Gross Added Value„Tables“		**50 €**

This is a simplified assumption that the intermediate goods do not require some intermediate inputs!

GDP Calculation of gross added value



This is a simplified assumption that the intermediate goods do not require some intermediate inputs!

T0- nom

Production Value Table		100 €
Intermediate Consumption	Screws	10 €
	Wood	35 €
	Tax consultancy	5 €
Gross Added Value„Table“		**50 €**

+ 50%

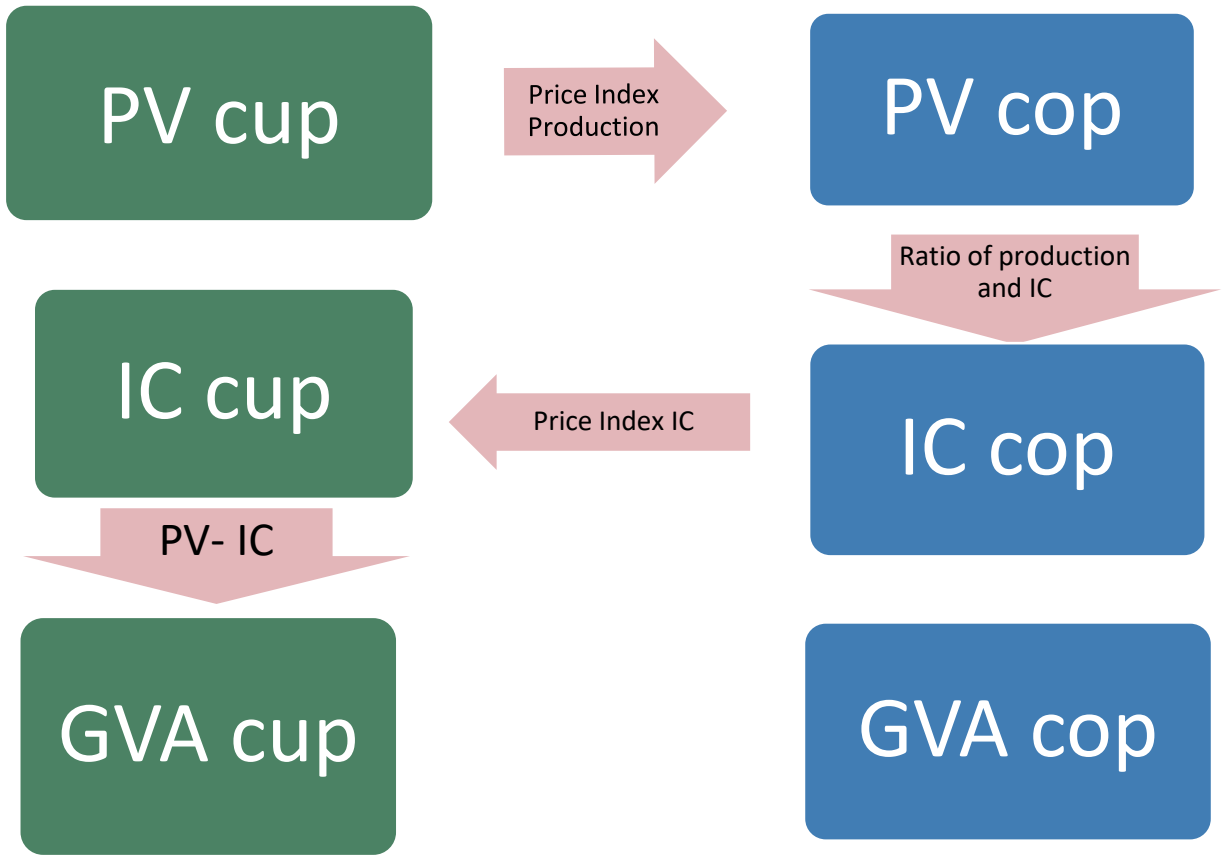
+ 100%

+ 20%

T1- nom

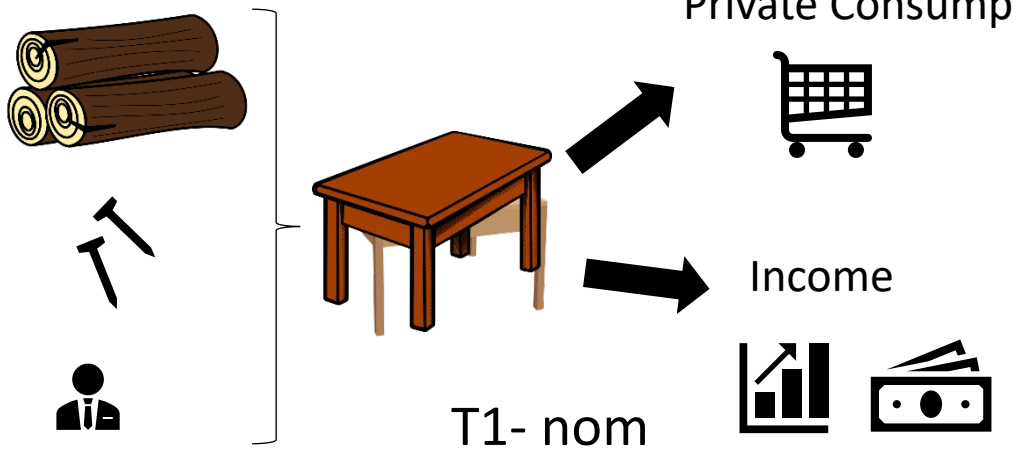
Production Value Table		**130** €
Intermediate Consumption	Screws	XX €
	Wood	XX €
	Tax consultancy	X€
Value Added Table		**XX €**

Heavy reliance on inflation data for indirect Calculation of Gross Value Added



PV	Production Value
IC	Intermediate Consumption
GVA	Value Added

GDP Calculation of gross added value



This is a simplified assumption that the intermediate goods do not require some intermediate inputs!

T1- nom

Production Value Table		130 €
Intermediate Consumption	Screws	15 €
	Wood	70 €
	Tax consultancy	6 €
Gross Added Value„Table“		**39 €**

+ 50%

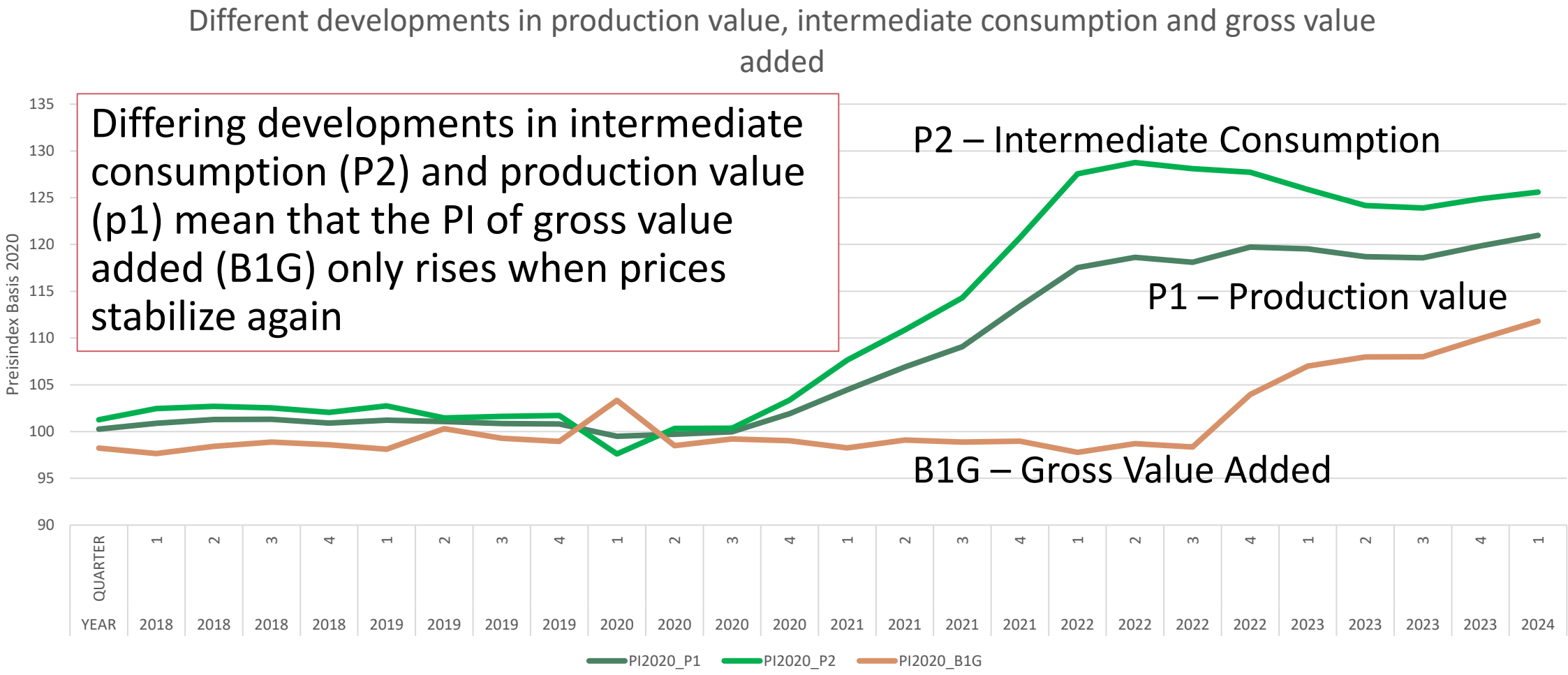
+ 100%

+ 20%

T1- real

Production Value Table		**100** €
Intermediate Consumption	Screws	10 €
	Wood	35 €
	Tax consultancy	5€
Value Added Table		**50 €**

GDP measurement issue in periods of high inflation



Double-deflation- Lessons learned / way ahead

- The prices of single goods and services are observable, but not the prices of value added in total
- Different pace of inflation may lead to ‘surprising’ prices of value added at first glance
- Data on intermediate consumption is only available annually in structural business statistics (SBS) with a time lag of 1.5 years
- In quarterly accounts and the latest years in annual accounts assumptions on the development of Intermediate Consumption (IC) are made
- In case of high inflation we need to adjust these assumptions in order to avoid bias

GDP Measurement

Issues in periods of high inflation

Case 2: Use of Yearly Averages

National accounts

Low inflation

	Q1	Q2	Q3	Q4		YEAR		
Nom	100	105	95	110		410,0		
PI	100,0	100,3	100,1	99,9		100,076	100,073	
Real	100,0	104,7	94,9	110,1		409,7	409,7	0,0%

Sum of Real Q1-4

Sum of nom Q1-4 / Yearly Average of PI Q1-4

Large difference whether the annual value is calculated as the sum of the quarters or with an annual average price.

Low inflation

	Q1	Q2	Q3	Q4		YEAR		
Nom	100	105	95	110		410,0		
PI	100,0	100,3	100,1	99,9		100,076	100,073	
Real	100,0	104,7	94,9	110,1		409,7	409,7	0,0%
PI	103,4	107,6	110,9	114,3		111,526	109,039	
Real	96,7	93,2	90,3	87,4		367,6	376,0	-2,2%

Sum of Real Q1-4

Sum of nom Q1-4 / Yearly Average of PI Q1-4

This matters because ….

- Conceptual constraints
  - Monthly prices are observable at very detailed level but corresponding quantities are often not
  - The underlying basket of a price index has conceptually the same weight for every month of the year → yearly prices are always the yearly average
- Data and feasibility constraints
  - Many Data Sources in Annual National Accounts do not have Quarterly (or even Monthly Information) e.g. SBS, Supply-Use-Tables-etc
  - Annual accounts and regional accounts are too detailed for full temporal disaggregation

Conceptual bias that requires more balancing

Conclusion

- GDP measurement in phases of high inflation cause statistical challenge
- The disappearance of a stable referent to account for value needs to be addressed
- Methodological efforts need to be taken invested in and communicated

How inflation impacts economic measurement

Examples from Austrian GDP compilation

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Backup

Konnex ökomomische Theorie

Y

Output	Einkommen	Summe von Teilkomponenten
$f(K, L) =$	Y	$= C + G + I + NX$
Output als Funktion von Kapital und Arbeit	Oft wird ‚Y' auch nur als Einkommen bezeichnet	Summe von Konsum, Staatsausgaben, Investitionen und dem Außenbeitrag

Methodical approach of annual financial accounts

- Production accounts
  - Account system according to NACE
  - Data sources: Input-output tables, economic survey, performance and structural survey, balance sheets
- Expenditure accounts
  - Commodity Flow by goods
  - Breakdown of total revenue (production + imports - exports) into utilization categories (consumption, investment, intermediate consumption, inventories)
  - Statistical Difference
- Income / Distribution
  - Calculation of compensation of employees according to NACE
  - Balance from taxes and subsidies
  - Gross operating surplus as residual