

## **Economic Analysis of Non-Cash Payment Transactions Across Europe (2000-2023)**

This analysis examines the year-over-year growth in non-cash payment transactions leaving European countries to any recipient country, revealing important trends about financial digitalization, economic shocks, and structural payment behaviours.

### Macroeconomic Trends

#### 1. Financial Crisis Impact (2007-2009)

- **Germany** showed unusual volatility with a -9.42% drop in 2007 followed by recovery (+2.98% in 2008)
- **Luxembourg** experienced extreme growth (+261.54% in 2008) suggesting capital flight due to the high level of EU migrant workers.
- **Italy** maintained growth throughout the crisis, indicating relative stability in transactions through payment systems.
- **France** showed remarkable resilience with steady 2-4% annual growth during these crisis years.

#### 2. COVID-19 Pandemic Effects (2020-2021)

- **Luxembourg** again showed extreme behavior (+29.95% in 2020) - likely reflecting its role as a financial hub with cross-border workers moving funds.
- **Netherlands** had a 22.87% surge in 2022 suggesting a quicker digital payment infrastructure adoption during covid lockdown measures.
- **Italy** demonstrated the strongest pandemic increase (+23.85% in 2021, +16.91% in 2022) indicating accelerated digital adoption.
- **France** and **Austria** showed brief declines in 2020 (-2.70% and -4.35% respectively) before rebounding showing a general decline in consumer demand amidst a country with mature online payment infrastructure.

### Country-Specific Analysis

#### Digital Leaders (Consistent High Growth)

##### 1. **Poland**

- Averaged 16-20% YoY growth from 2003-2021.
- Massive 26.07% jump in 2015 coinciding with banking sector modernization.
- Exceptional pandemic performance (23.85% in 2021).

#### Volatile Performers

## 1. Luxembourg

- Extreme fluctuations: +261.54% (2008), +76.87% (2006)
- Reflects its role as financial center with mobile capital..
- Pandemic surge suggests cross-border financial restructuring.

## 2. Austria

- Dramatic -35.58% drop in 2014 (possible regulatory change).

## 3. Germany

- Negative growth during financial crisis (-9.42% in 2007).
- Stable but modest growth recently (4-5%).
- Suggests conservative payment system evolution.

### Technology Adoption Patterns

The data reveals three distinct adoption curves:

#### 1. Early Digitizers (Sweden, Netherlands)

- Mature growth patterns (5-8%).
- Limited pandemic spikes as digital already dominant.

#### 2. Rapid Adopters (Poland, Italy)

- Double-digit growth for extended periods.
- Pandemic accelerated existing digital trends.

#### 3. Late Bloomers (Austria, Germany)

- Early volatility followed by recent acceleration.
- COVID-19 served as digital tipping point.

### Structural Observations

1. **Financial Centre Effect:** Luxembourg's extreme volatility suggests its payments reflect capital movements rather than consumer behaviour.
2. **Eastern European countries:** Poland's consistent high growth shows how newer EU members skipped cash phases.
3. **Core EU Stability:** France and Germany (except 2007) showed payment systems bare consistent transactions during shocks.

The data paints a picture of Europe's uneven but accelerating transition away from cash, with financial crises and pandemics serving as catalysts for digital payment adoption. Countries with advanced digital infrastructure pre-pandemic showed resilience, while others used the crisis to accelerate transformation. Luxembourg remains an outlier due to its unique financial centre characteristics.

SQL Data Outputs

	Year	Country	PaymentValue	PrevYearValue	YoY_Growth_Pct
1	2001	Austria	955.24	887.58	7.620000000000000
2	2002	Austria	1012.99	955.24	6.050000000000000
3	2003	Austria	1746.30	1012.99	72.390000000000000
4	2004	Austria	1770.25	1746.30	1.370000000000000
5	2005	Austria	1896.79	1770.25	7.150000000000000
6	2006	Austria	1909.33	1896.79	0.660000000000000
7	2007	Austria	2052.75	1909.33	7.510000000000000
8	2008	Austria	2130.73	2052.75	3.800000000000000
9	2009	Austria	2191.81	2130.73	2.870000000000000
10	2010	Austria	2229.33	2191.81	1.710000000000000
11	2011	Austria	2318.42	2229.33	4.000000000000000
12	2012	Austria	2375.96	2318.42	2.480000000000000
13	2013	Austria	2410.25	2375.96	1.440000000000000
14	2014	Austria	1552.71	2410.25	-35.580000000000000
15	2015	Austria	1554.51	1552.71	0.120000000000000
16	2016	Austria	1657.40	1554.51	6.620000000000000
17	2017	Austria	1787.79	1657.40	7.870000000000000
18	2018	Austria	1951.69	1787.79	9.170000000000000
19	2019	Austria	2120.63	1951.69	8.660000000000000
20	2020	Austria	2241.10	2120.63	5.680000000000000
21	2021	Austria	2452.56	2241.10	9.440000000000000
22	2022	Austria	2764.20	2452.56	12.710000000000000
23	2023	Austria	3018.30	2764.20	9.190000000000000
24	2001	Belgium	1542.61	1390.74	10.920000000000000
25	2002	Belgium	1703.85	1542.61	10.450000000000000
26	2003	Belgium	1668.72	1703.85	-2.060000000000000
27	2004	Belgium	1797.12	1668.72	7.690000000000000
28	2005	Belgium	1892.07	1797.12	5.280000000000000
29	2006	Belgium	1978.95	1892.07	4.590000000000000
30	2007	Belgium	2099.71	1978.95	6.100000000000000
31	2008	Belgium	2197.82	2099.71	4.670000000000000
32	2009	Belgium	2289.54	2197.82	4.170000000000000
33	2010	Belgium	2386.39	2289.54	4.230000000000000
34	2011	Belgium	2502.64	2386.39	4.870000000000000
35	2012	Belgium	2510.91	2502.64	0.330000000000000
36	2013	Belgium	2701.80	2510.91	7.600000000000000
37	2014	Belgium	3442.36	2701.80	27.410000000000000
38	2015	Belgium	3193.77	3442.36	-7.220000000000000
39	2016	Belgium	3459.81	3193.77	8.330000000000000
40	2017	Belgium	3773.78	3459.81	9.070000000000000
41	2018	Belgium	4243.61	3773.78	12.450000000000000
42	2019	Belgium	4626.82	4243.61	9.030000000000000
43	2020	Belgium	4852.28	4626.82	4.870000000000000
44	2021	Belgium	5316.98	4852.28	9.580000000000000
45	2022	Belgium	5696.60	5316.98	7.140000000000000
46	2023	Belgium	6226.20	5696.60	9.300000000000000
47	2001	Finland	915.74	863.81	6.010000000000000
48	2002	Finland	1032.61	915.74	12.760000000000000
49	2003	Finland	1152.63	1032.61	11.620000000000000
50	2004	Finland	1222.33	1152.63	6.050000000000000
51	2005	Finland	1370.12	1222.33	12.090000000000000
52	2006	Finland	1544.60	1370.12	12.730000000000000
53	2007	Finland	1695.60	1544.60	9.780000000000000
54	2008	Finland	1823.60	1695.60	7.550000000000000
55	2009	Finland	1756.50	1823.60	-3.680000000000000
56	2010	Finland	1985.63	1756.50	13.040000000000000
57	2011	Finland	2183.36	1985.63	9.960000000000000
58	2012	Finland	2427.83	2183.36	11.200000000000000
59	2013	Finland	2451.69	2427.83	0.980000000000000
60	2014	Finland	2200.26	2451.69	-10.260000000000000
61	2015	Finland	2299.69	2200.26	4.520000000000000
62	2016	Finland	2447.33	2299.69	6.420000000000000
63	2017	Finland	2588.32	2447.33	5.760000000000000
64	2018	Finland	2808.49	2588.32	8.510000000000000
65	2019	Finland	3014.40	2808.49	7.330000000000000
66	2020	Finland	2883.25	3014.40	-4.350000000000000
67	2021	Finland	3073.77	2883.25	6.610000000000000
68	2022	Finland	3330.26	3073.77	8.340000000000000
69	2023	Finland	3595.13	3330.26	7.950000000000000
70	2001	France	12365.64	11979.94	3.220000000000000
71	2002	France	13347.32	12365.64	7.940000000000000
72	2003	France	13691.77	13347.32	2.580000000000000
73	2004	France	14070.96	13691.77	2.770000000000000
74	2005	France	14224.04	14070.96	1.090000000000000
75	2006	France	14936.31	14224.04	5.010000000000000
76	2007	France	15459.67	14936.31	3.500000000000000
77	2008	France	15893.46	15459.67	2.810000000000000
78	2009	France	16422.32	15893.46	3.330000000000000
79	2010	France	17057.49	16422.32	3.870000000000000
80	2011	France	17538.26	17057.49	2.820000000000000
81	2012	France	18068.32	17538.26	3.020000000000000
82	2013	France	18086.10	18068.32	0.100000000000000
83	2014	France	18957.98	18086.10	4.820000000000000
84	2015	France	20208.01	18957.98	6.590000000000000
85	2016	France	20907.94	20208.01	3.460000000000000
86	2017	France	21964.32	20907.94	5.050000000000000
87	2018	France	23498.04	21964.32	6.980000000000000
88	2019	France	24881.15	23498.04	5.890000000000000
89	2020	France	24210.19	24881.15	-2.700000000000000
90	2021	France	27090.08	24210.19	11.900000000000000
91	2022	France	29125.96	27090.08	7.520000000000000
92	2023	France	30621.78	29125.96	5.140000000000000
93	2001	Germany	12520.97	12209.05	2.550000000000000

94	2002	Germany	12156.76	12520.97	-2.910000000000000	141	2004	Luxemb...	56.54	53.34	6.000000000000000
95	2003	Germany	13432.10	12156.76	10.490000000000000	142	2005	Luxemb...	59.91	56.54	5.960000000000000
96	2004	Germany	14612.48	13432.10	8.790000000000000	143	2006	Luxemb...	105.96	59.91	76.870000000000000
97	2005	Germany	15892.59	14612.48	8.760000000000000	144	2007	Luxemb...	120.66	105.96	13.870000000000000
98	2006	Germany	17212.33	15892.59	8.300000000000000	145	2008	Luxemb...	436.23	120.66	261.5400000000000...
99	2007	Germany	15591.78	17212.33	-9.420000000000000	146	2009	Luxemb...	543.00	436.23	24.480000000000000
100	2008	Germany	16057.02	15591.78	2.980000000000000	147	2010	Luxemb...	703.47	543.00	29.550000000000000
101	2009	Germany	16578.01	16057.02	3.240000000000000	148	2011	Luxemb...	927.84	703.47	31.890000000000000
102	2010	Germany	17324.27	16578.01	4.500000000000000	149	2012	Luxemb...	1161.20	927.84	25.150000000000000
103	2011	Germany	17738.73	17324.27	2.390000000000000	150	2013	Luxemb...	1415.09	1161.20	21.860000000000000
104	2012	Germany	18210.69	17738.73	2.660000000000000	151	2014	Luxemb...	1710.51	1415.09	20.880000000000000
105	2013	Germany	19589.73	18210.69	7.570000000000000	152	2015	Luxemb...	2036.48	1710.51	19.060000000000000
106	2014	Germany	18042.58	19589.73	-7.900000000000000	153	2016	Luxemb...	2388.43	2036.48	17.280000000000000
107	2015	Germany	19798.59	18042.58	9.730000000000000	154	2017	Luxemb...	2861.63	2388.43	19.810000000000000
108	2016	Germany	20372.39	19798.59	2.900000000000000	155	2018	Luxemb...	3346.39	2861.63	16.940000000000000
109	2017	Germany	21305.73	20372.39	4.580000000000000	156	2019	Luxemb...	3676.91	3346.39	9.880000000000000
110	2018	Germany	22419.99	21305.73	5.230000000000000	157	2020	Luxemb...	4777.99	3676.91	29.950000000000000
111	2019	Germany	23917.29	22419.99	6.680000000000000	158	2021	Luxemb...	5416.23	4777.99	13.360000000000000
112	2020	Germany	25902.05	23917.29	8.300000000000000	159	2022	Luxemb...	5777.86	5416.23	6.680000000000000
113	2021	Germany	27292.77	25902.05	5.370000000000000	160	2023	Luxemb...	6055.91	5777.86	4.810000000000000
114	2022	Germany	27588.93	27292.77	1.090000000000000	161	2001	Netherla...	3140.89	2894.37	8.520000000000000
115	2023	Germany	28717.95	27588.93	4.090000000000000	162	2002	Netherla...	3408.81	3140.89	8.530000000000000
116	2001	Italy	3017.61	2063.55	46.230000000000000	163	2003	Netherla...	3582.46	3408.81	5.090000000000000
117	2002	Italy	3129.44	3017.61	3.710000000000000	164	2004	Netherla...	3738.39	3582.46	4.350000000000000
118	2003	Italy	3232.75	3129.44	3.300000000000000	165	2005	Netherla...	3961.26	3738.39	5.960000000000000
119	2004	Italy	3423.36	3232.75	5.900000000000000	166	2006	Netherla...	4287.09	3961.26	8.230000000000000
120	2005	Italy	3517.05	3423.36	2.740000000000000	167	2007	Netherla...	4533.04	4287.09	5.740000000000000
121	2006	Italy	3605.98	3517.05	2.530000000000000	168	2008	Netherla...	4822.67	4533.04	6.390000000000000
122	2007	Italy	3760.26	3605.98	4.280000000000000	169	2009	Netherla...	5090.73	4822.67	5.560000000000000
123	2008	Italy	3816.22	3760.26	1.490000000000000	170	2010	Netherla...	5441.90	5090.73	6.900000000000000
124	2009	Italy	3957.44	3816.22	3.700000000000000	171	2011	Netherla...	5604.45	5441.90	2.990000000000000
125	2010	Italy	4004.43	3957.44	1.190000000000000	172	2012	Netherla...	5783.28	5604.45	3.190000000000000
126	2011	Italy	4159.58	4004.43	3.870000000000000	173	2013	Netherla...	6351.88	5783.28	9.830000000000000
127	2012	Italy	4263.02	4159.58	2.490000000000000	174	2014	Netherla...	6453.51	6351.88	1.600000000000000
128	2013	Italy	4487.12	4263.02	5.260000000000000	175	2015	Netherla...	6795.86	6453.51	5.300000000000000
129	2014	Italy	4792.76	4487.12	6.810000000000000	176	2016	Netherla...	7174.12	6795.86	5.570000000000000
130	2015	Italy	5288.12	4792.76	10.340000000000000	177	2017	Netherla...	7800.20	7174.12	8.730000000000000
131	2016	Italy	5746.19	5288.12	8.660000000000000	178	2018	Netherla...	8707.03	7800.20	11.630000000000000
132	2017	Italy	6035.00	5746.19	5.030000000000000	179	2019	Netherla...	9420.52	8707.03	8.190000000000000
133	2018	Italy	6784.00	6035.00	12.410000000000000	180	2020	Netherla...	9190.36	9420.52	-2.440000000000000
134	2019	Italy	7601.95	6784.00	12.060000000000000	181	2021	Netherla...	9723.38	9190.36	5.800000000000000
135	2020	Italy	8006.58	7601.95	5.320000000000000	182	2022	Netherla...	11947.39	9723.38	22.870000000000000
136	2021	Italy	9916.25	8006.58	23.850000000000000	183	2023	Netherla...	12810.34	11947.39	7.220000000000000
137	2022	Italy	11593.23	9916.25	16.910000000000000	184	2001	Poland	606.93	490.42	23.760000000000000
138	2023	Italy	13217.21	11593.23	14.010000000000000	185	2002	Poland	632.03	606.93	4.140000000000000
139	2002	Luxemb...	50.59	43.52	16.250000000000000	186	2003	Poland	781.52	632.03	23.650000000000000
140	2003	Luxemb...	53.34	50.59	5.440000000000000	187	2004	Poland	935.98	781.52	19.760000000000000

188	2005	Poland	1027.63	935.98	9.790000000000000
189	2006	Poland	1233.80	1027.63	20.060000000000000
190	2007	Poland	1476.05	1233.80	19.630000000000000
191	2008	Poland	1714.09	1476.05	16.130000000000000
192	2009	Poland	2041.40	1714.09	19.100000000000000
193	2010	Poland	2335.71	2041.40	14.420000000000000
194	2011	Poland	2674.51	2335.71	14.510000000000000
195	2012	Poland	2975.87	2674.51	11.270000000000000
196	2013	Poland	3314.45	2975.87	11.380000000000000
197	2014	Poland	3873.67	3314.45	16.870000000000000
198	2015	Poland	4883.71	3873.67	26.070000000000000
199	2016	Poland	5665.38	4883.71	16.010000000000000
200	2017	Poland	6511.70	5665.38	14.940000000000000
201	2018	Poland	7561.64	6511.70	16.120000000000000
202	2019	Poland	8872.58	7561.64	17.340000000000000
203	2020	Poland	9714.37	8872.58	9.490000000000000
204	2021	Poland	11482.24	9714.37	18.200000000000000
205	2022	Poland	0.04	11482.24	-100.0000000000000
206	2023	Poland	14471.88	0.04	36179600.000000000
207	2001	Sweden	1266.50	1212.90	4.420000000000000
208	2002	Sweden	1147.70	1266.50	-9.380000000000000
209	2003	Sweden	1432.77	1147.70	24.840000000000000
210	2004	Sweden	1669.00	1432.77	16.490000000000000
211	2005	Sweden	1785.00	1669.00	6.950000000000000
212	2006	Sweden	2056.00	1785.00	15.180000000000000
213	2007	Sweden	2317.51	2056.00	12.720000000000000
214	2008	Sweden	2578.80	2317.51	11.270000000000000
215	2009	Sweden	2740.80	2578.80	6.280000000000000
216	2010	Sweden	2980.70	2740.80	8.750000000000000
217	2011	Sweden	3102.70	2980.70	4.090000000000000
218	2012	Sweden	3346.20	3102.70	7.850000000000000
219	2013	Sweden	3604.10	3346.20	7.710000000000000
220	2014	Sweden	3899.97	3604.10	8.210000000000000
221	2015	Sweden	4204.54	3899.97	7.810000000000000
222	2016	Sweden	4776.66	4204.54	13.610000000000000
223	2017	Sweden	5008.00	4776.66	4.840000000000000
224	2018	Sweden	5379.85	5008.00	7.430000000000000
225	2019	Sweden	5601.47	5379.85	4.120000000000000
226	2020	Sweden	5564.84	5601.47	-0.650000000000000
227	2021	Sweden	5927.35	5564.84	6.510000000000000