A STRUCTURAL BRIDGE BETWEEN INPUT-OUTPUT ANALYSIS AND SEMI-STRUCTURAL MACROECONOMETRIC MODELLING: EVIDENCE FROM MOLDOVA

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SUMMARY

This paper develops a parsimonious structural bridge linking semi-structural macroeconometric estimation with input-output sectoral analysis for the Republic of Moldova, addressing the analytical gap between aggregate forecasting and sectoral diagnostics in small post-Soviet economies. The methodology proceeds in three steps: macroeconomic shocks are translated into expenditure-side aggregates using OLS elasticities; aggregate changes are distributed across 20 NACE Rev.2 sectors using two alternative weighting schemes (one IO-derived, the other derived independently from BNS customs export data); sectoral output impacts are obtained via Leontief multiplication. Aggregate impacts converge within ±2% across schemes despite substantial sectoral divergence, providing evidence that economy-wide results are robust to the choice of export weighting. Four counterfactual scenarios are examined: a 5% EU27 demand contraction generates a 9.8% reduction in total gross output, with 26% accruing to non-export sectors via supply-chain channels invisible in aggregate models; a 10% fiscal revenue increase yields a sub-unitary multiplier (1.03) reflecting import leakage; a 15% currency depreciation generates zero sectoral impact under strict elasticities; single-sector shocks reveal a duality of static IO under demand and supply interpretations. The methodology is reproducible from public data and transferable to comparable post-Soviet economies.

Keywords: *input-output analysis, macroeconometric model, bridge methodology, small open economy, Leontief multipliers, counterfactual scenarios.*

INTRODUCTION

Macroeconomic policy analysis in small post-Soviet economies typically operates at one of two analytical levels. Aggregate-level work, exemplified by the Bayesian quarterly tradition of Pârțachi and Mija (2013, 2015a, 2024) for the Republic of Moldova, produces forecasts and elasticity estimates for GDP and its expenditure-side aggregates. Sectoral-level work, for which Moldova has gained an analytical foundation through recent reconstructions of the input-output series at 20-sector NACE Rev.2 disaggregation, produces structural diagnostics: Leontief multipliers, Rasmussen linkages, and structural decomposition. The two levels of analysis inform each other but rarely intersect within a unified analytical procedure. The methodological space between them, populated internationally by hybrid IO-econometric frameworks such as Cambridge Econometrics' E3ME, the HERMIN family, and GINFORS, is largely unoccupied for small post-Soviet economies, primarily because these frameworks require decades of quarterly disaggregated data that are not currently available for these economies.

This paper develops a parsimonious bridge methodology that fills this gap for the Moldovan case while remaining transferable to comparable post-Soviet economies. The methodology connects two analytical components currently under development for Moldova within a broader research programme on Moldovan macroeconomic infrastructure: (i) sectoral structural information from a recently reconstructed annual input-output series in the CAEM Rev.2 / NACE Rev.2 classification; and (ii) aggregate behavioural elasticities from a parsimonious annual semi-structural macroeconometric specification estimated by OLS on annual data for 2014-2024 (N = 11). The Bayesian quarterly tradition of Pârțachi and Mija addresses different questions (monetary transmission to inflation; aggregate forecasting via BVAR) and operates on confidential or semi-public quarterly data; the methodology developed here is therefore complementary rather than competitive, addressing the specific gap in sectoral resolution for macroeconomic shocks under public-data replicability constraints.

This paper makes four contributions. First, it develops a parsimonious three-step bridge: macroeconomic shock propagation through OLS elasticities yields aggregate ΔY; sectoral distribution via weighting schemes yields Δf; Leontief multiplication yields sectoral output $\Delta x = L\Delta f$. The methodology is transparent, reproducible, and computationally light. Second, it addresses the circularity concern raised by Dietzenbacher and Los (1998) by testing two alternative weighting schemes: one derived from the IO baseline, the other from independent BNS customs export data classified by SITC. Third, it produces four counterfactual, illustrative findings of policy relevance: external shock asymmetry, a sub-unitary fiscal multiplier, confirmed null exchange-rate transmission at the sectoral level, and a documented duality of static IO under demand- and supply-side single-sector shocks. Fourth, the methodology is transferable to other post-Soviet economies (Armenia, Georgia, Kyrgyzstan) confronting analogous data constraints. The remainder of the paper is organised as follows: the next section reviews the relevant literature; the methodology section presents the three-step bridge framework; the data section documents sources and unit conventions; the results section presents bridge validation and the four counterfactual scenarios; the discussion situates the findings; the conclusions identify policy implications and future work.

THEORETICAL FRAMEWORK

The integration of input-output analysis with macroeconometric estimation has a substantial international tradition, populated by full-integration models that simultaneously embed behavioural equations within an IO accounting framework. The Cambridge Econometrics' E3ME model (Barker, 1999; Mercure et al., 2018) combines IO analysis with a set of econometric equations that determine the components of aggregate demand, prices, and energy/emissions data. The GINFORS family (Meyer & Lutz, 2007; Lutz, Meyer, & Wolter, 2010) serves as a bilateral world trade model that links 64 countries using OECD input-output tables. The HERMIN family (Bradley & Untiedt, 2008; Bradley et al., 1995) was developed specifically for European convergence economies and has been adapted to the Czech, Hungarian, and Polish contexts. The Austrian ASCANIO and e3.at models (Kratena & Wüger, 2010; Sommer & Kratena, 2017) provide a partial bridge between sectoral IO data and separately estimated demand equations. Recent extensions include agent-based forecasting (Poledna et al., 2023; Hommes & Poledna, 2026), multi-sector inflation analysis (Garcia, 2024 extending Baqaee & Farhi, 2019), and Bayesian large-VAR approaches (Bańbura et al., 2023). The full-integration paradigm and its recent extensions deliver analytical richness at substantial data and computational costs: decades of quarterly disaggregated data, harmonised across 50+ sectoral identities, are required for robust estimation. The data environment for small post-Soviet economies, including the Republic of Moldova, does not currently support this level of integration.

A complementary tradition employs partial bridges or soft coupling, in which separately estimated macroeconometric and IO models communicate through specific information transfers without full simultaneous estimation. The foundational treatment is Pyatt and Round (1985) for the related case of social accounting matrices. Rose and Liao (2005) document a soft-coupled application for regional economic resilience analysis; Sommer and Kratena (2017) apply partial-bridge logic in the context of household consumption and environmental impact assessment. Miller and Blair (2022) provide the canonical methodological treatment of input-output analysis. A long-standing concern in IO-econometric integration is potential circularity: when weights derived from the same matrix being decomposed are used for the decomposition itself, the resulting attribution may simply reflect the structure of the input matrix rather than independent empirical content (Dietzenbacher & Los, 1998). The bridge methodology developed here explicitly addresses this concern through dual-scheme construction: one weighting scheme derived from the IO baseline and the other from an independent customs export benchmark.

The macromodelling literature for the Republic of Moldova has been developed primarily through the work of Pârțachi, Mija, and collaborators over the past fifteen years. Pârțachi and Mija (2013, 2015a, 2015b, 2024) and Mija et al. (2013) develop a monetary policy transmission framework using Bayesian VAR specifications on quarterly data to capture inflation responses to demand and exchange rate shocks. Mija (2022) consolidates this research line in a doctoral thesis. The IMF prepares Moldovan macroeconomic projections through internal Article IV procedures (most recently IMF, 2024) whose specifications are not publicly disclosed; the BNM operates a quarterly Bayesian VAR forecasting system similarly not in the public domain. Naval (2019) provides input-output-based optimisation modelling for Moldova at lower frequency. The bridge methodology developed here directly connects sectoral IO structure with aggregate macroeconometric elasticities, complementing the established Bayesian quarterly tradition rather than competing with it.

DATA AND METHODS

The bridge framework formalises the connection between aggregate and sectoral analysis through a three-step procedure. Given an exogenous macroeconomic shock, a contraction in foreign demand, a fiscal impulse, an exchange rate movement, or a sector-specific productivity change, the framework: (i) translates the shock into changes of expenditure-side aggregates using OLS-estimated elasticities; (ii) distributes these aggregate changes across the 20 NACE Rev.2 sectors using a weighting scheme derived from either the IO baseline (Schema A) or from independent customs export data (Schema B); (iii) multiplies the resulting sectoral final demand vector by the Leontief inverse to produce a sectoral output response. Formally, denoting the macroeconomic shock as Δz_macro and the OLS coefficients as β, Step 1 produces $\Delta Y = f(\beta, \Delta z\_macro)$ where ΔY is the vector $\{\Delta C, \Delta X, \Delta M, \Delta FBC, \Delta G\}$; Step 2 produces $\Delta f = W\Delta Y$ where W is a 20×5 weighting matrix; Step 3 produces $\Delta x = L\Delta f$ where $L = (I - A)^{-1}$.

The macroeconomic propagation in Step 1 uses five behavioural equations estimated by OLS on annual Moldovan data 2014-2024 (N = 11): $\log\_C = \alpha_1 + \beta_1 \cdot \log\_GDP + \varepsilon_1$ (consumption); $\log\_X = \alpha_2 + \beta_2 \cdot \log\_DEX + \varepsilon_2$ (exports); $\log\_M = \alpha_3 + \beta_{3,1} \cdot \log(GDP+X) + \beta_{3,2} \cdot \log\_RER + \varepsilon_3$ (imports); $\log\_FBC = \alpha_4 + \beta_4 \cdot \log\_GDP + \varepsilon_4$ (gross capital formation, where $FBC = IFBCF + \Delta\_Stocks$ per ESA 2010); $\log\_G = \alpha_5 + \beta_5 \cdot \log\_VEN + \varepsilon_5$ (government consumption). The closure is the expenditure-side accounting identity $GDP = C + C\_NPISH + G + FBC + (X - M)$. The estimated elasticities are reported in Table 1; the parsimonious specifications follow the small-sample tradition of Cogley and Sargent (2005) and Bańbura, Giannone, and Reichlin (2010). Given an exogenous shock, the propagation through the system follows iteratively until the closing aggregate ΔGDP is reached through the identity.

Table 1.

Behavioural elasticities used in the bridge methodology

Equation	Specification	Coefficient	Estimate	Std. Error	p-value
E1	log_C ~ log_GDP	*β_GDP_C*	0.7029	0.1201	0.0002
E2	log_X ~ log_DEX	*β_DEX_X*	1.9681	0.4752	0.0025
E3	log_M ~ log(GDP+X), log_RER	*β_GDPX_M*	1.3219	0.3891	0.0094
E3		*β_RER_M*	0.0390	0.1518	0.8039
E4	log_FBC ~ log_GDP	*β_GDP_FBC*	1.2880	0.4489	0.0185
E5	log_G ~ log_VEN	*β_VEN_G*	1.4071	0.1741	<0.0001

Source: authors' calculations on annual Moldovan data 2014-2024 (N = 11). All variables in natural logarithms of constant 2014 prices.

Step 2 distributes each aggregate change across the 20 NACE Rev.2 sectors. For component k ∈ {X, C, FBC, G}, the sectoral distribution is Δf_(k,i) = w_(k,i) · ΔY_k where w_(k,i) is the share of sector i in total final demand for component k. Two alternative schemes are tested for the export distribution. Scheme A uses export weights derived from the 2023 IO table itself: w_(X,i)^A = X_i^(2023) / Σ_i X_i^(2023). Scheme B uses an independent benchmark constructed from BNS customs export data classified by SITC and mapped to NACE Rev.2 using a 10×20 concordance matrix. The dual-scheme construction provides empirical evidence on the magnitude of the circularity concern. Step 3 multiplies the sectoral final demand change Δf by the Leontief inverse L to obtain the sectoral output response Δx = L · Δf. The Leontief inverse is derived from the reconstructed 2023 IO matrix as $L = (I - A)^{-1}$, where A is the 20×20 matrix of technical coefficients with elements a_(i,j) = z_(i,j)/VP_j. The matrix A is invariant under uniform deflation of the underlying flows.

Four scenarios are examined. S1 - External demand contraction: Δlog_DEX = -0.05, equivalent to a 5% reduction in EU27 real GDP. S2 - Fiscal impulse: Δlog_VEN = +0.10, equivalent to a 10% increase in fiscal revenues. S3 - Currency depreciation: Δlog_RER = +0.15, reported under two interpretations (S3_L1 strict estimates; S3_L2 with literature prior β_RER_X = 0.30 from Goldstein and Khan, 1985). S4 - Single-sector shock in Manufacturing: 10% magnitude under two interpretations (S4_L1: +10% final demand for sector C; S4_L2: -10% reduction in input requirements for sector C, modifying the column of A and computing L_modified). All scenarios are computed in constant 2014 prices.

The bridge methodology relies on three data layers. The Input-Output table for 2023 has been reconstructed by applying biproportional RAS updating (Junius & Oosterhaven, 2003) to the 2014 baseline Supply-Use Table published by the National Bureau of Statistics (BNS) of the Republic of Moldova, with annual marginal controls on gross output, intermediate consumption, and gross value added for 2015-2023. The OLS coefficients used in Step 1 are estimated on annual data 2014-2024 (N = 11) under the CAEM Rev.2 framework, with all variables transformed to natural logarithms of constant 2014 prices. Schema B uses the 2023 export totals by SITC section as published by BNS in the table "Comerțul Internațional al Republicii Moldova". All values in the bridge calculations are expressed in MDL billion at constant 2014 prices, with the Z matrix and VP vector converted from nominal 2023 prices through Y_2014 = Y_nominal × $(1/10^6)$ × (1/2.0844), where 2.0844 is the GDP implicit deflator for 2023 with 2014 as the base year. The complete computational implementation is documented in a single Excel workbook (33 sheets) provided as supplementary material to support independent replication.

MAIN RESULTS

The bridge construction begins with verifying the Leontief inverse matrix L derived from the reconstructed 2023 input-output table. Computing $L = (I - A)^{-1}$ on the 20-sector matrix yields an economy-wide mean multiplier of 2.029 and Manufacturing forward linkage index FL_C = 5.629. The methodology applies the OLS coefficients to translate macroeconomic shocks into changes in aggregate components, then distributes those changes across sectors. Scheme A uses export weights derived from the 2023 IO table itself; Scheme B uses an independent benchmark constructed from BNS customs export data classified by SITC. The two schemes differ substantially across sectors: Scheme B concentrates 66.0% of export weight in Manufacturing versus 58.4% in Scheme A, fully omits services such as Transport (0.1% versus 13.8%) and ICT (0% versus 4.9%), and reflects re-export through Energy (5.6% versus 0%) and Trade (7.2% versus 0%). The total absolute weight divergence between the schemes is 49.7 percentage points distributed across eight sectors. This divergence is methodologically valuable: the four scenarios reported below yield aggregate differences of less than 2% between the two schemes, providing evidence that economy-wide results are not highly sensitive to the choice of export weights; sectoral allocations remain sensitive to the choice of weights, however, and should be interpreted with caution.

Before presenting individual scenarios, it is worth explicitly emphasising two distinct quantities reported in the empirical results. Step 1 of the bridge produces aggregate ΔGDP, the change in value added measured by the expenditure-side identity. Step 3 produces the sum Σ Δx across all 20 sectors, the change in total gross output. The two quantities measure different but connected economic objects. For Moldova in 2023, the baseline values are GDP_real = 154.87 mld MDL and Σ VP_real = 237.33 mld MDL, with the difference (82.46 mld) representing intermediate consumption flows. The bridge methodology preserves both perspectives: ΔGDP captures the welfare-relevant outcome at aggregate level; Σ Δx captures the production-disruption profile distributed across sectors and supply chains.

Scenario S1 - External demand contraction. A 5% contraction in EU27 real GDP, equivalent to the magnitude of the 2020 pandemic shock. Step 1 produces ΔX = -5.10, ΔM = -5.69, ΔC = -2.99, ΔFBC = -1.29, ΔG = 0, with ΔGDP = -3.69 mld MDL (-2.4% of baseline). Step 3 yields an aggregate sectoral output impact Σ Δx_A = -23.16 mld MDL (at constant 2014 prices), corresponding to approximately 9.8% of baseline gross output. Manufacturing absorbs more than half of this impact (Δx_C = -12.84 mld), followed by Agriculture (-3.46), Transport (-1.47), Construction (-1.19), and Energy (-0.75). Under Scheme B, the aggregate impact is -23.44 mld, a difference of only 1.21% from Scheme A despite the substantial sectoral divergence in underlying weights. The decomposition into direct and indirect effects reveals that Manufacturing experiences an 81.4% direct and 18.6% indirect impact, reflecting its dominant share of the shock to export demand. Conversely, sectors not directly exposed to exports, Energy (100% indirect), Trade (100% indirect), Real Estate (96.6% indirect), Mining (100% indirect), absorb their entire share of the shock through supply chain connections to Manufacturing. The 26% figure quoted in the abstract is computed as the share of total |Δx| absorbed by sectors with zero or negligible direct export shock in Δf. This pattern is the central empirical contribution of the bridge methodology: aggregate models are blind to the indirect channel through which non-exporting sectors absorb external shocks.

Scenario S2 - Fiscal impulse via revenue increase. A 10% increase in fiscal revenues. Step 1 propagates the shock through E5 (β_VEN_G = 1.41) to obtain ΔG = +4.19 mld MDL, then through the closed model: ΔC = +2.51, ΔFBC = +1.11, ΔM = +2.45, ΔX = 0, with ΔGDP = +5.36 mld MDL (+3.46% of baseline). The implied fiscal multiplier (ΔGDP/ΔG = 5.36/4.19) is 1.28, sub-unitary when measured against revenues (5.36/5.22 = 1.03). This sub-unitary feature reflects import leakage: 46% of the additional government spending leaks abroad through the high import elasticity. The sectoral decomposition under Scheme A yields Σ Δx_A = +15.96 mld MDL with the largest impacts on Manufacturing (+6.22), Education (+1.54), Agriculture (+1.46), Health (+1.29), and Public Administration (+1.10). The convergence of Schema A and Schema B in S2 is exact at the aggregate level.

Scenario S3 - Currency depreciation. A 15% nominal depreciation of the Moldovan leu against the euro (Δlog_RER = +0.15), reported under two alternative elasticity assumptions. Under strict estimates (S3_L1), the export equation E2 contains no exchange rate term (β_RER_X dropped from the parsimonious specification given $p > 0.5$), and the import equation E3 yields β_RER_M = 0.039 (statistically indistinguishable from zero, $p = 0.80$). Applying these coefficients produces ΔX = 0, ΔM = +0.54 mld MDL, ΔGDP = -0.54 mld via identity, and Σ Δx_A = 0 across all 20 sectors. This null sectoral result confirms the macro-level finding at sectoral granularity. As a robustness check (S3_L2), imposing β_RER_X = 0.30 from the trade-elasticity literature (Goldstein & Khan, 1985; Hooper, Johnson, & Marquez, 2000) produces ΔX = +2.45 mld MDL, ΔM = +1.93, ΔGDP = +1.17, and Σ Δx_A = +11.49 mld with Manufacturing absorbing +6.37 and Agriculture +1.71. The contrast illustrates the sensitivity of policy conclusions to elasticity assumptions: structural features of the Moldovan economy, high import-price pass-through, EUR-denominated trade, remittance-driven consumption, suppress the standard Marshall-Lerner mechanism.

Scenario S4 - Single-sector shock in Manufacturing. A 10% shock concentrated in sector C, reported under two complementary interpretations. Under S4_L1 (demand-side), a 10% increase in final demand for sector C corresponds to Δf_C = +5.74 mld MDL; multiplying through the Leontief inverse yields Σ Δx_A = +27.21 mld MDL, with Manufacturing absorbing +20.14 (74% of total) and the remainder distributed across Agriculture (+2.95), Energy (+0.84), Transport (+0.55). Under S4_L2 (supply-side), a 10% reduction in input requirements modifies the column of A corresponding to C: A_modified[i, C] = 0.9 × A[i, C] for all i ≠ C; computing L_modified and applying to unchanged baseline final demand yields Σ Δx_A = -42.15 mld MDL. Under static IO interpretation at unchanged final demand, a reduction in input coefficients mechanically lowers gross-output requirements; this should not be interpreted as a welfare loss or real GDP contraction, but as a methodological illustration of how productivity gains, in the absence of induced demand response, manifest themselves in the static IO framework. The opposite signs across all sectors (Table 2) illustrate a methodological property of static IO: the framework cannot endogenize the demand response to supply-side shocks. This dual analysis motivates extension to dynamic computable general equilibrium models.

Table 2.

Cross-scenario synthesis. ΔGDP from macroeconometric Step 1; Σ Δx_A from sectoral Step 3 (Schema A); Δx_A[C] is the impact on Manufacturing. All values in mld MDL at constant 2014 prices.

Scenario	Description	ΔGDP	Σ Δx_A	Δx_A[C]	Schema A vs B
S1	-5% EU27 GDP	-3.69	-23.16	-12.84	1.21%
S2	+10% fiscal revenues	+5.36	+15.96	+6.22	<0.5%
S3_L1	+15% RER (strict)	-0.54	0.00	0.00	n/a
S3_L2	+15% RER (β=0.30)	+1.17	+11.49	+6.37	<0.5%
S4_L1	+10% final demand C	n/a	+27.21	+20.14	<0.5%
S4_L2	-10% inputs C	n/a	-42.15	-24.69	<0.5%

Source: *authors' calculations using the structural bridge methodology.*

DISCUSSION

Five empirical findings emerge from the joint examination of the four scenarios, with three substantive policy implications and two methodological insights. First, external shock asymmetry: a 5% EU27 contraction generates a 9.8% reduction in total Moldovan gross output, with 26% accruing to non-export sectors via supply-chain channels. The Manufacturing direct/indirect decomposition (81.4%/18.6%) contrasts with the 100% indirect transmission to Energy, Trade, Real Estate, and Mining, supply-chain effects entirely invisible in aggregate models. Second, the sub-unitary fiscal multiplier (1.03, measured against revenues) reflects the import leakage documented in the macroeconometric companion specification: 46% of additional government spending leaks abroad due to the high import elasticity. Third, the null exchange-rate transmission is confirmed at sectoral granularity. The result is robust to the alternative interpretations of S3 and reflects structural features of the Moldovan economy.

On methodological grounds, the bridge methodology addresses the circularity concern raised by Dietzenbacher and Los (1998) explicitly through dual-scheme construction. The aggregate impact convergence between Schema A (IO-derived) and Schema B (independent customs benchmark) within ±2% across all four scenarios provides empirical evidence that economy-wide bridge results are not highly sensitive to the choice of export weights, while sectoral allocations remain sensitive and should be interpreted with caution. This is a genuinely informative finding because the schemes differ substantially in their underlying composition (a 49.7 percentage-point absolute weight divergence across eight sectors). The convergent aggregate impact, alongside divergent sectoral distribution, is the methodologically interesting finding: aggregate bridge predictions are robust to weighting choices; sectoral allocations are not. The dual-scheme construction, therefore, constitutes both a robustness check and a structural diagnostic distinguishing economy-wide from sectoral robustness.

In situating the present findings, the export elasticity β_DEX = 1.97 places Moldova at the upper end of the trade-elasticity literature for small open economies (Hooper, Johnson, & Marquez, 2000; Bussière et al., 2013). The asymmetric structure of Moldovan trade, 1.97 export elasticity coupled with 1.32 import elasticity to absorption, implies that external shocks are amplified rather than dampened. The null real-exchange-rate finding aligns with the post-Soviet pattern documented for several small open economies and complements the substantial price-level pass-through reported by Pârţachi and Mija (2015a) at quarterly frequency. The two findings are jointly consistent with a structural transmission environment in which exchange rate movements pass through to domestic prices rapidly, neutralising the relative-price effect on trade flows that the Marshall-Lerner mechanism would conventionally predict. The S4 duality finding, opposite signs across all sectors under demand-side and supply-side single-sector shocks of equal magnitude, illustrates a known limitation of static input-output analysis: the framework cannot endogenise the demand response to supply-side shocks (Miller & Blair, 2022). Real-world productivity shocks involve both channels simultaneously, with the net direction determined by the elasticity of demand to price reductions, a parameter not present in the static IO framework. This motivates extension to dynamic computable general equilibrium frameworks. The methodology is fully reproducible from public data sources and the supplementary computational workbook; it is transferable to comparable post-Soviet economies (Armenia, Georgia, Kyrgyzstan) where annual IO and aggregate macromodels can plausibly be constructed.

Three limitations should be acknowledged. First, the macroeconometric estimation rests on N = 11 annual observations, a degrees-of-freedom margin that is uncomfortable by macroeconometric standards; the OLS specifications are deliberately parsimonious, and the static structure precludes dynamic feedback or error-correction representation. Second, the bridge methodology is itself static: it does not endogenise the demand response to supply-side shocks (S4_L2) or the dynamic adjustment path of sectoral output to a permanent shock. Third, the single-year IO baseline (2023) does not capture potential time variation in technical coefficients; as additional IO years accumulate under CAEM Rev.2, the bridge methodology should be re-estimated and structural decomposition tests applied across years. These limitations define the boundary of the current contribution and identify the natural paths for extension.

CONCLUSIONS

This paper has developed a parsimonious structural bridge methodology connecting semi-structural macroeconometric estimation with input-output sectoral analysis for the Republic of Moldova. The methodology proceeds in three steps: macroeconomic shocks are translated into changes of expenditure-side aggregates via OLS elasticities; aggregate changes are distributed across 20 NACE Rev.2 sectors using two alternative weighting schemes; sectoral output impacts are obtained through Leontief multiplication. The dual-scheme construction provides an empirical test of the circularity concern raised by Dietzenbacher and Los (1998): aggregate impacts converge within ±2% across schemes despite substantial sectoral divergence (49.7 percentage points across eight sectors), providing evidence that economy-wide results are robust to the choice of export weighting, while sectoral allocations remain sensitive.

The empirical findings carry three substantive policy implications for the Moldovan macroeconomic environment. The asymmetric external transmission identified by S1 (a 5% EU27 contraction generates a 9.8% reduction in total gross output, with 26% accruing to non-export sectors via supply chains) implies that fiscal stabilisation, rather than exchange rate management, must bear the primary burden of demand-side stabilisation against external shocks. The sub-unitary fiscal multiplier identified by S2 (1.03 against revenues) constrains the effectiveness of fiscal stimulus, with import leakage capturing 46% of any revenue expansion. The null exchange-rate transmission identified by S3, robust across alternative elasticity assumptions, narrows the operational scope of the BNM's existing managed-float regime: the trade channel of monetary transmission is structurally weak. The duality result of S4 motivates extension to dynamic computable general equilibrium frameworks for productivity-shock analysis, where the demand response is endogenously modelled.

Three extensions warrant attention as the analytical infrastructure matures. First, the integration of this static bridge with a dynamic CGE specification, when sufficient sectoral data accumulate, will permit endogenous demand response to supply-side shocks. Second, the methodology is directly transferable to other small post-Soviet economies confronting analogous data constraints: Armenia, Georgia, and Kyrgyzstan share with Moldova the combination of a small open economy, recent ESA-2010-compatible national accounts, and a paucity of public macroeconometric work, and the present framework adapts to these settings with minimal modification. Third, the bridge methodology can support routine policy applications: ex ante impact assessment of fiscal measures, scenario evaluation for IMF Article IV frameworks, and sectoral diagnostics for industrial policy design. The methodology is fully reproducible from the documented public data sources and the supplementary computational workbook.

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