

Findings and Management Recommendations

EU Working Capital and Customer Profitability Database | Tauernquell Industriebedarf GmbH (fictional) | reporting date 30 September 2026 | prepared by Kleivin Gjuzi

Synthetic data. Tauernquell Industriebedarf GmbH is a fictional distributor of workshop and industrial supplies with warehouses in Austria, Germany and the Netherlands. Every customer, supplier, invoice, payment and stock movement was produced by a seeded generator (seed 2718). No figure describes a real business. **Simplified tax treatment:** every sale and purchase is treated as a domestic transaction of the local warehouse at that country's standard VAT rate; VAT is stored separately, is excluded from revenue and margin, and its settlement with tax authorities is not modelled. This is not a tax-compliance project.

1. Executive summary and business questions

This report summarises a working-capital and profitability database built in DuckDB 1.4.5. It holds 9,131 sales invoices with 35,417 lines, 1,002 credit notes, 6,204 customer payments with 8,720 allocations, 3,220 supplier invoices, 30,844 stock movements and 4,500 month-end stock snapshots for 24 months to 30 September 2026. All figures below are produced by the SQL in the project.

Business questions. (1) Which customers and products earn the gross profit, and what is left after the cost of serving them? (2) How much cash is tied up in receivables and stock, who owes it and which items are overdue or slow? (3) How long is the cash conversion cycle, and how much cash could be released under explicit scenarios?

Key figure	Value	Basis
Net revenue, last 12 months	EUR 28,319,545	net of VAT, after credit notes
Gross profit, last 12 months / margin	EUR 5,204,761 / 18.4%	net of VAT
Contribution after modelled service costs, 24 months / margin	EUR 8,702,792 / 15.3%	gross profit less service-cost assumptions
Trade receivables / of which overdue	EUR 6,683,926 / EUR 2,039,206 (30.5%)	gross, by due date
Inventory / trade payables	EUR 2,868,230 / EUR 4,424,709	cost / gross
DSO / DIO / DPO (12-month window)	72.0 / 45.3 / 57.2 days	closing balance / trailing 12-month flow x days
Cash conversion cycle	$72.0 + 45.3 - 57.2 = 60.1$ days	DSO + DIO - DPO

Answer in brief.

- Profit is not cash: over the last 12 months gross profit was EUR 5.20m, but trade cash flow before VAT was EUR 4.55m, because EUR 0.64m went into higher receivables and stock net of supplier credit.
- Revenue is concentrated and thin where it is largest: 8 key accounts bring 65.6% of revenue at a 15.0% gross margin; power tools sold to them earn 5.0%, and 9.2% of that revenue is on lines with a negative gross profit.
- 30.5% of receivables are overdue. 7 customers hold 85.3% of the overdue amount; key accounts pay 33 days after the due date on an amount-weighted basis.
- 17.5% of stock (EUR 503k) has not been sold for at least 180 days.
- Scenario, not a saving: 6 days less DSO and 6 days less DIO would release about EUR 0.94m.

2. Data provenance and limitations

Label	What it covers	Where it comes from
Synthetic	All master data and transactions: customers, products, suppliers, invoices, credit notes, payments, allocations, purchases, stock movements and snapshots	generator/generate_data.py, fixed seed 2718
Derived	Every reported figure: profitability, ageing, DSO, DIO, DPO, cash conversion cycle, concentration, slow-moving classes	SQL views and analysis queries
Analyst assumption	Service-cost rates (EUR 12.00 per invoice, EUR 1.80 per line, EUR 24.00 delivery per invoice, EUR 30.00 per credit note, 6% financing rate); slow-moving thresholds; ageing buckets; priority rules; scenario reductions	model_parameters, scenario_assumptions (editable tables)

Label	What it covers	Where it comes from
Real-world reference	Standard VAT rates: Austria 20%, Germany 19%, Netherlands 21%. Nothing else is taken from reality.	Source_Register.csv
Reported actuals	None. No published company figure is used.	-

Limitations. One legal entity and one currency. Cross-border VAT rules (intra-community supplies, reverse charge), reduced rates and VAT returns are not modelled. Product cost is a constant standard cost, so there are no purchase-price variances or stock revaluations. Balances start at zero in the first month because no history before October 2024 exists, which distorts the first months of the ratios; 12-month ratios are shown only from the twelfth month. Customer behaviour (payment delays, returns, discounts) follows invented profiles per customer and segment and makes no statement about real customers or countries. The service costs are assumptions used to show the method; they are not measured costs.

3. KPI definitions and methodology

KPI	Definition	VAT basis
Net revenue	Invoice line net amounts minus credit-note net amounts	net
Gross profit / margin	Net revenue minus cost of goods sold (standard cost; cost of restocked returns is reversed) / divided by net revenue	net
Contribution after service costs	Gross profit minus modelled order, picking, delivery, returns and financing costs. Financing cost = (gross invoice - credit notes) x rate x days outstanding / 365	net profit; financing on gross receivable
Open amount	Invoice gross - credit notes gross - allocated payments, per invoice	gross
Ageing	Days from the invoice DUE date to the reporting date: 0 or fewer = not due; 1-30; 31-60; 61-90; over 90	gross
DSO	Closing trade receivables / gross sales after credit notes of the window x days in the window	gross / gross
DIO	Closing inventory at cost / cost of goods sold of the window x days	net / net
DPO	Closing trade payables / gross purchases of the window x days. Calculated only because purchase invoices and their payment dates exist in the data	gross / gross
Cash conversion cycle	DSO + DIO - DPO	-
Window convention	Closing balance at month end against the trailing 3 or 12 calendar months ending on the same date; days = calendar days in the window; empty until the window is complete	-
Weighted versus simple	Company and segment ratios are weighted (sum / sum). Simple averages of customer ratios are shown next to them and labelled	-
Slow-moving stock	'No movement': no sale for 180 days or more. 'Excess cover': stock / average daily sales of the last 90 days above 180 days. 'Watch': 91 to 180 days	net (cost)
HHI	Sum of squared revenue shares in % (10,000 = a single customer)	net

Method. Child tables are aggregated to invoice grain before they are joined, so no total can be inflated by a one-to-many join. 15 views hold the logic, 16 analysis queries export result files, and 127 automated tests reconcile invoices, credits, payments, open balances, stock and report totals.

4. Findings

Finding 1: profit and cash differ by the change in working capital

Bridge, last 12 months (EUR)	Amount
Gross profit (net of VAT)	5,204,761
Less: increase in trade receivables	-625,488
Less: increase in inventory	-449,046
Plus: increase in trade payables	437,792
Less: stock losses (write-offs and count differences)	-22,751
Plus: net VAT collected (settlement with tax office not modelled)	935,539
Plus: increase in unallocated customer cash	5,430
Equals: net trade cash flow (customer receipts less supplier payments)	5,486,236

Gross profit of EUR 5,204,761 turned into EUR 5,486,236 of net trade cash flow. EUR 935,539 of that is VAT collected for the tax office, which is not the company's money (its payment is not modelled). Without it, trade cash

flow was EUR 4,550,697: EUR 654,063 less than gross profit. Receivables grew by EUR 625,488, stock by EUR 449,046, and suppliers financed EUR 437,792 more; EUR 22,751 of stock was written off. The bridge closes to zero in the validation.

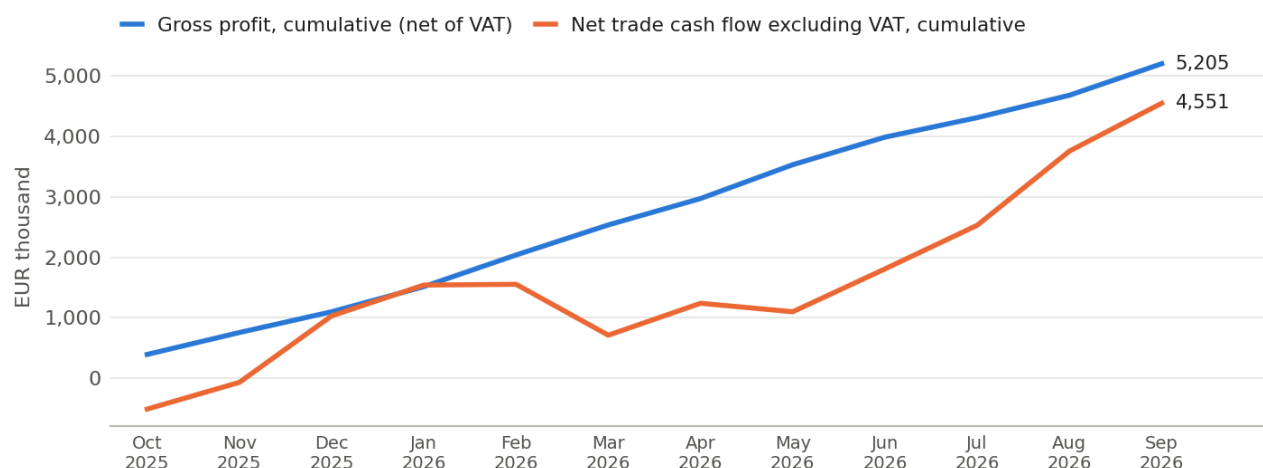


Chart 1: cumulative gross profit and cumulative trade cash flow before VAT, last 12 months, EUR thousand. Source: v_monthly_flows. Synthetic data.

Finding 2: the largest customers earn the thinnest margins

Segment	Cust.	Net revenue (EUR)	Share	Gross margin (weighted)	Service cost / gross profit	Contribution margin	Cust. with negative contribution
Key account	8	37,339,274	65.6%	15.0%	13.6%	12.9%	0
Industrial	34	14,967,234	26.3%	21.1%	8.5%	19.4%	0
Trade and craft	48	2,693,517	4.7%	26.0%	16.8%	21.6%	0
Public sector	10	1,658,617	2.9%	24.9%	10.7%	22.2%	0
Online small business	20	242,652	0.4%	27.8%	58.3%	11.6%	3
All customers	120	56,901,294	100.0%	17.5%	12.4%	15.3%	3

The company gross margin is 17.46% (weighted). The simple average of the 120 customer margins is 24.00%: small customers have high margins but little weight, so the simple average flatters the business. The top 5 customers bring 54.7% of 12-month revenue but 48.2% of gross profit; 18 customers make up 80% of revenue (HHI 751). Power tools are 42.4% of revenue at a 6.5% margin; with key accounts the average discount on them is 14.1%, the margin 5.0%, and EUR 1,586,491 of revenue sits on 429 lines with a negative gross profit (loss EUR 90,529). At the other end, online small businesses keep 11.6% of a 27.8% gross margin, because order, delivery and returns costs are fixed per document; 3 of them have a negative contribution. Of the modelled service costs of EUR 1,229,347, EUR 806,821 is the cost of financing receivables.

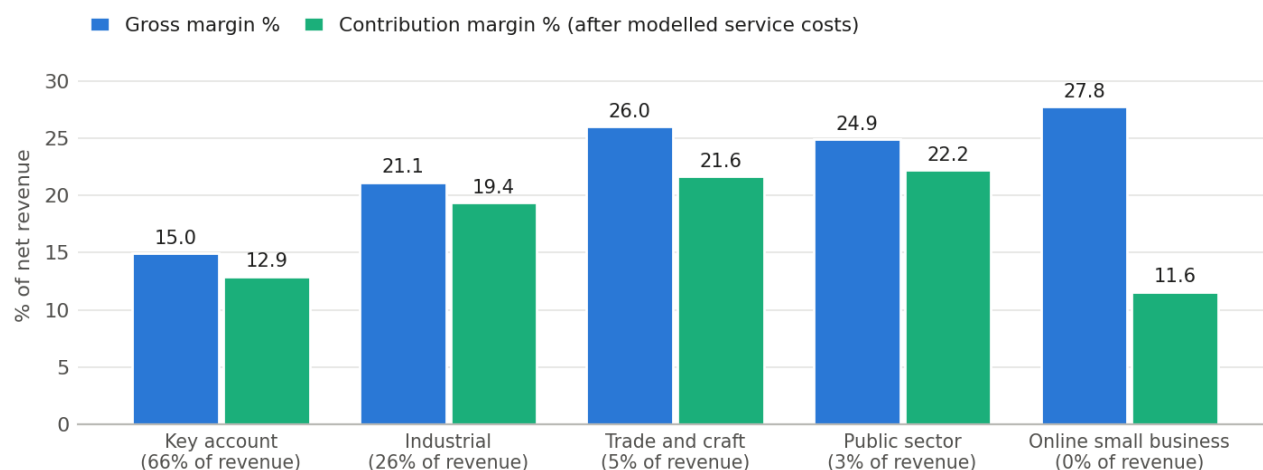


Chart 2: gross margin and contribution margin by customer segment, 24 months. Source: results/A03_profitability_by_segment_and_country.csv. Service costs are assumptions.

Finding 3: 30.5% of receivables are overdue and 7 accounts hold most of it

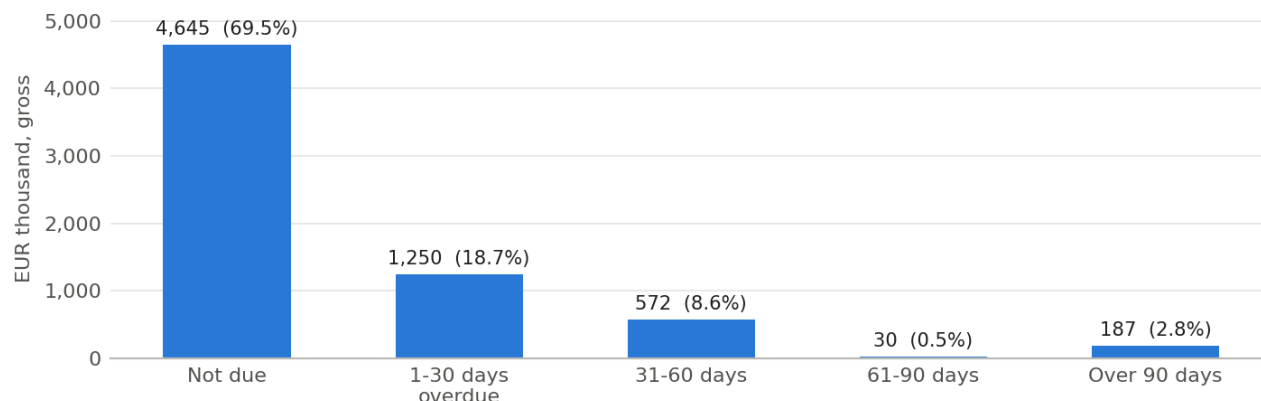


Chart 3: trade receivables by ageing bucket at 30 September 2026, gross, based on invoice due dates. Source: results/A05_receivables_ageing_summary.csv.

Rank	Customer	Segment	Open (EUR)	Overdue (EUR)	Over 90 days	Avg days late (weighted)	Over credit limit	Cl.
1	C0002 Donau Maschinenwerke GmbH	Key account	1,540,663	597,836	81,732	49	yes	A
2	C0004 Polderfeld Anlagenbau GmbH	Key account	1,121,991	455,010	32,772	49	no	A
3	C0008 Rheintal Industrieservice GmbH	Key account	611,833	381,673	19,743	50	yes	A
4	C0003 Quellhof Fahrzeugtechnik GmbH	Key account	377,220	160,829	4,110	50	yes	A
5	C0005 Veldhof Industrieservice GmbH	Key account	505,492	105,917	15,468	22	no	A
6	C0006 Linden Maschinenwerke GmbH	Key account	712,883	74,109	0	7	no	B
7	C0061 Nordfeld Bau B.V.	Trade and craft	16,038	16,038	16,038	17	yes	A
8	C0013 Dijkfeld Fertigungstechnik B.V.	Industrial	52,261	21,739	2,270	51	yes	A

Open receivables are EUR 6,683,926; EUR 2,039,206 is past its due date. The priority list ranks 56 customers with overdue items by an age-weighted score: 7 are class A (act now) with EUR 1,739,041 overdue, 23 class B and 26 class C. 16 customers are above their credit limit. Payment terms average 46.5 days weighted by invoice value, while paid invoices took 69.9 days on an amount-weighted basis and only 46.9 days as a simple average per invoice: the many small invoices are paid quickly, the large ones late. 78 items worth EUR 187,299 are more than 90 days overdue; 66 of them (EUR 170,622) are remainders of partly paid invoices, typically short payments that were never cleared by a credit note or a follow-up. EUR 5,430 of customer cash is still unallocated.

Finding 4: 17.5% of stock has not moved for six months

Stock class	Items (product x warehouse)	Value at cost (EUR)	Share of stock
Healthy	158	2,092,598	73.0%
Watch	8	263,565	9.2%
Excess cover	2	8,940	0.3%
No movement	12	503,127	17.5%
Total	180	2,868,230	100.0%

Stock is EUR 2,868,230 at cost. EUR 503,127 sits in 12 product-warehouse combinations without a sale for 180 days or more. They belong to 4 products: Bench drill 500W (EUR 222k, last sale 244 to 246 days ago); Degreaser spray 500ml (EUR 144k, last sale 215 to 218 days ago); Terminal block set (EUR 117k, last sale 203 to 217 days ago); Spirit level 60cm (EUR 20k, last sale 229 to 237 days ago). In each case a large purchase was followed by the end of customer demand. A further EUR 272,505 has more than 90 days of cover. Values are at standard cost; a sell-off or a return to the supplier would normally bring less.

Finding 5: the cash conversion cycle is about two months

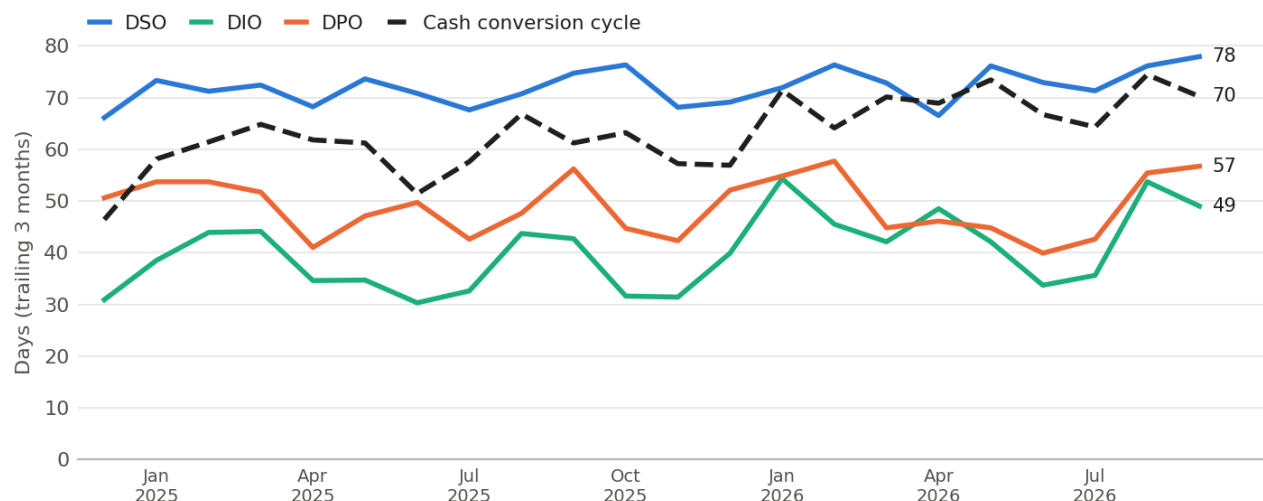


Chart 4: DSO, DIO, DPO and cash conversion cycle, trailing 3-month window, days. The first months are omitted or distorted because balances start at zero. Source: results/A07_working_capital_kpis_monthly.csv.

On the 12-month convention the cycle is $72.0 + 45.3 - 57.2 = 60.1$ days. On the 3-month convention it is $77.9 + 49.0 - 56.7 = 70.2$ days; the two differ because the last three months are not typical of the whole year (seasonality, timing of purchases). Trade working capital (receivables + inventory - payables) is EUR 5,127,447. Receivables are the largest block: DSO of 72 days compares with weighted payment terms of 46 days, a gap of about 26 days of sales. Suppliers are paid close to terms, so DPO offers little room; the levers are collection and stock.

5. Recommendations

#	Recommendation	Evidence	Trade-off	Risk if done / not done
1	Run collection by priority list: weekly follow-up of the 7 class-A accounts with sales, and clear the old remainders (collect, or issue a credit note if the short payment was justified).	Finding 3: EUR 1,739,041 overdue with 7 customers; 78 items over 90 days.	The class-A accounts are mostly key accounts (65.6% of revenue): pressure can cost goodwill; finance and sales must act together.	Done: some customers ask for longer terms instead. Not done: receivables keep financing customers at an assumed 6% a year.
2	Review prices and discounts for power tools with key accounts: a floor above standard cost, and discounts linked to payment behaviour.	Finding 2: 5.0% margin on EUR 17,301,047; 429 loss-making lines.	Higher prices can lose volume that carries fixed costs; standard cost is a simplification of real cost.	Done: a key account may move volume to a competitor. Not done: growth in this business adds revenue and receivables but little profit.
3	Stop re-ordering the 4 products without demand, agree returns or a sell-off, and require approval for purchases above a set number of months of demand.	Finding 4: EUR 503,127 without movement; EUR 272,505 on watch.	A sell-off realises less than cost and shows a loss now; tighter rules can cause stock-outs on fast items.	Done: one-off write-down. Not done: the stock ages further and the eventual write-off grows.

A smaller step from Finding 2: a minimum order value or a delivery charge for online small businesses, where fixed costs per order consume most of the gross profit. Trade-off: some of these customers will leave.

6. Scenario and sensitivity analysis

Scenario (estimate)	DSO today -> scenario	DIO today -> scenario	Cash from receivables	Cash from inventory	Total (EUR)	Cycle (days)	% of trade working capital
Conservative	72.0 -> 69.0	45.3 -> 42.3	278,535	189,985	468,520	60.1 -> 54.1	9.1%
Base	72.0 -> 66.0	45.3 -> 39.3	557,071	379,969	937,040	60.1 -> 48.1	18.3%
Stretch	72.0 -> 62.0	45.3 -> 35.3	928,452	633,282	1,561,734	60.1 -> 40.1	30.5%

How to read this. One day of DSO equals one day of gross sales (EUR 92,845); one day of DIO equals one day of cost of goods sold (EUR 63,328). The scenario multiplies these by assumed reductions. These are estimates of a one-off release, not proven savings: they assume sales stay the same and that the reduction is permanent. The

lasting benefit is the financing cost on the released cash (base scenario: about EUR 56,222 a year at the assumed 6%). **Plausibility check from the bottom up:** the base scenario needs 27% of today's overdue receivables (EUR 2,039,206) to be collected on time and 74% of the slow-moving stock (EUR 512,067 at cost) to be turned into cash at cost, which a sell-off will not achieve. The stretch scenario would need 124% of the slow stock, so it also requires lower cover on healthy items.

Sensitivity to conventions and assumptions. DSO is 72.0 days on the 12-month window and 77.9 on the 3-month window; any target must name its convention. If the financing rate were 4% or 8% instead of 6%, the modelled financing cost would be EUR 537,880 or EUR 1,075,761 instead of EUR 806,821, moving the company contribution margin between 15.8% and 14.8%; the ranking of segments does not change.

7. Validation summary

Area	Tests	Passed	What is proven
Row counts and control totals	21	21	Tables hold the rows and amounts the generator wrote.
Referential integrity and keys	17	17	No orphans; keys unique; views keep one row per invoice and per line.
Document arithmetic and VAT	12	12	Headers equal lines; VAT = net x rate, stored apart; revenue contains no VAT.
Payments and allocations	6	6	No over-allocation; cash received = allocated + unallocated.
Receivables and ageing	10	10	Open items = invoices - credits - payments; buckets equal the generator's; monthly roll-forward closes.
Known cases	27	27	Planted partial payments, multi-invoice payments and ageing boundaries (0, 1, 30, 31, 60, 61, 90, 91 days) give the expected result.
Stock reconciliation	10	10	Opening stock + movements = closing snapshot for every item and month; sales, returns and receipts match their documents.
Payables	3	3	Open payables = purchases - supplier payments; DPO has data behind it.
Profitability totals	4	4	Revenue and gross profit are identical by customer, product and month, and in the result files.
Weighted versus simple	4	4	Company margin equals the weighted average of customer margins; the simple average is different and labelled.
Working-capital KPIs	5	5	DSO, DIO, DPO recalculated from source; cycle = DSO + DIO - DPO; profit-to-cash bridge closes to 0.00.
Concentration, stock and scenario	5	5	Shares add to 100%; stock classes cover all stock; scenario recalculated.
Scope	3	3	20,000 to 40,000 invoice lines, 24 months, three countries.
Total	127	127	

Tested by execution: the complete pipeline (schema, load, views, 16 analysis queries, validation) ran end to end on DuckDB 1.4.5 through the Python API; 127 of 127 tests pass; the generator gives identical files on repeated runs. **Not tested:** the DuckDB command-line client, other DuckDB versions, PostgreSQL or other engines (the SQL uses GROUP BY ALL, ANTI JOIN, macros and COPY ... TO), larger volumes, real company data.

8. Source references

All data: generator/generate_data.py (seed 2718); input files in data/input; answer keys in data/expected. Engine: DuckDB 1.4.5. Result files: results/A01 to A14. Tests: validation_results.csv. Standard VAT rates and all assumptions: Source_Register.csv. This report contains no investment or tax advice and makes no statement about any real company.