

## TYCHOS SECTOR RISK REPORT

		2019	2020	2021	2022	2023 Q3
<b>Total Private Debt</b>	Debt to GDP	122%	131%	130%	128%	124%
	5 year % change	3%	11%	11%	9%	3%
	Billion Euro	€4,242	€4,449	€4,696	€4,953	€5,019
<b>Business Debt</b>	Debt to GDP	69%	74%	74%	73%	71%
	5 year % change	7%	15%	14%	13%	4%
	Billion Euro	€2,384	€2,508	€2,654	€2,823	€2,874
<b>Household Debt</b>	Debt to GDP	53%	57%	57%	55%	53%
	5 year % change	-1%	6%	6%	4%	1%
	Billion Euro	€1,858	€1,941	€2,042	€2,130	€2,146

## Areas of Concern

Business Sectors		2019	2020	2021	2022	2023 Q3
<b>Commercial Real Estate</b>	Debt to GDP	15.0%	17.0%	17.0%	17.0%	17.0%
	5 year % change	7%	19%	19%	19%	12%
	Billion Euro	€536	€573	€615	€661	€680
<b>Memo: Real Estate</b>	Debt to GDP	13.0%	14.0%	14.0%	14.0%	14.0%
	5 year % change	7%	18%	16%	16%	10%
	Billion Euro	€458	€491	€517	€552	€566
<b>Memo: Construction</b>	Loans to GDP	2.0%	2.0%	3.0%	3.0%	3.0%
	5 year % change	9%	22%	37%	37%	28%
	Billion Euro	€77	€83	€98	€109	€113
<b>Information Technology</b>	Loans to GDP	4.0%	4.0%	4.0%	4.0%	4.0%
	5 year % change	14%	24%	20%	20%	12%
	Billion Euro	€127	€136	€141	€152	€154

Private Debt Lenders		2019	2020	2021	2022	2023 Q3
<b>Foreign Loans</b>	Debt to GDP	24.0%	26.0%	26.0%	25.0%	23.0%
	5 year % change	28%	34%	33%	25%	-1%
	Billion Euro	€825	€879	€933	€960	€930
<b>Other Financial Institutions</b>	Debt to GDP	6.0%	6.6%	6.6%	6.7%	6.7%
	5 year % change	0%	15%	-5%	11%	24%
	Billion Euro	€208	€224	€239	€260	€273
<b>Corporate Bonds</b>	Debt to GDP	5.9%	7.0%	7.0%	5.9%	5.8%
	5 year % change	14%	35%	19%	-8%	4%
	Billion Euro	€205	€238	€252	€229	€235

Individual Lenders		2019	2020	2021	2022	2023 Q3
<b>DZ Bank</b>	Loans to GDP	5.9%	6.2%	6.0%	5.7%	5.6%
	5 year % change	22%	28%	-3%	-3%	-3%
	Billion Euro	€204	€209	€217	€221	€224
	Charge-off Rate	n/a	n/a	n/a	n/a	n/a

▲ High Concern
 ▲ Concern
 ▲ Low Concern
 ▲ Current or recent crisis
 + No Current Concern

n/a: Data Not Available

## Business Debt

Bank Loans by Industry		2019	2020	2021	2022	2023 Q3	
Commercial Real Estate	Debt to GDP	15.0%	17.0%	17.0%	17.0%	17.0%	⚠
	5 year % change	7%	19%	19%	19%	12%	⚠
	Billion Euro	€536	€573	€615	€661	€680	⚠
Memo: Real Estate	Debt to GDP	13.0%	14.0%	14.0%	14.0%	14.0%	⚠
	5 year % change	7%	18%	16%	16%	10%	⚠
	Billion Euro	€458	€491	€517	€552	€566	⚠
Memo: Construction	Loans to GDP	2.0%	2.0%	3.0%	3.0%	3.0%	⚠
	5 year % change	9%	22%	37%	37%	28%	⚠
	Billion Euro	€77	€83	€98	€109	€113	⚠
Manufacturing	Loans to GDP	4.0%	4.0%	4.0%	4.0%	4.0%	+
	5 year % change	0%	2%	1%	3%	-6%	+
	Billion Euro	€147	€147	€146	€160	€160	+
Information Technology	Loans to GDP	4.0%	4.0%	4.0%	4.0%	4.0%	⚠
	5 year % change	14%	24%	20%	20%	12%	⚠
	Billion Euro	€127	€136	€141	€152	€154	⚠
Wholesale and Retail	Loans to GDP	4.0%	4.0%	4.0%	4.0%	4.0%	+
	5 year % change	-4%	-3%	-5%	-2%	-5%	+
	Billion Euro	€142	€136	€140	€155	€160	+
Utilities	Loans to GDP	3.0%	4.0%	4.0%	4.0%	3.0%	+
	5 year % change	0%	9%	6%	3%	-4%	+
	Billion Euro	€119	€123	€128	€138	€135	+
Health Care	Loans to GDP	2.0%	3.0%	2.0%	2.0%	2.0%	+
	5 year % change	-8%	-1%	-2%	-4%	-7%	+
	Billion Euro	€85	€86	€89	€92	€92	+
Agriculture	Loans to GDP	2.0%	2.0%	2.0%	1.0%	1.0%	+
	5 year % change	-4%	-1%	-4%	-5%	-13%	+
	Billion Euro	€54	€55	€56	€56	€56	+
Transportation and Communication	Loans to GDP	1.0%	2.0%	2.0%	2.0%	2.0%	+
	5 year % change	-38%	-18%	-15%	7%	0%	+
	Billion Euro	€50	€60	€56	€65	€61	+
Hotels and Restaurants	Loans to GDP	1.0%	1.0%	1.0%	1.0%	1.0%	+
	5 year % change	3%	16%	10%	6%	-2%	+
	Billion Euro	€26	€29	€29	€30	€29	+
Other Services	Loans to GDP	1.0%	1.0%	1.0%	1.0%	1.0%	+
	5 year % change	-13%	-24%	-17%	-21%	-22%	+
	Billion Euro	€45	€38	€41	€42	€41	+

\* Commercial Real Estate industry includes Real Estate and Construction loans

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n/a: Data Not Available

## Corporate Debt

Debt to Earnings by GICS Sector		2018	2019	2020	2021	2022
Energy	Debt/EBITDA	n/a	n/a	n/a	n/a	n/a
	Debt (billions)	n/a	n/a	n/a	n/a	n/a
	EBITDA (billions)	n/a	n/a	n/a	n/a	n/a
Materials	Debt/EBITDA	2.3	3.3	4.4	1.9	1.9
	Debt (billions)	€53	€58	€57	€50	€52
	EBITDA (billions)	€23	€17	€13	€26	€28
Industrials	Debt/EBITDA	3.1	3.8	8.9	4.1	3.2
	Debt (billions)	€114	€137	€149	€157	€171
	EBITDA (billions)	€37	€36	€17	€38	€54
Consumer Discretionary	Debt/EBITDA	6.5	9.1	11.4	6.1	5.1
	Debt (billions)	€267	€305	€293	€269	€249
	EBITDA (billions)	€41	€33	€26	€44	€49
Consumer Staples	Debt/EBITDA	1.8	3.0	2.8	2.5	2.1
	Debt (billions)	€6	€9	€9	€9	€8
	EBITDA (billions)	€3	€3	€3	€4	€4
Health Care	Debt/EBITDA	3.7	3.6	3.7	3.9	3.6
	Debt (billions)	€84	€102	€102	€111	€115
	EBITDA (billions)	€23	€28	€27	€28	€32
Information Technology	Debt/EBITDA	1.4	1.8	2.2	2.2	1.8
	Debt (billions)	€16	€21	€27	€27	€25
	EBITDA (billions)	€11	€12	€12	€12	€14
Communication Services	Debt/EBITDA	2.6	3.4	4.1	4.1	4.3
	Debt (billions)	€78	€106	€159	€163	€167
	EBITDA (billions)	€30	€31	€39	€40	€38
Utilities	Debt/EBITDA	2.8	6.4	3.7	6.2	-16.1
	Debt (billions)	€26	€52	€55	€78	€86
	EBITDA (billions)	€9	€8	€15	€13	€-5
Real Estate	Debt/EBITDA	12.8	13.6	13.7	18.6	20.4
	Debt (billions)	€52	€62	€64	€87	€85
	EBITDA (billions)	€4	€5	€5	€5	€4
All Sectors	Debt/EBITDA	3.8	4.9	5.8	4.5	4.4
	Debt (billions)	€698	€853	€914	€951	€958
	EBITDA (billions)	€183	€174	€157	€210	€219

## Household Debt

Household Debt, by Type		2019	2020	2021	2022	2023 Q3
Mortgage Debt	Debt to GDP	37.0%	41.0%	41.0%	41.0%	39.0%
	5 year % change	4%	14%	14%	13%	7%
	Billion Euro	€1,301	€1,387	€1,486	€1,568	€1,583
Consumer Credit	Debt to GDP	6.0%	6.0%	5.0%	5.0%	5.0%
	5 year % change	-2%	0%	-8%	-13%	-15%
	Billion Euro	€202	€198	€196	€198	€201
Other	Debt to GDP	10.0%	10.0%	10.0%	9.0%	9.0%
	5 year % change	-18%	-12%	-13%	-15%	-13%
	Billion Euro	€354	€356	€361	€364	€362

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## Private Debt by Lender/Holder

Private Debt Lenders		2019	2020	2021	2022	2023 Q3	
Commercial and Savings Banks	Debt to GDP	49.0%	52.0%	51.0%	51.0%	49.0%	+
	5 year % change	8%	15%	12%	10%	5%	
	Billion Euro	€1,700	€1,767	€1,850	€1,976	€1,999	
Credit Institutions	Debt to GDP	18.0%	19.0%	19.0%	19.0%	19.0%	!
	5 year % change	4%	11%	17%	14%	9%	
	Billion Euro	€611	€649	€694	€739	€754	
Mortgage and Land Banks	Debt to GDP	12.0%	13.0%	13.0%	13.0%	12.0%	+
	5 year % change	-21%	-11%	-6%	-5%	-10%	
	Billion Euro	€433	€445	€468	€489	€498	
Foreign Loans	Debt to GDP	24.0%	26.0%	26.0%	25.0%	23.0%	!
	5 year % change	28%	34%	33%	25%	-1%	
	Billion Euro	€825	€879	€933	€960	€930	
Other Financial Institutions	Debt to GDP	6.0%	6.6%	6.6%	6.7%	6.7%	!
	5 year % change	0%	15%	-5%	11%	24%	
	Billion Euro	€208	€224	€239	€260	€273	
Corporate Bonds	Debt to GDP	5.9%	7.0%	7.0%	5.9%	5.8%	!
	5 year % change	14%	35%	19%	-8%	4%	
	Billion Euro	€205	€238	€252	€229	€235	

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## Portfolio Loans &amp; Investment (Total Economy) - Germany into Foreign Countries

Debt Security Investment		2018	2019	2020	2021	2022 Q2	
Germany Holdings of Foreign Debt Securities	to GDP	56%	61%	70%	57%	47%	
	5 year % change	-3%	11%	20%	1%	-25%	⚠
	Billion Euro	€1,882	€2,122	€2,366	€2,057	€1,756	
France	to GDP	8.0%	9.0%	11.0%	9.0%	7.0%	
	5 year % change	-8%	7%	29%	9%	-26%	⚠
	Billion Euro	€271	€313	€369	€316	€251	
United States	to GDP	7.0%	8.0%	9.0%	8.0%	7.0%	
	5 year % change	60%	69%	44%	13%	-19%	⚠
	Billion Euro	€232	€268	€298	€277	€252	
Netherlands	to GDP	6.0%	7.0%	8.0%	6.0%	5.0%	
	5 year % change	-10%	11%	26%	4%	-24%	⚠
	Billion Euro	€205	€232	€256	€220	€188	
Equity and Investment Fund Shares		2018	2019	2020	2021	2022 Q2	
Germany Holdings of Foreign Equity and Investment Fund Shares	to GDP	31%	38%	46%	51%	41%	
	5 year % change	24%	59%	63%	74%	17%	⚠
	Billion Euro	€1,028	€1,333	€1,574	€1,821	€1,551	
Luxembourg	to GDP	14.0%	16.0%	19.0%	19.0%	16.0%	
	5 year % change	22%	47%	44%	46%	0%	⚠
	Billion Euro	€472	€570	€637	€693	€606	
United States	to GDP	4.0%	5.0%	7.0%	9.0%	8.0%	
	5 year % change	39%	77%	112%	155%	89%	⚠
	Billion Euro	€127	€183	€250	€341	€288	
Ireland	to GDP	3.0%	4.0%	5.0%	7.0%	6.0%	
	5 year % change	105%	163%	173%	190%	97%	⚠
	Billion Euro	€96	€145	€184	€240	€208	
Loans		2018	2019	2020	2021	2022 Q2	
Germany Holding of Foreign Loans	to GDP	33.0%	33.0%	35.0%	36.0%	37.0%	
	5 year % change	4%	8%	11%	17%	16%	⚠
	Billion Euro	€1,099	€1,160	€1,190	€1,306	€1,395	
Germany Holding of Foreign Loans: Short Term	to GDP	12.0%	13.0%	15.0%	16.0%	17.0%	
	5 year % change	0%	10%	21%	40%	41%	⚠
	Billion Euro	€388	€452	€494	€570	€643	
Germany Holding of Foreign Loans: Long Term	to GDP	21.0%	20.0%	20.0%	20.0%	20.0%	
	5 year % change	7%	6%	5%	3%	0%	+
	Billion Euro	€710	€708	€696	€736	€752	

\* Total Economy includes Financial, Non-Financial and General Government sectors

⚠ High Concern    ⚠ Concern    ⚠ Low Concern    ⚠ Current or recent crisis    + No Current Concern

n/a: Data Not Available

## Portfolio Loans &amp; Investment (Total Economy) - Foreign Countries into Germany

Debt Security Investment		2018	2019	2020	2021	2022 Q2	
Foreign Holdings of Germany's Debt Securities	to GDP	47%	49%	56%	46%	39%	+
	5 year % change	-21%	-11%	-6%	-16%	-28%	+
	Billion Euro	€1,581	€1,690	€1,898	€1,637	€1,452	
Netherlands	to GDP	5.0%	5.0%	6.0%	5.0%	4.0%	+
	5 year % change	-18%	-14%	-7%	-10%	-38%	+
	Billion Euro	€172	€183	€196	€181	€134	
Luxembourg	to GDP	4.0%	5.0%	6.0%	5.0%	4.0%	!
	5 year % change	-19%	11%	22%	21%	-4%	!
	Billion Euro	€148	€173	€194	€183	€160	
France	to GDP	3.0%	3.0%	4.0%	3.0%	3.0%	+
	5 year % change	-30%	-18%	-2%	-9%	-26%	+
	Billion Euro	€92	€111	€136	€117	€104	
Equity and Investment Fund Shares		2018	2019	2020	2021	2022 Q2	
Foreign Holdings of Germany's Equity and Investment Fund Shares	to GDP	25%	30%	33%	31%	21%	!
	5 year % change	-2%	30%	14%	12%	-32%	!
	Billion Euro	€848	€1,038	€1,119	€1,129	€789	
United States	to GDP	8.0%	10.0%	11.0%	11.0%	8.0%	!
	5 year % change	-5%	39%	28%	27%	-23%	!
	Billion Euro	€259	€340	€368	€387	€289	
Luxembourg	to GDP	5.0%	5.0%	5.0%	5.0%	4.0%	!
	5 year % change	17%	47%	13%	10%	-30%	!
	Billion Euro	€154	€179	€185	€181	€135	
France	to GDP	2.0%	2.0%	3.0%	2.0%	1.0%	+
	5 year % change	-24%	-1%	-8%	-16%	-47%	+
	Billion Euro	€66	€79	€86	€77	€55	

\* Total Economy includes Financial, Non-Financial and General Government sectors

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## Derivative Activity

OTC Derivative Activity by Contract Type		2018	2019	2020	2021	2022 Q2	
Interest Rate	to GDP	984%	953%	1005%	1057%	1192%	
	5 Year % Change	-34%	-26%	8%	10%	10%	+
	Billion Euro	€33,160	€33,167	€34,136	€37,977	€46,010	
Foreign Exchange	to GDP	133%	132%	128%	142%	163%	
	5 Year % Change	-20%	-27%	-24%	1%	19%	!
	Billion Euro	€4,496	€4,607	€4,351	€5,103	€6,301	
Credit Derivatives	to GDP	22%	18%	23%	27%	31%	
	5 Year % Change	-64%	-62%	-49%	-38%	-34%	+
	Billion Euro	€735	€642	€766	€962	€1184	
Index and Stock-related	to GDP	12%	5%	3%	1%	1%	
	5 Year % Change	-35%	-71%	-85%	-92%	-94%	+
	Billion Euro	€386	€186	€88	€45	€39	
Commodity contracts	to GDP	0.7%	0.7%	0.6%	0.7%	1.0%	
	5 Year % Change	-83%	-49%	-40%	-25%	51%	!
	Billion Euro	€22	€26	€21	€25	€40	
Total Notional	to GDP	1151%	1110%	1158%	1228%	1388%	
	5 Year % Change	-34%	-28%	0%	5%	8%	+
	Billion Euro	€38,799	€38,628	€39,362	€44,112	€53,574	

! High Concern  
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n/a: Data Not Available

## Largest Individual Lenders

Individual Lenders		2019	2020	2021	2022	2023 Q2	
Deutsche Bank	Loans to GDP	12.0%	13.0%	13%	13%	n/a	
	5 year % change	-11%	-11%	0%	2%	n/a	+
	Billion Euro	€434	€432	€476	€489	n/a	
	NLP ratio	2.2%	2.7%	2.5%	2.4%	n/a	
Commerzbank	Loans to GDP	8.0%	8.0%	7.0%	7%	n/a	
	5 year % change	-8%	3%	-15%	-13%	n/a	+
	Billion Euro	€261	€259	€265	€268	n/a	
	NLP ratio	1.4%	1.8%	1.5%	2.1%	n/a	
DZ Bank	Loans to GDP	5.9%	6.2%	6.0%	5.7%	5.6%	
	5 year % change	22%	28%	-3%	-3%	-3%	!
	Billion Euro	€204	€209	€217	€221	€224	
	NLP ratio	1.7%	1.6%	1.1%	1.0%	n/a	
KfW (State-Owned)	Loans to GDP	4.0%	4.0%	4%	4%	n/a	
	5 year % change	-9%	-7%	-11%	9%	n/a	+
	Billion Euro	€129	€141	€140	€164	n/a	
	NLP ratio	4.4%	4.3%	1.0%	1.1%	n/a	

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## Real Estate

Total Debt		2019	2020	2021	2022	2023 Q3
Mortgage Debt	Debt to GDP	37.0%	41.0%	41.0%	41.0%	39.0%
	5 year % change	4%	14%	14%	13%	7%
	Billion Euro	€1,301	€1,387	€1,486	€1,568	€1,583



Quarterly Residential Housing Summary		Jun-2022	Sep-2022	Dec-2022	Mar-2023	Jun-2023	Sep-2023
Total Housing Units Approved for Construction	Volume	38,654	36,345	30,233	27,026	26,087	24,526
	Annual Change	-7.8%	-13.3%	-22.2%	-28.7%	-32.5%	-32.5%
Total Housing Units Construction Started	Volume	5,005	4,838	4,312	3,706	3,041	2,810
	Annual Change	-3.5%	-12.5%	-16.4%	-23.4%	-39.2%	-41.9%
Residential Property Price Index	Index (2015=100)	166.4	165.2	156.7	152.2	150.4	148.3
	Annual Change	9.6%	4.4%	-3.6%	-6.8%	-9.6%	-10.2%

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n/a: Data Not Available

## Additional Data




Public Debt		2019	2020	2021	2022	2023 Q3
Total General Government Debt	Debt to GDP	59%	69%	69%	66%	65%
	5 Year % Change	-21%	-4%	0%	2%	4%
	Billion Euro	€2,070	€2,341	€2,496	€2,562	€2,631
Total Central Government Debt	Debt to GDP	38%	45%	47%	46%	46%
	5 Year % Change	-21%	-1%	7%	10%	14%
	Billion Euro	€1,312	€1,526	€1,679	€1,776	€1,852
Total State and Local Government Debt	Debt to GDP	22%	24%	23%	21%	20%
	5 Year % Change	-21%	-10%	-11%	-13%	-14%
	Billion Euro	€774	€828	€831	€806	€797

Supplementary Data		2019	2020	2021	2022	2023 Q3
Nominal GDP	Billion Euro	€3,480	€3,397	€3,608	€3,870	€4,058
	Annual % Change	3.3%	-2.4%	6.2%	7.3%	6.6%
Real GDP	Billion 2015 Euros	€3,248	€3,112	€3,209	€3,269	€3,265
	Annual % Change	1.1%	-4.2%	3.1%	1.9%	0.1%
Consumer Price Index (Inflation)	CPI (2015=100)	106.0	105.3	111.3	122.0	127.4
	Inflation Rate	1.5%	-0.7%	5.7%	9.6%	4.3%
Unemployment	Person (Thousands)	2,287	2,781	2,390	2,517	2,648
	Unemployment Rate	5.0%	6.1%	5.2%	5.5%	5.7%
Current Account Balance	Billion Euros	€291	€235	€282	€170	€254
	to GDP	8.4%	6.9%	7.8%	4.4%	6.3%
Trade Balance	Billion Euros	€209	€196	€192	€73	€146
	to GDP	6.0%	5.8%	5.3%	1.9%	3.6%











▲ High Concern
 ▲ Concern
 ▲ Low Concern
 ▲ Current or recent crisis
 + No Current Concern

n/a: Data Not Available

## Explanatory Notes

Color Code	Total Private Debt Cell Description
	5 Year % Change > 20%
	5 Year % Change > 13% < 20%
	Residual Risk Period

\* Due to the size of total private debt, five-year percentage growth constitutes greater concern as compared to the individual sector data

Color Code	Sector Data Cell Description
	5 Year % Change > 40%
	5 Year % Change > 40%
	Debt to GDP < 1.5% (immaterial)
	5 Year % Change > 20% < 40%
	5 Year % Change > 20% < 40%
	Debt to GDP < 1.5% (immaterial)
	5 Year % Change > 13% < 20%
	5 Year % Change > 13% < 20%
	Debt to GDP < 1.5% (immaterial)
	Residual Risk Period

 High Concern    Concern    Low Concern    Current or recent crisis    No Current Concern

n/a: Data Not Available

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