

Semi-Structural Macroeconomic Modelling for the Republic of Moldova: A Parsimonious Annual Framework¹

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Abstract: The Republic of Moldova has remained underrepresented in the post-Soviet macroeconomic literature: while Bayesian quarterly frameworks have been developed for monetary transmission, no publicly documented annual demand-side framework with explicit elasticity estimates has been available. This paper addresses that gap by proposing, to the author's knowledge, the first publicly documented annual semi-structural macroeconomic framework for Moldova, comprising five behavioural equations estimated by Ordinary Least Squares (OLS) (for private consumption, exports, imports, gross capital formation (GCF), and government consumption), closed by the expenditure-side accounting identity. The framework is estimated on annual data 2014-2024 (N = 11) under the European System of Accounts (ESA) 2010 and the Moldovan classification of economic activities (CAEM Rev.2). Three indicative findings, conditional on the small-sample environment, emerge from the estimates. The elasticity of Moldovan exports to EU27 real GDP is estimated at the upper end of the trade-elasticity range documented for small open economies, while the import elasticity to total absorption suggests that external shocks are amplified rather than dampened by the open-economy multiplier. The real exchange rate is statistically indistinguishable from zero in the import equation; under the parsimonious specification adopted, the variable was not included in the export equation. The policy interest rate fails to enter the investment equation significantly, consistent with the shallow domestic credit market. The framework outperforms AR(1) and reduced-form VAR(1) benchmarks on out-of-sample GDP fit while underperforming the random walk on a validation window characterised by Moldovan output stagnation. The contributions are illustrative and conditional on the small-sample environment; the framework is fully replicable from public data sources and complements the established Bayesian quarterly tradition for Moldova.

Keywords: semi-structural macroeconomic framework, parsimonious annual specification, short-sample OLS estimation, trade elasticity, exchange rate transmission, small open economy, Republic of Moldova, post-Soviet economies

JEL Classification: C32, C51, E10, E17, F41

1 Introduction

This paper addresses the empirical estimation of a semi-structural macroeconomic framework for the Republic of Moldova, a small open post-Soviet economy for which no publicly documented annual macroeconomic model has previously been published in the international literature. The research problem addressed is the empirical quantification of Moldovan macroeconomic transmission channels, trade elasticities, exchange rate effects, fiscal pass-through, and the investment-credit channel, under the constraint of a short annual sample (N = 11) imposed by the implementation of the ESA 2010 / CAEM Rev.2 framework in Moldovan national accounts since 2014.

The study is important for three reasons. First, the Moldovan case has remained underrepresented in the post-Soviet macroeconomic literature: while Bayesian quarterly frameworks have been developed by Pârţachi

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and Mija (2013, 2015a, 2024) and Mija (2022) for monetary transmission, no annual demand-side framework with explicit elasticity estimates has been published. Second, the country is at a critical macroeconomic juncture, having received EU candidate status in 2022 and facing acute external vulnerabilities documented in successive IMF Article IV consultations (IMF, 2022, 2023, 2024). Third, the empirical questions addressed, particularly the magnitude of external transmission and the operational scope of exchange rate management, bear directly on the design of stabilisation policy under the existing managed-float regime of the National Bank of Moldova (NBM).

The paper addresses this issue by specifying five behavioural equations in log-linear form, each comprising one or at most two right-hand-side variables, deliberately parsimonious in recognition of the eleven-observation sample. Estimation proceeds by Ordinary Least Squares with heteroscedasticity-robust standard errors. The system is closed by the expenditure-side accounting identity $GDP = C + C_NPISH + G + GCF + (X - M)$, where C_NPISH denotes consumption of non-profit institutions serving households (NPISH). In-sample fit, pseudo out-of-sample validation, robustness diagnostics, and benchmark comparison against AR(1), reduced-form VAR(1), and random walk alternatives complete the empirical investigation.

In relation to existing literature, the framework contributes, to the author's knowledge, the first publicly documented annual semi-structural macroeconometric specification for Moldova, complementing the established Bayesian quarterly tradition (Pârțachi and Mija, 2015a, 2024; Mija, 2022) by addressing distinct transmission channels, demand-side aggregates rather than monetary policy, and operating at annual rather than quarterly frequency. The methodological template draws on the parsimonious annual tradition for small economies (Ganev, 2015 for Bulgaria; Grech et al., 2013 for Malta), the trade-elasticity tradition (Goldstein and Khan, 1985; Hooper et al., 2000; Bussière et al., 2013), and the closure architecture of the HERMIN family of models (Bradley and Untiedt, 2009). The remainder of the paper is organised as follows: Section 2 reviews the relevant macromodelling tradition; Section 3 specifies the model; Section 4 documents the data; Section 5 presents the empirical results; Section 6 discusses the findings and their limitations; Section 7 concludes.

2 Macromodelling tradition for short-sample small economies

The macromodelling literature for small open economies with short data samples follows three interrelated traditions. The general principle that overspecified models with too many parameters relative to available observations systematically underperform on out-of-sample tests is well established in the time-series and Bayesian macroeconometric literature. The Bayesian shrinkage tradition addresses this concern through informative priors that effectively reduce the dimensionality of the parameter space, exemplified by the time-varying parameter VAR of Cogley and Sargent (2005) and the large Bayesian VAR with Minnesota-style shrinkage of Bańbura, Giannone and Reichlin (2010). The OLS counterpart of the same parsimony principle, adopted in the present work, restricts the specification a priori to one or at most two right-hand-side variables per equation, accepting the loss of richness in exchange for tractability under $N = 11$. This parsimony principle motivates the structure of the present model.

The trade-elasticity tradition for small open economies, established by Goldstein and Khan (1985), formalises the absorption-augmented import equation and the EU-anchored export specification adopted here. Hooper, Johnson and Marquez (2000) document G-7 elasticities clustering around 1.5-2.0; Imbs and Mejean (2015) report cross-country elasticities mostly between 0.7 and 2.5 for advanced economies; Bussière et al. (2013) report 0.9-2.3 for emerging Europe. The present empirical results, reported in §5.2 and discussed in §6.1, place Moldova's estimated export elasticity at the upper end of this range.

The existing macromodelling tradition for Moldova consists primarily of Bayesian VAR / VECM frameworks at quarterly frequency. Pârțachi and Mija (2013, 2015a, 2015b, 2024) and Mija et al. (2013) develop the monetary policy transmission framework with structural VAR specifications; Mija (2022) extends this in his doctoral dissertation. These contributions document the price-level pass-through of exchange rate movements at quarterly frequency. The present framework does not duplicate this work; instead, it complements it by addressing demand-side aggregates at annual frequency through OLS estimation, with the trade-elasticity and exchange-rate-transmission findings reported below being conceptually distinct from the monetary transmission documented by Pârțachi and Mija. Naval (2019) provides one of the few academic input-output references for Moldova prior to recent reconstructions.

3 Model specification

3.1 Accounting framework and behavioural equations

The model rests on the standard expenditure-side decomposition of GDP at constant 2014 prices:

$$GDP_t = C_t + C_{NPISH,t} + G_t + GCF_t + (X_t - M_t) \quad (1)$$

where C is private final consumption, C_{NPISH} consumption of NPISH (treated as exogenous, share 1.2-1.5% of GDP), G government final consumption, GCF gross capital formation (gross fixed capital formation plus changes in inventories per ESA 2010), X exports of goods and services, and M imports. Identity (1) holds with absolute residual below 0.01% of GDP across all eleven sample years. The closure architecture follows Bradley and Untiedt (2009): the five behavioural equations specified below model the demand-side determinants of C, X, M, GCF, and G; identity (1) recovers GDP without an additional GDP equation.

The five behavioural equations, in log-linear specification, are:

$$\log C_t = \alpha_{1,1} + \beta_{1,1} \cdot \log GDP_t + \varepsilon_{1,t} \quad (2)$$

$$\log X_t = \alpha_{2,1} + \beta_{2,1} \cdot \log DEX_t + \varepsilon_{2,t} \quad (3)$$

$$\log M_t = \alpha_{3,1} + \beta_{3,1} \cdot \log (GDP_t + X_t) + \beta_{3,2} \cdot \log RER_t + \varepsilon_{3,t} \quad (4)$$

$$\log GCF_t = \alpha_{4,1} + \beta_{4,1} \cdot \log GDP_t + \varepsilon_{4,t} \quad (5)$$

$$\log G_t = \alpha_{5,1} + \beta_{5,1} \cdot \log VEN_t + \varepsilon_{5,t} \quad (6)$$

Equation (2) follows the absolute-income consumption hypothesis. Equation (3) employs EU27 real GDP (DEX) as external demand proxy, with EU27 absorbing approximately 65% of Moldovan exports in 2023 (NBS trade statistics). Equation (4) follows the Goldstein-Khan absorption framework, with imports specified against total absorption (GDP + X) rather than GDP alone, recognising that Moldovan exports have substantial imported intermediate-input content; the real exchange rate (RER) enters as a price-competitiveness term. Equation (5) follows the accelerator principle. Equation (6) specifies fiscal pass-through, with VEN denoting total general government revenue (taxes plus social contributions plus health insurance contributions) at constant prices.

3.2 Estimation method and counterfactual scenarios

The five behavioural equations are estimated by OLS on the full sample 2014-2024 with heteroscedasticity-robust standard errors (Newey-West HAC, truncation lag 1). OLS is preferred over Bayesian alternatives for three reasons: (i) replicability without prior-specification justification; (ii) direct interpretation of coefficients as long-run elasticities under log-linear specification; (iii) robustness to prior-specification sensitivity that would be acute at $N = 11$ in Bayesian alternatives. The trade-offs of $N = 11$ are acknowledged: stationarity tests have low statistical power, the Diebold-Mariano test is not feasible, and the sample size precludes vector error-correction modelling.

Counterfactual scenarios are implemented by altering an exogenous variable from its observed value to a counterfactual path, re-evaluating the behavioural equations using the OLS coefficients estimated on the historical sample, and aggregating the modified components through identity (1). Four scenarios are explored: a 5% contraction in EU27 demand, a 10% fiscal impulse via revenue increase, a 15% nominal depreciation of the leu, and a 10% productivity-driven GDP increase. Scenarios assume static behaviour and apply OLS coefficients as if the relationships were structurally invariant, a strong assumption at $N = 11$ acknowledged as a limitation in §6.

4 Data

The model is estimated on annual data 2014-2024 ($N = 11$), the full period for which NBS Moldova publishes ESA-2010-compliant national accounts under the CAEM Rev.2 framework. Moldovan macroeconomic series, GDP, C, C_{NPISH} , X, M, IFBCF, Δ _Stocks, G, the GDP deflator P, are taken from NBS (2025), expenditure approach. Total general government revenue (VEN) is from the NBS series "Bugetul public național" (Statistical Yearbook 2024, Table 22.1), covering the consolidated fiscal account. Gross capital formation (GCF), denoted FBC in Moldovan national accounts terminology, is constructed as IFBCF + Δ _Stocks per ESA 2010. The MDL/EUR exchange rate (NER) and NBM policy rate (i, annual average) are from NBM statistical bulletins. EU27 real GDP at 2010 prices (DEX) is from Eurostat (namq_10_gdp series). All Moldovan nominal series are deflated to constant 2014 prices using the GDP implicit deflator. The accounting identity $GDP = C + C_{NPISH} + G + GCF + (X - M)$ holds with maximum absolute residual below 0.01% of GDP across all eleven years. The

bilateral real exchange rate against the euro is constructed as $RER_t = NER_t \times (P_{foreign,t} / P_{domestic,t})$, with euro area inflation approximated at 1.5% per year. All variables, except the policy interest rate (which enters as $\log(1 + i_t/100)$), are transformed to natural logarithms.

The sample exhibits trend behaviour expected of a small economy growing in real terms: GDP rises from MDL 132 bn (2014) to MDL 156 bn (2024), cumulative real growth of 18%. Components display heterogeneous patterns: consumption tracks GDP closely; exports show pronounced volatility (a 30% nominal jump in 2022 driven by energy-crisis re-export activity); GCF is the most volatile component, with year-on-year real changes ranging from -9% (2020) to +21% (2018); government spending exhibits the smoothest profile. External variables (NER, DEX) are relatively stable; the policy rate exhibits the highest within-sample variation, ranging from 3.5% (2020) to 16.6% (2022) reflecting NBM's response to the energy crisis.

5 Results

5.1 Baseline OLS estimates

Table 1 reports the baseline OLS estimates. All five equations are jointly significant at conventional levels, with adjusted R^2 ranging from 0.42 (E4) to 0.87 (E5). The point estimates carry direct economic interpretation as long-run elasticities under log-linear specification. The income elasticity of private consumption is 0.70 ($p < 0.001$), indicating a marginal propensity to consume below unity. The elasticity of Moldovan exports to EU27 GDP is 1.97 ($p < 0.005$), placing Moldova at the upper end of the trade-elasticity range for small open economies (Goldstein and Khan, 1985; Bussière et al., 2013). The income-side elasticity of imports against total absorption is 1.32 ($p < 0.01$). The fiscal pass-through coefficient $\beta_{VEN} = 1.41$ ($p < 0.001$) indicates that government final consumption rises by approximately 1.4 percent for each percent increase in tax revenue. The real exchange rate enters the import equation with a coefficient indistinguishable from zero ($p > 0.80$), and the policy interest rate enters the investment equation only marginally ($p > 0.40$).

Table 1: Baseline OLS estimates of the five behavioural equations

Variable	E1 log C	E2 log X	E3 log M	E4 log GCF	E5 log G
Constant	1.317* (0.599)	-28.288** (7.761)	-2.625 (2.381)	-2.867 (2.238)	-2.255** (0.667)
log GDP	0.703*** (0.120)	-	-	1.288* (0.449)	-
log DEX	-	1.968** (0.475)	-	-	-
log (GDP + X)	-	-	1.322** (0.389)	-	-
log RER	-	-	0.039 (0.152)	-	-
log VEN	-	-	-	-	1.407*** (0.174)
R ² -adj	0.769	0.618	0.695	0.420	0.865
F p-value	0.0002	0.0025	0.0035	0.0185	<0.0001
Durbin-Watson	1.729	1.633	1.431	1.806	1.565
N	11	11	11	11	11

Notes: OLS estimates on annual data 2014-2024 ($N = 11$). All variables in natural logarithms; real values at 2014 prices (Moldovan series); EU27 GDP at 2010 prices (DEX). Standard errors in parentheses. Significance: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Source: Author's calculations on NBS Moldova, NBM, World Bank and Eurostat data.

5.2 Three indicative findings from the baseline estimates

The baseline estimates produce three indicative findings, discussed below with the small-sample caveats noted in §6. First, external vulnerability is asymmetric and substantial: $\beta_{DEX} = 1.97$ implies that a one-percent decline in EU27 real GDP translates into approximately a two-percent decline in Moldovan exports, with the open-economy multiplier amplifying rather than dampening the externally generated cycle. Combined with the export-import differential structure (exports averaging 35% of GDP, imports 60%) and the import elasticity to total absorption of 1.32, a 5% EU27 contraction would translate into approximately a 9% reduction in Moldovan exports.

Second, real exchange rate transmission is statistically indistinguishable from zero in the import equation, where it was tested; under the parsimonious specification strategy, the real exchange rate was not included as a regressor in the export equation. The null finding is consistent with the structural features of the Moldovan economy: dominance of EU-denominated commodity trade, substantial role of remittances (averaging 18-22% of GDP) that generate income flows insensitive to domestic price developments, and high pass-through of import prices documented by the NBM (2022, 2023). The implication for stabilisation policy is that the conventional exchange rate channel of monetary transmission has limited efficacy in Moldova. This result complements Pârtaçi and Mija (2015a), who document substantial exchange rate transmission to inflation at quarterly frequency: the two findings reflect distinct channels, price-level pass-through (their result) and trade-flow non-response (the present result), that are jointly consistent with rapid pass-through neutralising the relative-price effect on trade flows.

Third, the investment-to-interest-rate channel is also weak: when included additively, the policy rate is statistically insignificant in E4. This indicates that conventional credit-channel effects of monetary policy on fixed capital formation are limited in Moldova, consistent with the shallow domestic credit market (private credit \approx 30% of GDP, low by EU standards) and the high share of foreign-financed investment (EU Eastern Partnership infrastructure funds, IMF Extended Credit Facility disbursements).

5.3 In-sample fit, out-of-sample validation and benchmark comparison

Aggregate GDP is reconstructed via identity (1) by inserting OLS-implied components, with NPISH consumption taken as observed. The aggregate GDP forecast achieves an in-sample MAPE of 2.05% with Theil $U = 0.0117$, with 98.9% of squared error variance attributable to the covariance component (U_C), 0.4% to bias (U_M), and 0.7% to variance (U_S). This composition indicates that the model captures the dynamic profile of GDP accurately. At component level: consumption MAPE 1.50%, government 3.68%, imports 4.15%, exports 5.36%, GCF 7.73%. The relatively weaker fit of GCF reflects the structurally volatile nature of investment in Moldova, with year-on-year changes driven by lumpy infrastructure projects and external financing pulses.

Pseudo out-of-sample validation re-estimates the equations on 2014-2022 ($N_{train} = 9$) and forecasts 2023-2024 ($N_{test} = 2$). Aggregate GDP MAPE_OOS is 2.69%, only 31% above the in-sample value, a moderate deterioration that is indicative, but cannot be confirmed as structural reliability given $N = 11$. Consumption remains essentially unchanged across the cut (MAPE_OOS 1.47% vs. MAPE_IS 1.50%); government spending actually improves (MAPE_OOS 1.02% vs. 3.69%); GCF deteriorates substantially (MAPE_OOS 23.0% vs. MAPE_IS 7.7%), reflecting post-2022 compression of investment activity driven by the persistent effects of the energy crisis, regional security tensions, and the cumulative impact of restrictive monetary policy.

Table 2 reports the benchmark comparison. Against AR(1) on log GDP, the framework reduces OOS MAPE by 2.27 pp (1.85-fold improvement); against reduced-form VAR(1), by 0.57 pp despite using fewer parameters (8 vs. 12). Both indicate that the cross-equation theoretical restrictions add genuine forecasting value. Against the random walk, however, the framework underperforms (2.69% vs. 0.77%) on a validation period (2023-2024) characterised by Moldovan output stagnation (annual growth 1.0% and 0.6% respectively); in low-drift environments, the random walk is structurally difficult to outperform on short horizons (Atkeson and Ohanian, 2001; Stock and Watson, 2007; Diebold, 2015). The result is interpreted as reflecting the temporary stagnation of the validation sample rather than the relative analytical merit of the structural approach: the random walk produces no economic information, no elasticities, no scenarios, no decomposition.

Table 2: Forecasting performance: structural OLS vs. alternative benchmarks

Model	MAPE_IS GDP (%)	MAPE_OOS GDP (%)	N parameters	Interpretability
Semi-structural OLS (this paper)	2.05	2.69	8	High (elasticities + scenarios)
Random walk on log GDP	4.43	0.77	0	None
AR(1) on log GDP	4.31	4.96	2	Low (single AR coefficient)
VAR(1) reduced form	3.42	3.26	12	Low (reduced-form coefficients)

Notes: In-sample period 2014-2024 (or 2015-2024 where the benchmark consumes the first observation). Out-of-sample period 2023-2024 (estimation on 2014-2022). The strong performance of the random walk on the validation window reflects the unusual stagnation of Moldovan real GDP in 2023-2024 (annual growth 1.0% and 0.6% respectively); see Atkeson and Ohanian (2001), Stock and Watson (2007). Source: Author's calculations.

5.4 Robustness diagnostics

Three robustness diagnostics confirm the structural integrity of the baseline specification within the limits permitted by $N = 11$. Chow tests applied at the 2020 break point yield F-statistics ranging from 0.10 to 2.10, with all p-values exceeding 0.10, no detectable structural break across the COVID-19 boundary. Augmented Dickey-Fuller tests reject the unit-root null at 5% for all five equations (statistics from -2.12 to -4.08, all below the -1.95 critical value); KPSS tests with the opposite null yield statistics from 0.13 to 0.27, all below the 0.46 critical value at 5%. The convergence of ADF rejection and KPSS non-rejection across all five equations provides indicative support for residual stationarity, consistent with the spurious-regression concern being limited within the sample window (though the statistical power of these tests at $N = 11$ should be acknowledged). Durbin-Watson statistics fall within the indeterminate range [1.32; 2.18] for $N = 11$, ranging from 1.43 (E3) to 1.81 (E4); Cochrane-Orcutt-equivalent corrections confirm that AR(1) adjustment does not materially alter coefficient estimates or significance.

6 Discussion

6.1 Asymmetric external vulnerability and the null finding on exchange rate transmission

The export elasticity $\beta_{\text{DEX}} = 1.97$ places Moldova at the upper end of the international trade-elasticity literature: G-7 elasticities cluster at 1.5-2.0 (Hooper, Johnson and Marquez, 2000); cross-country estimates for advanced economies fall mostly between 0.7 and 2.5 (Imbs and Mejean, 2015); panel estimates for emerging Europe span 0.9-2.3 (Bussière et al., 2013). Moldova's estimated elasticity falls in the upper part of this range; comparable upper-bound estimates have been reported for small open economies of the Central and South-Eastern European region during their pre-accession period (Ganev, 2015 for Bulgaria). The economic interpretation is direct: a one-percent decline in EU27 GDP translates into roughly a two-percent contraction of Moldovan exports. The asymmetry of transmission becomes apparent once the import side is incorporated: with import elasticity to total absorption at 1.32, the same EU27 shock generates a 0.7-percent reduction of imports for every 1-percent fall in EU27 GDP. The difference between export contraction (1.97%) and import contraction (0.7%) compounds across the trade balance, amplifying GDP impact through the open-economy multiplier. In the absence of effective exchange rate transmission, external shocks of the magnitude experienced in 2022 (effective shock of roughly 2.4 percentage points on EU27 growth) translate into substantially larger Moldovan output contractions than in less externally exposed economies.

The null finding on real exchange rate transmission in the import equation requires interpretation rather than dismissal. Three structural features converge to suppress real-exchange-rate transmission in Moldova. First, dominance of euro-denominated trade reduces the effective bilateral exposure to MDL/EUR fluctuations. Second, remittances from Moldovan migrants abroad (18-22% of GDP) generate an income flow largely insensitive to domestic price developments. Third, high pass-through of import prices to domestic prices, documented by the NBM in successive Financial Stability Reports (2022, 2023), neutralises the price-competitiveness mechanism. Calvo and Reinhart (2002) document analogous patterns in their analysis of "fear of floating". A complementary perspective comes from Pârtachi and Mija (2015a), who report substantial exchange rate transmission to inflation at quarterly frequency: the two findings are jointly consistent with a structural pattern 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 macroeconomic implication is that NBM exchange rate management has limited stabilisation effect through the trade channel, framing the limited macroeconomic value of competitive devaluation as a development strategy for Moldova.

6.2 The investment channel, situating the results, and limitations

The fixed capital formation equation E4 yields the lowest $R^2\text{-adj}$ (0.42) and the largest OOS deterioration (MAPE rising from 7.7% to 23.0%). Both findings reflect substantive features of the Moldovan investment environment: structurally low private credit penetration (25-30% of GDP, against 60-90% in EU member states at comparable income levels per the World Bank Global Financial Development Database), and the predominance of foreign-financed investment uncorrelated with domestic demand growth. The post-2024 OOS deterioration is concentrated in disbursement pulses from EU Eastern Partnership funds and the IMF Extended

Credit Facility, which the parsimonious specification cannot capture; this limitation is intrinsic to the present specification rather than an estimation artefact.

Within the Moldovan macromodelling tradition, the present results enter dialogue with Pârtachi and Mija (2013, 2015a, 2024) and Mija (2022) through three points of comparison. On exchange rate transmission, the divergent findings, substantial price-level pass-through at quarterly frequency (their result) and zero trade-flow response at annual frequency (the present result), are best understood as documenting distinct channels. On forecasting performance, the present annual MAPE_OOS of 2.69% complements their Bayesian quarterly framework over a 20-quarter horizon: both confirm that disciplined macromodelling is feasible for Moldovan GDP despite data-environment limitations. On methodological complementarity, the two traditions are best understood as parallel research programmes addressing the same economy from distinct methodological angles, with comparative advantages: Bayesian frameworks exploit informative priors when well-justified; classical OLS frameworks deliver fully replicable results without prior-specification sensitivity. Within the Moldovan institutional landscape, where IMF Article IV consultations and NBM internal forecasting systems are not publicly disclosed, the present paper contributes, to the author's knowledge, the first publicly documented and fully replicable annual framework.

Three limitations should be acknowledged. Sample size: with $N = 11$, the estimation rests on a degrees-of-freedom margin that is uncomfortable by macroeconomic standards; statistical tests for stationarity, structural stability, and forecast accuracy comparison have low statistical power. Static structure: the model has no lagged endogenous variables and no error-correction representation; with $N = 11$, the inclusion of lags would require sacrificing further degrees of freedom. Treatment of stocks: the aggregated specification (with $GCF = IFBCF + \Delta_Stocks$, denoted FBC in Moldovan national accounts) closes the identity but conflates two structurally distinct components. These limitations are intrinsic to the data environment and define the boundary of the current contribution; as additional observations accumulate under the CAEM Rev.2 framework, the model should be re-estimated and its specification expanded.

7 Conclusions

This paper has presented, to the author's knowledge, the first publicly documented annual semi-structural macroeconomic framework for the Republic of Moldova, comprising five behavioural equations estimated by Ordinary Least Squares (OLS) closed by the expenditure-side accounting identity, estimated on annual data 2014-2024 ($N = 11$). The empirical results yield three indicative findings, conditional on the small-sample environment: (i) the elasticity of Moldovan exports to EU27 demand is 1.97 ($p < 0.005$), placing Moldova at the upper end of the trade-elasticity range and implying that external shocks are amplified rather than dampened by the open-economy multiplier; (ii) the real exchange rate is statistically indistinguishable from zero in the import equation, where it was tested; under the parsimonious specification strategy, the variable was not included as a regressor in the export equation, indicating limited efficacy of the conventional exchange rate channel for stabilisation; (iii) the policy interest rate fails to enter the investment equation significantly, consistent with the shallow domestic credit market. The framework outperforms AR(1) and reduced-form VAR(1) benchmarks on out-of-sample MAPE while underperforming the random walk on a validation window characterised by Moldovan output stagnation.

The expected impact of these results is threefold. First, the asymmetric external transmission identified by the model suggests that fiscal stabilisation, rather than exchange rate management, may play the primary role in demand-side stabilisation against external shocks — a model-based indication consistent with successive IMF Article IV consultations and quantified here, to the author's knowledge for the first time, on annual demand-side aggregates. Second, the null finding on real exchange rate transmission in the import equation indicates that the trade channel of monetary transmission appears to be limited in Moldova within the sample window — a model-based result that should be interpreted with caution given the small-sample environment, but which is consistent with the structural features documented in §6.1. Third, the framework provides a public quantitative platform on which future Moldovan macroeconomic policy debates can be grounded; the model is replicable from documented data sources and OLS coefficients.

Three extensions warrant attention as the data environment evolves. The accumulation of additional observations under the CAEM Rev.2 framework will, by approximately 2030 with $N \geq 17$, support the introduction of dynamic structure (lagged endogenous variables, error-correction representations) currently precluded. Integration of the aggregate framework with the input-output reconstruction of the Moldovan

economy will permit a sectorally disaggregated analysis of the same shocks, exploiting bridging methodologies between reduced-form macroeconomic and structural input-output diagnostics. The methodological template, parsimonious semi-structural specification with identity closure, is directly transferable to other small post-Soviet economies (Armenia, Georgia, Kyrgyzstan) confronting analogous data constraints; the broader research programme is the institutionalisation of replicable, public-domain macroeconomic work for the small post-Soviet economies underrepresented in the published literature.

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