

## TYCHOS SECTOR RISK REPORT

		2016	2017	2018	2019	2020
<b>Total Private Debt</b>	Debt to GDP	117%	118%	120%	122%	132%
	5 year % change	-3%	-1%	0%	3%	13%
	Billion Euro	€3,670	€3,840	€4,024	€4,208	€4,396
<b>Business Debt</b>	Debt to GDP	64%	65%	66%	68%	73%
	5 year % change	0%	3%	3%	6%	15%
	Billion Euro	€1,999	€2,111	€2,231	€2,332	€2,438
<b>Household Debt</b>	Debt to GDP	53%	53%	53%	54%	59%
	5 year % change	-7%	-6%	-4%	0%	10%
	Billion Euro	€1,671	€1,729	€1,793	€1,876	€1,958

## Areas of Concern

<b>Business Sectors</b>		2016	2017	2018	2019	2020
<b>Commercial Real Estate</b>	Debt to GDP	14.3%	14.4%	15.1%	15.5%	17.2%
	5 year % change	-8%	-7%	0%	8%	21%
	Billion Euro	€449	€469	€506	€536	€573
<b>Real Estate</b>	Debt to GDP	12.3%	12.3%	12.9%	13.3%	14.8%
	5 year % change	-7%	-7%	-1%	7%	21%
	Billion Euro	€386	€401	€434	€458	€491
<b>Information Technology</b>	Loans to GDP	3.3%	3.3%	3.4%	3.7%	4.1%
	5 year % change	0%	1%	4%	14%	27%
	Billion Euro	€102	€107	€113	€127	€136
<b>Construction</b>	Loans to GDP	2.0%	2.1%	2.1%	2.2%	2.5%
	5 year % change	-10%	-5%	2%	9%	24%
	Billion Euro	€62	€67	€72	€77	€83

<b>Private Debt Lenders</b>		2016	2017	2018	2019	2020
<b>Foreign Loans</b>	Debt to GDP	19.0%	20.0%	22.0%	22.0%	24.0%
	5 year % change	2%	8%	14%	20%	25%
	Billion Euro	€607	€647	€724	€769	€799
<b>Other Financial Institutions</b>	Debt to GDP	7.0%	6.0%	7.0%	7.0%	8.0%
	5 year % change	12%	-5%	0%	15%	34%
	Billion Euro	€216	€195	€224	€237	€255
<b>Corporate Bonds</b>	Debt to GDP	6.0%	6.0%	5.0%	6.0%	7.0%
	5 year % change	43%	35%	9%	15%	45%
	Billion Euro	€184	€211	€181	€205	€249

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

n/a: Data Not Available

## Business Debt

Bank Loans by Industry		2016	2017	2018	2019	2020	
Commercial Real Estate	Debt to GDP	14.3%	14.4%	15.1%	15.5%	17.2%	⚠
	5 year % change	-8%	-7%	0%	8%	21%	⚠
	Billion Euro	€449	€469	€506	€536	€573	
Real Estate	Debt to GDP	12.3%	12.3%	12.9%	13.3%	14.8%	⚠
	5 year % change	-7%	-7%	-1%	7%	21%	⚠
	Billion Euro	€386	€401	€434	€458	€491	
Manufacturing	Loans to GDP	4.0%	4.0%	4.1%	4.2%	4.4%	+
	5 year % change	-20%	-16%	-9%	1%	5%	+
	Billion Euro	€125	€131	€139	€147	€147	
Wholesale and Retail	Loans to GDP	4.1%	4.1%	4.1%	4.1%	4.1%	+
	5 year % change	-11%	-11%	-6%	-3%	-1%	+
	Billion Euro	€128	€133	€139	€142	€136	
Information Technology	Loans to GDP	3.3%	3.3%	3.4%	3.7%	4.1%	⚠
	5 year % change	0%	1%	4%	14%	27%	⚠
	Billion Euro	€102	€107	€113	€127	€136	
Utilities	Loans to GDP	3.3%	3.5%	3.5%	3.4%	3.7%	+
	5 year % change	7%	2%	0%	1%	11%	+
	Billion Euro	€105	€113	€117	€119	€123	
Health Care	Loans to GDP	2.5%	2.5%	2.4%	2.4%	2.6%	+
	5 year % change	-12%	-15%	-14%	-8%	1%	+
	Billion Euro	€78	€81	€82	€85	€86	
Construction	Loans to GDP	2.0%	2.1%	2.1%	2.2%	2.5%	⚠
	5 year % change	-10%	-5%	2%	9%	24%	⚠
	Billion Euro	€62	€67	€72	€77	€83	
Agriculture	Loans to GDP	1.6%	1.5%	1.6%	1.6%	1.7%	+
	5 year % change	2%	-5%	-3%	-4%	1%	+
	Billion Euro	€51	€50	€53	€54	€55	
Transportation and Communication	Loans to GDP	1.8%	1.6%	1.5%	1.5%	1.8%	+
	5 year % change	-39%	-43%	-39%	-38%	-17%	+
	Billion Euro	€57	€52	€51	€50	€60	
Hotels and Restaurants	Loans to GDP	0.7%	0.7%	0.7%	0.8%	0.9%	⚠
	5 year % change	-8%	-7%	-3%	3%	19%	⚠
	Billion Euro	€23	€24	€25	€26	€29	
Other Services	Loans to GDP	2.9%	3.0%	3.0%	3.1%	3.0%	+
	5 year % change	-24%	-17%	-9%	3%	6%	+
	Billion Euro	€90	€97	€102	€107	€101	

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

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

n/a: Data Not Available

## Business Debt

Corporate Debt by Industry		2016	2017	2018	2019	2020	
Consumer Discretionary	Debt to GDP	13.1%	12.9%	14.2%	15.3%	15.5%	
	5 year % change	27%	13%	30%	33%	22%	
	Billion euro	€410	€419	€479	€530	€515	⚠
	Default Rate	n/a	n/a	n/a	n/a	n/a	
Communication Services	Debt to GDP	3.1%	2.8%	2.8%	3.3%	5.1%	
	5 year % change	24%	15%	8%	17%	66%	⚠
	Billion euro	€98	€91	€94	€114	€171	
	Default Rate	n/a	n/a	n/a	n/a	n/a	
Industrials	Debt to GDP	3.3%	3.3%	3.6%	4.1%	4.8%	
	5 year % change	15%	13%	36%	48%	65%	⚠
	Billion euro	€104	€107	€122	€141	€161	
	Default Rate	n/a	n/a	n/a	n/a	n/a	
Health Care	Debt to GDP	2.1%	2.0%	2.5%	2.7%	2.9%	
	5 year % change	45%	53%	96%	55%	34%	⚠
	Billion euro	€64	€65	€84	€94	€98	
	Default Rate	n/a	n/a	n/a	n/a	n/a	
Utilities	Debt to GDP	2.4%	2.2%	1.7%	2.3%	2.6%	
	5 year % change	-17%	-11%	-48%	-24%	-17%	+
	Billion euro	€75	€73	€57	€80	€85	
	Default Rate	n/a	n/a	n/a	n/a	n/a	
Materials	Debt to GDP	1.8%	1.7%	1.7%	1.8%	1.8%	
	5 year % change	4%	-8%	-10%	3%	14%	⚠
	Billion euro	€56	€56	€56	€61	€59	
	Default Rate	n/a	n/a	n/a	n/a	n/a	
Consumer Staples	Debt to GDP	0.6%	0.6%	0.7%	1.0%	0.9%	
	5 year % change	-10%	-4%	43%	46%	49%	⚠
	Billion euro	€19	€21	€25	€34	€31	
	Default Rate	n/a	n/a	n/a	n/a	n/a	
Information Technology	Debt to GDP	0.4%	0.4%	0.6%	0.7%	0.9%	
	5 year % change	53%	24%	91%	34%	91%	⚠
	Billion euro	€14	€13	€19	€23	€29	
	Default Rate	n/a	n/a	n/a	n/a	n/a	
Energy	Debt to GDP	0.2%	0.2%	0.2%	0.4%	0.3%	
	5 year % change	242%	42%	68%	185%	46%	⚠
	Billion euro	€7	€7	€8	€13	11	
	Default Rate	n/a	n/a	n/a	n/a	n/a	
Memo: Automobiles and Components	Debt to GDP	12.6%	12.4%	13.7%	14.7%	14.5%	
	5 year % change	31%	17%	33%	34%	20%	⚠
	Billion euro	€394	€406	€460	€507	483	
	Default Rate	n/a	n/a	n/a	n/a	n/a	

\* Sector aggregates are based on limited data availability

## Household Debt

Household Debt, by Type		2016	2017	2018	2019	2020	
Mortgage Debt	Debt to GDP	36.0%	36.0%	36.6%	37.7%	41.7%	
	5 year % change	-1%	-1%	1%	5%	16%	⚠
	Billion Euro	€1,126	€1,175	€1,231	€1,301	€1,387	
Consumer Credit	Debt to GDP	5.9%	5.9%	5.8%	5.8%	6.0%	
	5 year % change	-15%	-11%	-7%	-1%	2%	+
	Billion Euro	€184	€192	€196	€202	€198	
Other	Debt to GDP	11.5%	11.1%	10.9%	10.8%	11.2%	
	5 year % change	-17%	-18%	-17%	-13%	-6%	+
	Billion Euro	€361	€362	€366	€373	€373	

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

n/a: Data Not Available

## Private Debt by Lender/Holder

Private Debt Lenders		2016	2017	2018	2019	2020	
Commercial and Savings Banks	Debt to GDP	45.9%	46.3%	48.1%	49.2%	53.1%	⚠
	5 year % change	-5%	-3%	5%	9%	17%	⚠
	Billion Euro	€1,437	€1,512	€1,617	€1,700	€1,767	⚠
Mortgage and Land Banks	Debt to GDP	13.9%	13.4%	12.4%	12.5%	13.4%	+
	5 year % change	-32%	-29%	-26%	-20%	-10%	+
	Billion Euro	€433	€436	€416	€433	€445	+
Credit Institutions	Debt to GDP	16.5%	16.7%	17.2%	17.7%	19.5%	⚠
	5 year % change	1%	0%	2%	5%	14%	⚠
	Billion Euro	€517	€546	€577	€611	€649	⚠
Foreign Loans	Debt to GDP	19.0%	20.0%	22.0%	22.0%	24.0%	⚠
	5 year % change	2%	8%	14%	20%	25%	⚠
	Billion Euro	€607	€647	€724	€769	€799	⚠
Other Financial Institutions	Debt to GDP	7.0%	6.0%	7.0%	7.0%	8.0%	⚠
	5 year % change	12%	-5%	0%	15%	34%	⚠
	Billion Euro	€216	€195	€224	€237	€255	⚠
Corporate Bonds	Debt to GDP	6.0%	6.0%	5.0%	6.0%	7.0%	⚠
	5 year % change	43%	35%	9%	15%	45%	⚠
	Billion Euro	€184	€211	€181	€205	€249	⚠

⚠ High Concern  
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n/a: Data Not Available

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

Debt Security Investment		2016	2017	2018	2019	2020 Q2	
Germany Holdings of Foreign Debt Securities	to GDP	57.0%	61.0%	54.0%	60.0%	63.0%	
	5 year % change	23%	6%	-6%	9%	14%	⚠
	Billion Euro	€1,778	€1,975	€1,823	€2,066	€2,101	
France	to GDP	8.0%	8.7%	7.9%	8.9%	9.8%	
	5 year % change	18%	-3%	-10%	6%	19%	⚠
	Billion Euro	€252	€284	€266	€307	€325	
United States	to GDP	6.8%	7.1%	6.0%	6.9%	7.4%	
	5 year % change	79%	72%	40%	51%	35%	⚠
	Billion Euro	€213	€232	€202	€238	€245	
Netherlands	to GDP	5.9%	6.2%	6.0%	6.6%	7.1%	
	5 year % change	1%	-11%	-12%	11%	22%	⚠
	Billion Euro	€185	€204	€202	€230	€237	
Equity and Investment Fund Shares		2016	2017	2018	2019	2020 Q2	
Germany Holdings of Foreign Equity and Investment Fund Shares	to GDP	29.0%	35.0%	29.0%	37.0%	36.0%	
	5 year % change	69%	65%	17%	55%	32%	⚠
	Billion Euro	€912	€1,139	€970	€1,288	€1,199	
Luxembourg	to GDP	13.0%	16.0%	13.0%	16.0%	15.0%	
	5 year % change	47%	46%	12%	39%	20%	⚠
	Billion Euro	€415	€510	€433	€538	€497	
United States	to GDP	4.0%	4.0%	4.0%	5.0%	6.0%	
	5 year % change	130%	104%	38%	76%	75%	⚠
	Billion Euro	€116	€138	€126	€181	€188	
Ireland	to GDP	2.0%	3.0%	3.0%	4.0%	4.0%	
	5 year % change	211%	176%	100%	161%	123%	⚠
	Billion Euro	€72	€97	€94	€143	€135	
Loans		2016	2017	2018	2019	2020 Q2	
Germany Holding of Foreign Loans	to GDP	31.2%	30.7%	31.3%	32.1%	34.5%	
	5 year % change	-5%	-9%	0%	4%	8%	+
	Billion Euro	€976	€1,003	€1,051	€1,109	€1,148	
Germany Holding of Foreign Loans: Short Term	to GDP	11.4%	11.4%	11.4%	12.5%	14.3%	
	5 year % change	-5%	-4%	-1%	6%	13%	⚠
	Billion Euro	€356	€373	€383	€432	€476	
Germany Holding of Foreign Loans: Long Term	to GDP	19.8%	19.3%	19.9%	19.6%	20.2%	
	5 year % change	-6%	-12%	1%	2%	4%	+
	Billion Euro	€620	€629	€668	€677	€672	

\* 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		2016	2017	2018	2019	2020 Q2	
Foreign Holdings of Germany's Debt Securities	to GDP	54%	53%	47%	49%	50%	+
	5 year % change	-8%	-20%	-21%	-10%	-8%	+
	Billion Euro	€1,703	€1,728	€1,580	€1,688	€1,665	
Netherlands	to GDP	5.6%	5.7%	5.1%	5.2%	5.5%	+
	5 year % change	0%	-17%	-18%	-15%	-9%	+
	Billion Euro	€176	€186	€171	€180	€182	
Luxembourg	to GDP	4.2%	4.6%	4.4%	5.0%	5.3%	+
	5 year % change	-27%	-24%	-19%	10%	15%	+
	Billion Euro	€131	€149	€147	€171	€178	
France	to GDP	3.6%	3.1%	2.7%	3.2%	3.8%	+
	5 year % change	-33%	-36%	-30%	-18%	-11%	+
	Billion Euro	€112	€101	€92	€111	€127	
Equity and Investment Fund Shares		2016	2017	2018	2019	2020 Q2	
Foreign Holdings of Germany's Equity and Investment Fund Shares	to GDP	28%	34%	25%	30%	26%	⚠
	5 year % change	79%	58%	-2%	31%	5%	⚠
	Billion Euro	€882	€1,099	€845	€1,037	€880	
United States	to GDP	8.5%	10.9%	7.7%	9.8%	9.5%	⚠
	5 year % change	82%	68%	-5%	40%	14%	⚠
	Billion Euro	€265	€354	€259	€340	€317	
Luxembourg	to GDP	4.6%	5.4%	4.5%	5.0%	4.7%	⚠
	5 year % change	53%	56%	15%	44%	13%	⚠
	Billion Euro	€143	€176	€151	€174	€157	
France	to GDP	2.6%	2.9%	2.0%	2.3%	2.0%	+
	5 year % change	44%	20%	-24%	0%	-23%	+
	Billion Euro	€80	€95	€66	€79	€67	

\* 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

## Derivative Activity

OTC Derivative Activity by Contract Type		2016	2017	2018	2019	2020 Q2	
Interest Rate	to GDP	965%	1155%	987%	960%	1070%	
	5 Year % Change	-47%	-26%	-34%	-26%	-1%	+
	Billion Euro	30,198	37,683	33,160	33,167	36,167	
Foreign Exchange	to GDP	141%	138%	134%	133%	130%	
	5 Year % Change	-30%	-27%	-20%	-26%	-23%	+
	Billion Euro	4,419	4,496	4,496	4,607	4,384	
Credit Derivatives	to GDP	44%	48%	22%	19%	26%	
	5 Year % Change	-55%	-28%	-64%	-61%	-43%	+
	Billion Euro	1,362	1,577	735	642	893	
Index and Stock-related	to GDP	16%	14%	11%	5%	4%	
	5 Year % Change	-28%	-34%	-35%	-70%	-82%	+
	Billion Euro	506	450	386	186	129	
Commodity contracts	to GDP	1%	1%	1%	1%	1%	
	5 Year % Change	-89%	-88%	-83%	-49%	-39%	+
	Billion Euro	29	19	22	26	23	
Total Notional	to GDP	1167%	1355%	1154%	1118%	1231%	
	5 Year % Change	-46%	-26%	-34%	-27%	-6%	+
	Billion Euro	36,514	44,225	38,799	38,628	41,596	

▲ High Concern  
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n/a: Data Not Available

## Largest Individual Lenders

Individual Lenders		2016	2017	2018	2019	2020	
Deutsche Bank	Loans to GDP	13.2%	12.4%	12%	12.6%	13.0%	
	5 year % change	-15%	-15%	-11%	-10%	-9%	+
	Billion Euro	€414	€406	€405	€434	€432	
	Charge-off Rate	n/a	n/a	n/a	n/a	n/a	
KfW (State-Owned)	Loans to GDP	4.4%	3.9%	3.8%	3.7%	4.2%	
	5 year % change	-1%	-9%	-8%	-8%	-5%	+
	Billion Euro	€137	€128	€127	€129	€141	
	Charge-off Rate	n/a	n/a	n/a	n/a	n/a	
DZ Bank	Loans to GDP	6.2%	5.9%	5.7%	5.9%	n/a	
	5 year % change	20%	22%	16%	23%	n/a	
	Billion Euro	€195	€192	€192	€204	n/a	!
	Charge-off Rate	n/a	n/a	n/a	n/a	n/a	
Commerzbank	Loans to GDP	8.7%	8.1%	7.4%	7.6%	7.8%	
	5 year % change	-24%	-22%	-18%	-7%	6%	+
	Billion Euro	€271	€265	€249	€261	€259	
	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



## Real Estate

Total Debt		2016	2017	2018	2019	2020
Mortgage Debt	Debt to GDP	36.0%	36.0%	36.6%	37.7%	41.7%
	5 year % change	-1%	-1%	1%	5%	16%
	Billion Euro	€1,126	€1,175	€1,231	€1,301	€1,387



Quarterly Residential Housing Summary		Sep-2019	Dec-2019	Mar-2020	Jun-2020	Sep-2020	Dec-2020
Total Housing Units Approved for Construction	Volume	38,360	34,331	33,632	38,872	40,758	40,677
	Annual Change	2.8%	3.8%	3.4%	5.3%	6.3%	18.5%
Total Housing Units Construction Started	Volume	5,172	4,947	5,097	5,421	5,565	6,051
	Annual Change	6.8%	7.4%	10.9%	7.5%	7.6%	22.3%
Residential Property Price Index	Index (2015=100)	129.6	132.7	133.5	135.8	139.8	143.5
	Annual Change	5.3%	6.5%	7.1%	6.3%	7.9%	8.1%

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 + No Current Concern

n/a: Data Not Available

## Additional Data


Public Debt		2016	2017	2018	2019	2020
Total General Government Debt	Debt to GDP	69%	65%	62%	60%	70%
	5 Year % Change	-13%	-20%	-22%	-21%	-3%
	Billion Euro	€2,172	€2,123	€2,074	€2,058	€2,332
Total Federal Government Debt	Debt to GDP	44%	41%	39%	38%	46%
	5 Year % Change	-13%	-18%	-20%	-21%	0%
	Billion Euro	€1,366	€1,350	€1,323	€1,300	€1,513
Total State and Local Government Debt	Debt to GDP	26%	24%	23%	22%	25%
	5 Year % Change	-14%	-22%	-23%	-21%	-9%
	Billion Euro	€819	€789	€767	€774	€833

Supplementary Data		2016	2017	2018	2019	2020
Nominal GDP	Billion Euro	€3,129	€3,263	€3,361	€3,455	€3,325
	Annual % Change	3.5%	4.3%	3.0%	2.8%	-3.8%
Real GDP	Billion 2015 Euros	€3,088	€3,177	€3,219	€3,238	€3,067
	Annual % Change	2.1%	2.9%	1.3%	0.6%	-5.3%
Consumer Price Index (Inflation)	CPI (2015=100)	100.4	102.1	104.0	105.5	105.8
	Inflation Rate	0.4%	1.7%	1.9%	1.4%	0.3%
Unemployment	Person (Thousands)	2,629	2,441	2,264	2,285	2,780
	Unemployment Rate	6.0%	5.5%	5.0%	5.0%	6.1%
Current Account Balance	Billion Euros	€263	€255	€268	€265	€227
	to GDP	8.4%	7.8%	8.0%	7.7%	6.8%

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

n/a: Data Not Available

## Explanatory Notes

Color Code	Cell Description
	5 Year % Change > 40%
	5 Year % Change > 40%
	Debt to GDP < 1.5% (immaterial)
	5 Year % Change > 20% < 40%
	Debt to GDP < 1.5% (immaterial)
	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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