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Multi-Channel Financing, Service Costing and the Financial Result in Public Hospitals: Evidence from a Seven-Year Reporting Archive

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Abstract: Public medical organisations in Uzbekistan now draw roughly half their resources from sources other than the budget, yet their accounting is organised on a model built for full budget financing. This paper traces the consequences of that mismatch through three connected questions: how multi-channel financing reshapes the organisation of accounting, whether the cost of a medical service can be computed from the resulting records, and what the reported financial result actually measures. We use the complete 2019–2025 statutory reporting archive of four public medical organisations, with the haematology centre serving as the object for which service-volume data exist. Four results are reported. Four independent financial flows operate in parallel, each with its own treasury personal account and its own reporting form, and no consolidating form exists; the number of accounts in use varied between one and four across the period and the budget account code changed twice. The three-stage model of cost formation lacks its middle stage entirely: directly attributable expenditure amounts to 11.3 per cent of the total in 2024, and the remaining 88.7 per cent cannot be allocated because no cost-centre cross-section is recorded anywhere. Applying partial identification, the cost of a bed-day is bounded between 67 and 598 thousand UZS in 2024, an 8.9-fold interval that narrows to 512–571 thousand only once four assumptions are stated openly; the sensitivity coefficient with respect to the measurement base reaches 4.33. Finally, the financial result on budget funds is shown to be an identity: it equals the difference between cash and actual expenditure to the last decimal in all seven years and conveys no independent information. Once capital consumption enters the calculation, the result changes sign in four years out of five.

Keywords: budget accounting, multi-channel financing, hospital costing partial identification, financial result, cost centres, public hospitals

Citation: Shonazarovich, K. A. Multi-Channel Financing, Service Costing and the Financial Result in Public Hospitals: Evidence from a Seven-Year Reporting Archive. American Journal of Economics and Business Management 2026, 9(9), 762-774.

Received: 15th Jul 2026

Revised: 10th Aug 2026

Accepted: 30th Aug 2026

Published: 21st Sep 2026



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1. Introduction

A public hospital in Uzbekistan today is financed from several purses at once. Budget appropriations cover establishment costs; the Development Fund accumulates revenue from paid services; the Material Incentive Fund distributes a share of that revenue to staff; sponsorship and currency operations add two further streams. Across the organisations we studied own revenue moved between 36.5 and 60.4 per cent of all resources and settled near half. Accounting, however, continues to be organised as though the budget were the only source.[1]

That mismatch is the subject of this paper. Three questions follow from it. What does multi-channel financing do to the organisation of accounting, once every channel acquires its own treasury account and its own reporting form? Can the cost of a medical service be computed from the records the system produces? And what does the reported financial result of a budgetary medical organisation actually measure?[2][3]

None of the three is a question about compliance. All the filings we examined were submitted on time and in the prescribed form. The questions concern what the compliant filings can and cannot tell a manager, a ministry or a tariff commission. Answering them requires a different method from the one normally applied to public sector accounting: instead of comparing practice against a standard, we interrogate the records themselves and ask what quantity can be recovered from them.[4]

Cost is where the interrogation becomes sharpest. Tariff setting, provider payment, public-private partnership and health insurance all rest on a defensible unit cost. Our finding is that the existing system cannot produce one, and that the reason is structural rather than technical. We therefore do not report a cost figure. We report the interval within which the true figure must lie, and we show how wide that interval is.[5]

The paper is organised conventionally. Section 2 positions the study in the costing and public sector accounting literatures. Section 3 describes the archive and the four analytical procedures. Section 4 reports results on financing channels, on costing and on the financial result. Section 5 discusses implications and limitations, and Section 6 concludes.[6]

Hospital costing has a long methodological literature, almost all of it developed in settings where a cost-centre structure is already in place. Chapko and co-authors (2009) establish the conditions under which bottom-up and top-down costing converge; Tan and colleagues (2009) compare the methods systematically; Mogyorosy and Smith (2005) survey the whole field in a study that remains the standard reference. Adam, Evans and Murray (2003) estimate country-specific hospital costs econometrically for settings where primary data are scarce, and Chatterjee, Levin and Laxminarayan (2013) document the dispersion of unit costs across Indian hospitals. Ozaltin and Cashin (2014) supply the practitioner manual for costing in provider-payment reform.[7]

What unites these treatments is an assumption they rarely state: that expenditure can be attributed to an organisational unit smaller than the institution. Cooper and Kaplan (1988) made the attribution problem explicit for the private sector; Kaplan and Porter (2011) restated it for healthcare. The DRG literature summarised by Busse and colleagues (2011) presupposes the same attribution, since a diagnosis-related group is meaningless without it. Northcott and Llewellyn (2003) show what happens to a national reference costing index when the underlying attribution is weak, and Llewellyn and Northcott (2005) develop the argument that an "average hospital" produced from such data is an artefact of the method rather than a description of anything.[8]

Public sector accounting research approaches the same terrain from the other side. Anessi-Pessina and Steccolini (2007) examine what happens when budgetary and accrual logics coexist within one system, which is precisely the condition of the organisations we study. Hepworth (2003), Pettersen (2001) and Ouda (2021) trace the distance between the intentions of reform and its effects. Otley (1980) supplies the contingency argument that management accounting takes the shape its environment imposes on it.[9]

A smaller body of work examines the accounting consequences of mixed funding specifically. Ostonokulov (2021) documents the reporting treatment of extrabudgetary resources in Uzbek budgetary organisations and identifies the absence of consolidation as the central weakness; our evidence quantifies what that absence costs at the level of a single institution. IPSAS 23 sets the international treatment of non-exchange revenue, which is the category into which the larger part of these flows falls, and its requirements are not reflected in the local reporting set.[10]

Two gaps emerge. First, the costing literature offers no procedure for the case where the cost-centre cross-section is absent and cannot be reconstructed; it offers only the advice to build one. Second, the public sector literature has not examined what the statutory financial result of a budgetary organisation measures, as distinct from what it is called. We take up both.[11]

For the first we borrow from econometrics. Manski (2003) formalised partial identification: when point identification fails, a defensible response is to report the set of values consistent with the data and the assumptions, and to show how the set contracts as assumptions are added. To our knowledge the approach has not previously been applied to budgetary accounting.[12]

2. Materials and Methods

2.1 Data

Our evidence is the full 2019–2025 filing record of four public medical organisations. Expenditure and financing data come from the national rehabilitation and prosthetics centre, whose archive holds 73 filed reports spread over eight form families. For cost analysis we turn to the haematology centre, since it alone files the statistical report on beds and patients year after year, and a denominator therefore exists only there. Two further objects were used for cross-checks.

Figures were taken from the filed workbooks themselves. Duplicate submissions were resolved by treasury account, so that an annual total aggregates accounts rather than files, and wherever a redaction changed we mapped lines by substance before constructing any series across years.[13]

2.2 Procedures

Four procedures were applied.

- a. Channel analysis. For each year we identified the treasury personal accounts in operation, the reporting form serving each, and the expenditure recorded under each economic classification category, separately for budget and fund resources.
- b. Cost attribution analysis. Every expenditure item was classified by its degree of attributability to a medical service: directly attributable, attributable through an allocation base, or not attributable. The share of each class was computed for each year.
- c. Partial identification of unit cost. Lower and upper bounds were constructed and then narrowed by explicit assumptions.
- d. Identity testing of the financial result. The reported result was compared with the difference between cash and actual expenditure, and then recomputed with capital consumption included.

The bounds in procedure (iii) are defined as follows. Let C denote total expenditure of the reporting year, D the subset directly attributable to inpatient treatment, and Q the number of bed-days. The lower bound assigns only direct expenditure to inpatient care; the upper bound assigns the whole of expenditure:

$$L = D / Q \quad \text{and} \quad U = C / Q, \quad \text{so that} \quad L \leq c \leq U$$

Adding assumptions contracts the interval. We introduced four, each stated openly and each defensible from the archive: that administrative overheads are distributed in proportion to floor area; that utilities follow the same base; that outpatient activity absorbs expenditure in proportion to visits weighted at one-eighth of a bed-day; and that capital consumption is charged at the depreciation rate recorded in the balance sheet. The resulting interval is denoted $[m_{\min}, m_{\max}]$.

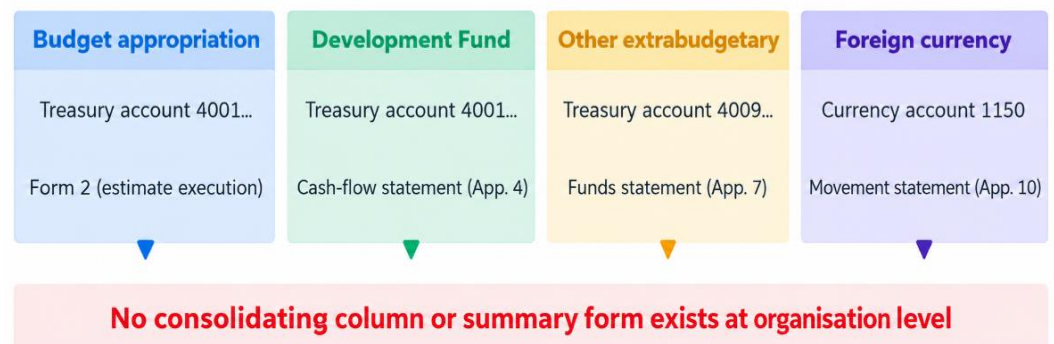
Sensitivity to the measurement base was quantified by a coefficient S , computed as the ratio of the highest to the lowest unit cost obtained across four admissible bases – bed-days, treated patients, outpatient visits and a composite unit:

$$S = \max(c_1, \dots, c_4) / \min(c_1, \dots, c_4)$$

3. Results

3.1 Four channels, four forms, no consolidation

Figure 1 sets out the structure. Four financial flows operate in parallel. Each has its own treasury personal account, each is reported on its own form, and the forms do not meet. No column, line or summary statement anywhere in the statutory set consolidates the four into a single figure for the organisation.



*Number of treasury personal accounts in use varied from one to four over 2019–2025;
the budget account code changed twice in seven years*

Figure 1. Financing channels, treasury personal accounts and the corresponding reporting forms of a public medical organisation

Instability compounds the fragmentation. The number of treasury accounts in use varied from one to four across the seven years, and the code of the budget account changed twice. A reader constructing a seven-year series must therefore reconcile accounts before reconciling figures, and nothing in the reporting set assists that reconciliation.[14]

Table 1 shows what the channels finance. The composition differs sharply. Budget resources concentrate on wages and social contributions; fund resources carry a much larger share of goods, services and capital items. Neither pattern is visible from any single form.

Table 1. Cash expenditure by economic classification category and financing channel, main research object, 2019 and 2024, mn UZS

Economic classification category	Budget 2019	Budget 2024	Fund 2019	Fund 2024	Budget change, %	Fund change, %
Wages (code 41-10)	6 141.0	13 642.8	3 102.7	9 873.0	+122.2	+218.2
Goods and services (42)	2 439.0	8 165.2	5 055.4	8 064.4	+234.8	+59.5
Fixed assets (43)	0.0	1 160.9	1 458.4	1 794.3	—	+23.0
Social benefits	710.1	234.4	92.1	103.3	–67.0	+12.2

Economic classification category	Budget 2019	Budget 2024	Fund 2019	Fund 2024	Budget change, %	Fund change, %
(47)						
Other expenditure	0.0	74.0	181.9	3 649.7	—	+1 906.4
(48)						
Total	9 290.1	23 277.2	9 890.5	23 484.7	+150.6	+137.4

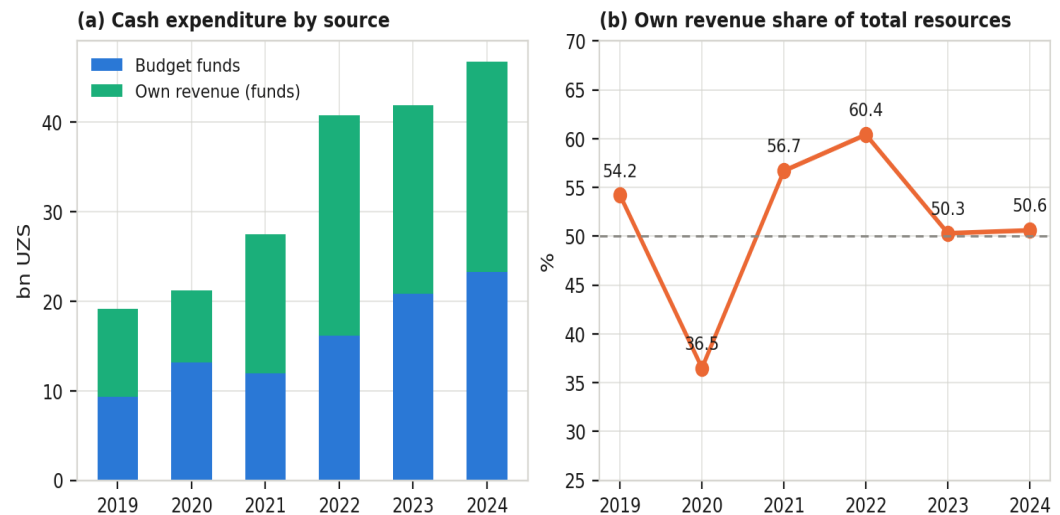


Figure 2. Cash expenditure by source and the share of own revenue in total resources, main research object, 2019–2024

Figure 2 records the shift in the resource structure. Own revenue crossed the half-way line in 2021 and has stayed near it. An organisation financed on this pattern is, in substance, a mixed-funding entity, and the accounting model applied to it has not changed.

One consequence deserves separate mention. Budget expenditure is subject to a detailed economic classification; fund expenditure is not held to the same standard. In 2022 an undifferentiated "other expenditure" line reached 9 279.6 mn UZS, or 37.6 per cent of all fund spending. The classification discipline applied to a shrinking half of the resource base is not applied to the growing half.

3.2 The missing stage of cost formation

Cost formation in a hospital proceeds in three stages: expenditure is recorded by economic classification, then allocated to cost centres, then divided by service volume. Figure 3 shows what the system contains.



Directly attributable expenditure items: 11.3% of total in 2024 (19.7% in 2020).
The remaining 88.7% cannot be allocated because the stage-2 cross-section does not exist.

Figure 3. The three stages of medical service cost formation and the point at which the accounting system breaks

Stage two does not exist. There is no cost-centre register, no analytical code that would carry a cost-centre value, and no reporting line in which such a value could appear. The consequence is quantified in Table 2. Expenditure that can be attributed to a medical service without an allocation base amounted to 11.3 per cent of the total in 2024 and 19.7 per cent in 2020. For the remaining share the allocation base itself is missing.[15]

Table 2. Classification of expenditure by degree of attributability to a medical service, haematology centre, 2024

Expenditure item	Attributability	2024, mn UZS	Share, %	Comment on the allocation base
Medicines and dressings	Directly attributable	4 108.7	11.0	Patient records exist but are not linked to the ledger
Food products	Directly attributable	0.1	0.0	Line not filled in the asset movement statement
Wages of medical staff	Attributable via base	20 698.5	55.5	Base would be staff units by department; not recorded
Social contributions	Attributable via base	5 345.7	14.3	Follows wages
Utilities	Attributable via base	1 819.2	4.9	Base would be floor area; recorded in staffing report only
Repair and maintenance	Attributable via base	304.0	0.8	No departmental breakdown
Other goods and services	Not attributable	953.5	2.6	No basis for allocation exists
Other expenditure	Not attributable	4 092.2	11.0	Undifferentiated line
Total	—	37 321.9	100.0	Directly attributable: 11.3%

The denominator is no more secure than the numerator. Table 3 records the availability of service-volume data over the seven years. Data exist in four years only. In 2022 every quantitative cell of the form was filed as zero; in 2023 only the plan column was completed; from 2024 the organisation migrated to a research-institute form in which beds and patients are not contemplated at all. A classification decision taken outside the accounting service thus removed the cost denominator.[16][17]

Table 3. Availability and completeness of service-volume data in the network, staffing and contingent report, haematology centre, 2019–2025

Year	Form / section code	Rows in form	Fill rate, %	Bed-days	Treated patients	Assessment
2019	7073 (hospital)	49	91.8	92 100	11 119	Complete
2020	7073 (hospital)	50	94.0	79 200	6 272	Complete
2021	7073 + 7075	77	66.2	92 434	6 492	Two parallel forms filed
2022	7073 + 7075	77	0.0	0	0	All quantitative cells zero
2023	7073 + 7075	77	0.0	0	0	Plan column only
2024	research form	93	50.5	62 446	4 408	Beds partially reported
2025	research form	32	40.6	—	—	Beds and patients not contemplated

3.3 Bounding the cost of a bed-day

With neither a reliable numerator nor a stable denominator, a point estimate of unit cost would be arithmetic without meaning. We therefore bound it. Figure 4 and Table 4 report the result.[18]

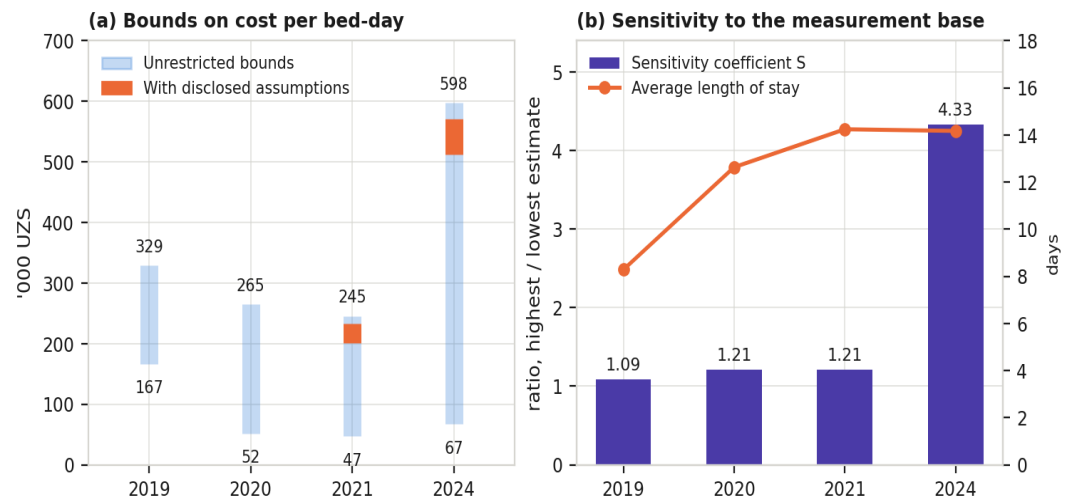
**Figure 4.** Bounds on the cost of one bed-day and the sensitivity of the estimate to the measurement base, haematology centre

Table 4. Partial identification of the cost of one bed–day, haematology centre, selected years

Year	Total expenditure, mn UZS	Direct expenditure, mn UZS	Bed-days	Lower bound, 000 UZS	Upper bound, 000 UZS	Width, times	With disclosed assumptions, 000 UZS
2019	30 283.6	15 364.7	92 100	166.8	328.8	1.97	—
2020	20 973.4	4 124.6	79 200	52.1	264.8	5.08	—
2021	22 678.7	4 373.1	92 434	47.3	245.4	5.19	201.6 – 233.1
2024	37 321.9	4 208.9	62 446	67.4	597.7	8.87	512.4 – 571.2
Mean	—	—	—	—	—	5.28	—

In 2024 the interval runs from 67.4 to 597.7 thousand UZS, a width of 8.9 times. Four disclosed assumptions narrow it to 512.4–571.2 thousand. The narrowing is informative in itself: nearly the whole width of the unrestricted interval is generated by assumptions that current practice leaves unstated.[19]

Sensitivity to the measurement base is the second result of this subsection. The coefficient *S* rose from 1.09 in 2019 to 4.33 in 2024. Put plainly, the same expenditure divided by four admissible bases yields estimates differing more than fourfold. A tariff document that reports a single figure without naming its base conveys less than it appears to.

A third observation concerns the divergence between the two natural units. Real cost per bed-day rose by 10.9 per cent over five years; real cost per treated patient rose by 89.6 per cent. The whole of the difference is generated by average length of stay, which moved from 8.28 to 14.17 days. Whether that movement reflects a change in case mix, in clinical practice or in recording cannot be determined from the reporting set.[20]

3.4 What the financial result measures

The statement of financial results is often read as a performance indicator. For budget resources it is not one. Across all seven years the reported result on budget funds equals the difference between cash and actual expenditure to the last decimal:

$$R_{\text{budget}} \equiv \text{Cash expenditure} - \text{Actual expenditure}$$

An identity of this kind carries no information beyond its components, both of which are already reported in Form 2. Table 5 sets out the comparison and adds the recomputation with capital consumption included.

Table 5. Financial result as reported and after inclusion of capital consumption, main research object, 2019–2023

Year	Income, mn UZS	Expenditure, mn UZS	Reported result	of which: budget funds	Depreciation accrued	Result adjusted for capital consumption	Effect
2019	20 196.0	20 344.6	–148.6	–1 563.3	2 083.8	–2 232.4	Sign changes
2020	22 104.2	22 468.7	–364.5	–956.8	2 636.7	–3 001.2	Deepens
2021	27 740.5	26 601.5	1 139.0	–1 464.5	2 270.0	–1 131.0	Sign changes
2022	38 447.1	35 225.1	3 222.1	–1 763.1	3 242.1	–20.0	Sign changes
2023	43 893.2	39 300.1	4 593.1	454.5	3 379.9	1 213.2	Remains positive

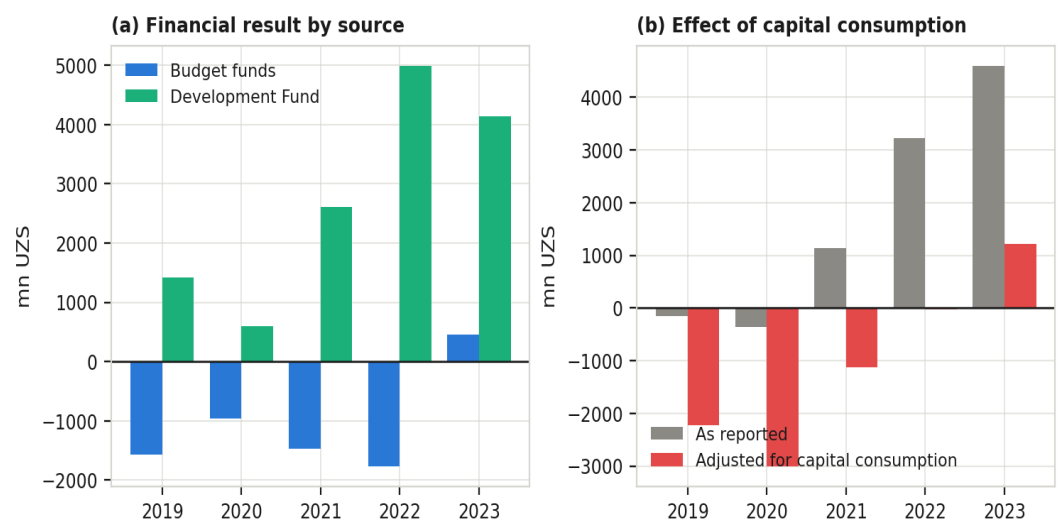


Figure 5. Financial result by financing source and the effect of including capital consumption, main research object, 2019–2023

Figure 5 makes the point visually. Once accrued depreciation enters the calculation, the result turns from positive to negative in four of the five years. The 2020 figure moves from –364.5 to –3 001.2 mn UZS. A reported surplus of several billion in 2022 becomes a deficit of 20.0 mn.[21]

We do not argue that the adjusted figure is the correct one. We argue that the reported figure is not a measure of anything a manager would want to know, and that the choice between the two is a methodological decision currently taken by default rather than by reasoning.

The 2024 redaction of the form improved matters in one respect: non-exchange transactions, revaluation and exchange differences are now shown separately. Depreciation is still not contemplated as a line. The change of line codes, meanwhile, broke inter-period comparability, which is the subject of the third paper in this series.

3.5 The discipline gap between the two halves of the budget

A finding that emerged in the course of the channel analysis deserves separate treatment, because it bears directly on whether the proposals of the fourth paper are feasible. Budget expenditure is classified to the level of the element — a seven-digit code.

Fund expenditure is not. Table 6 traces what happens when a growing share of resources escapes classification discipline.[22]

Table 6. The undifferentiated “other expenditure” line of the Development Fund, main research object, 2019–2024

Year	Undifferentiated “other expenditure”, mn UZS	Total fund expenditure, mn UZS	Share, %	Supporting detail in the reporting set
2019	181.9	9 890.5	1.8	Sponsorship and minor receipts
2020	86.9	8 098.4	1.1	Sponsorship and minor receipts
2021	2 427.2	15 605.0	15.6	No breakdown filed
2022	9 279.6	24 702.7	37.6	No breakdown filed
2023	3 458.9	21 112.5	16.4	No breakdown filed
2024	3 645.7	23 484.7	15.5	No breakdown filed

In 2022 more than a third of all fund spending passed through a line that names nothing. The sum, 9 279.6 mn UZS, exceeds the whole of that year’s budget appropriation for goods and services. No audit trail within the statutory reporting set can establish what it financed.[23]

We draw two inferences. The first is diagnostic: where classification is not demanded, it is not supplied, which reproduces at the level of a reporting line the pattern observed in the first paper at the level of the regulatory tier. The second is practical: extending the existing economic classification to fund expenditure requires no new code, no new form and no new document, since the classifier already exists and is already applied to the other half of the same organisation’s spending.[24]

3.6 Cross-object evidence

Table 7 reports the three central results on the other objects, to the extent their archives permit. Coverage is uneven, and we mark what cannot be tested rather than filling the gaps by assumption.[25]

Table 7. Cross-object evidence on financing channels, cost attribution and the financial result, 2019–2025

Feature tested	Main object (NCRP)	Haematology centre	Mental health centre	Somatic hospital
Number of financing channels	4	3	2	2
Consolidating form in the set	None	None	None	None
Cost-centre cross-section recorded	No	No	No	No
Service-volume report filed	No	Yes, 4 of 7 years	No	Yes, 2019 only
Unit cost computable	No	Bounds only	No	No
Result on budget funds is an	Yes, 7 of 7	Yes, 5 of 5	Not	Not

identity	years	tested	testable	testable
Own revenue share, 2024, %	50.6	Not disclosed separately	Not disclosed	Not disclosed

Uniformity in rows two and three is what matters. No object records a cost-centre value and none files a consolidating form, although the four differ in subordination, size and channel structure. Where a feature could not be tested we say so; three of the four objects do not file the service-volume report at all, which is itself a result, since it means that for three of four organisations no unit cost of any kind can be computed even in principle. Three implications follow, and a fourth qualification.[26]

Multi-channel financing has outgrown the accounting model applied to it. When half the resources arrive outside the budget and are reported on forms that never meet, the institution has no consolidated view of itself and neither does its ministry. The remedy is inexpensive: a consolidating column in the existing expenditure report would produce it, since every component figure is already filed. That such a column does not exist is a design omission rather than a data problem.[27]

Costing cannot be improved by better technique. The literature reviewed in Section 2 assumes an attribution that this system does not perform, and no refinement of method will supply it. What is required is the recording of a cost-centre value against each expenditure transaction, which is an accounting decision rather than a costing one. Our estimate of what such a decision would cost, developed in the fourth paper, rests on the observation that five of six plausible allocation bases are already collected in existing forms.

The financial result in its present form invites misuse. We have encountered it quoted as evidence of efficient management, and the identity established above shows that reading to be unsupportable. Where the figure is used in appraisal or in incentive schemes, the incentive it creates is to widen the gap between cash and actual expenditure, which is not an objective anyone would set deliberately.

A comparison with the international costing literature is instructive here. Chatterjee and colleagues (2013) report unit costs across Indian hospitals that vary by a factor of roughly four, and treat that dispersion as the substantive finding of their study. Our sensitivity coefficient of 4.33 produces a comparable spread within a single institution in a single year, purely from the choice of denominator. Dispersion of that magnitude arising from measurement rather than from economics should caution anyone constructing a tariff from reported expenditure.[28]

There is also a reading of our results that we want to forestall. Nothing here suggests that the accounting staff of these organisations perform their work poorly. Filings are timely, arithmetic is sound and the balance sheet identity holds without exception. The deficiencies we document are properties of the instruments, not of the people operating them, and the distinction matters because the two call for entirely different remedies.

The qualification concerns generality. Bounds were computed for one organisation, and that organisation is the only one of the four whose service-volume data permit any computation at all. Width of interval and sensitivity coefficient will differ elsewhere. What we expect to generalise is not the numbers but the structure of the problem: an absent middle stage, an unstable denominator, and a reported result that is an identity. Each of the three was observed in every object where the relevant data survive.

A further limitation is worth stating. Our four assumptions narrow the interval considerably, and a reader might prefer different ones. That is the point of stating them. Partial identification does not remove disagreement about assumptions; it relocates the disagreement from the result to the premises, where it can be argued about.

4. Conclusion

A public medical organisation in Uzbekistan operates four parallel financial flows that its reporting system never brings together, records expenditure in a form that cannot be attributed to the services it produces, and reports a financial result on budget funds that is an arithmetic identity. Each of these three statements has been established here against the filed reports of 2019–2025.

The cost of a bed-day, computed within the limits the data permit, lies between 67 and 598 thousand UZS for 2024, an interval 8.9 times wide, narrowing to 512–571 thousand once four assumptions are disclosed. Sensitivity to the choice of measurement base reaches 4.33. Directly attributable expenditure is 11.3 per cent of the total. Inclusion of capital consumption reverses the sign of the reported result in four years out of five.

Two recommendations follow directly. A cost-centre value should be recorded against every expenditure transaction, using the three-level analytical code developed in the fourth paper of this series; and the service-volume report should be brought inside the financial reporting set, so that a classification decision taken for statistical purposes can no longer remove the denominator of every cost calculation. Both proposals work within the accounting basis now in force and neither requires a new primary document.

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