Assessing the Impact of Trade Policy on the Macroeconomic System of the RA Using the IS-LM-BP Model

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Оценка влияния торговой политики на макроэкономическую систему РА с использованием модели IS-LM-BP
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Аннотация: В данной статье использовалась модель IS-LM-BP для оценки влияния торговой политики на экономику Республики Армения с использованием данных за период 2000-2022 годов. Модель объединила внутренние и внешние факторы, отражая взаимосвязь между производством, процентными ставками и обменными курсами. С помощью корреляционно-регрессионного анализа были исследованы связи между ключевыми экономическими переменными и оценены коэффициенты модели. Равновесные значения эндогенных переменных определены путем аналитического решения системы.
Далее были смоделированы сценарии для оценки последствий изменений торговой политики. Результаты показали важность таких факторов, как соотношение потребления и доходов, чувствительность спроса денег к процентным ставкам и динамика обменных курсов. В целом, результаты исследования проливают свет на сложные взаимосвязи между торговой политикой и макроэкономическими показателями Республики Армения, способствуя пониманию того, как корректировка торговой политики может повлиять на ключевые показатели экономики. Данное исследование направлено на предоставление ценной информации лицам, принимающим политические решения, и для дальнейших исследований в этой области.
Ключевые слова: Республика Армения, макроэкономическое моделирование, торговая политика, модель IS-LM-BP, сценарный анализ.

<< մակրոտնտեսական համակարգի վրա առևտրային քաղաքականության ազդեցության գնահատումը IS-LM-BP մոդելով
Մաթևոսյան Դիանա Ս.
<այաստանի պետական տնտեսագիտական համալսարան
Միջազգային տնտեսական հարաբերություններ ամբիոնի ասպիրանտ (Երևան, <<)
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Ամփոփագիր. Այս հոդվածը օգտագործել է IS-LM-BP մոդելը` <այաստանի <անրապետության տնտեսության վրա առևտրային քաղաքականության ազդեցությունը գնահատելու համար` օգտագործելով 2000-2022 թվականների տվյալները: Մոդելը միավորում է ներքին և արտաքին գործոնները` արտացոլելով արտադրության, տոկոսադրույքների և փոխարժեքի փոխհարաբերությունները: Կոռելացիոն-ռեգրեսիոն վերլուծության միջոցով ուսումնասիրվել են հիմնական տնտեսական փոփոխականների միջև կապերը և գնահատվել մոդելի գործակիցները: Էնդոգեն փոփոխականների հավասարակշռության արժեքները որոշվել են համակարգը անալիտիկ եղանակով լուծելով:
<աջորդ քայլով իրականացվել է սցենարային վերլուծություն` գնահատելու առևտրային քաղաքականության փոփոխությունների ազդեցությունը: Արդյունքները ցույց են տվել այնպիսի գործոնների կարևորությունը, ինչպիսիք են սպառման և եկամտի հարաբերակցությունը, փողի պահանջարկի զգայունությունը տոկոսադրույքների նկատմամբ և փոխարժեքների դինամիկան: Ընդհանուր առմամբ, ուսումնասիրության արդյունքները լույս են սփռում << առևտրային քաղաքականության և մակրոտնտեսական ցուցանիշների միջև բարդ փոխհարաբերությունների վրա` նպաստելով հասկանալուն, թե ինչպես կարող են առևտրային քաղաքակա-

նության ճշգրտումները ազդել հիմնական տնտեսական ցուցանիշների վրա։ Այս ուսումնասիրությունը նպատակ ունի արդեքավոր տեղեկատվություն տրամադրել քաղաքական որոշումներ կայացնողներին և այս ոլորտում հետագա հետազոտությունների համար։

Հանգուցաբառեր` Հայաստանի Հանրապետություն, մակրոտնտեսական մոդելավորում, առևտրային քաղաքականություն, IS-LM-BP մոդել, սցենարային վերլուծություն

1. Introduction

The scarcity of research focused on macroeconomic modeling in the Republic of Armenia (RA) poses a significant challenge. This article endeavours to address some of the empirical gaps in the analysis of the RA's macroeconomic system and to assess the impact of trade policy on this system by delineating its cascading effects.

The main goal of the study is to provide a comprehensive analysis of the impact of trade policy on the Republic of Armenia's macroeconomic framework. This entails examining various economic indicators, their interrelationships, and how they respond to changes in trade policy. The IS-LM-BP model, which integrates domestic and external factors, serves as a valuable tool for capturing these intricate dynamics. Through the utilization of empirical data spanning over two decades, the study aims to contribute valuable insights into the complex interplay between trade policy adjustments and the broader economy.

The statistical data utilized for this study are drawn from the databases of the National Statistical Committee of RA (armstat) [17], the Central Bank of RA (CBA) [2], and the World Bank [20], covering an annual timeframe. The article employs a range of statistical methodologies, including time series dynamics indicators, correlation-regression analysis, model residual analysis, forecast correction techniques, scenario analysis, and simulation of behavioural patterns in the indicator system. The equilibrium values of endogenous variables are determined through the analytical solution of the IS-LM-BP model. This analytical approach allows for a deeper understanding of the economy's response to changes in trade policy. Additionally, scenario analysis and simulation are conducted to explore the potential effects of different trade policy adjustments on key economic indicators. This forward-looking perspective is vital for policy-makers and researchers seeking to anticipate the potential outcomes of various policy decisions.

2. Literature review

At the foundation of the modern macroeconomic model of a country lies John M. Keynes (1936) [9], who introduced the concept of aggregate demand and demonstrated that a country's income cannot be uniquely determined solely by the production function (aggregate supply). Moreover, in the short term, it is influenced by demand factors.

This concept found its mathematical expression and extension in the IS-LM model (Hicks, 1937, pp. 147-159) [5]. The IS model describes the market for goods and services, i.e., the real sector, while the LM model pertains to the monetary market. In both markets, the variables determined by the models are income and interest rates. The IS-LM model originally depicted a closed economy, an isolated "in a vacuum" nation that had no interactions with neighbouring nations. However, in practice, this isolation is unrealistic. The model was subsequently refined by incorporating relationships with the "external world," accounting for trade and financial interactions with the rest of the globe (Mundell, 1960, 1961, 1964, 2001; Fleming, 1962, 1971) [3; 4; 12-15]. This expansion of the IS-LM model is referred to as the Mundell-Fleming model (IS-LM-BP). This model, with integrated modifications, remains relevant and popular today.

For instance, Hsing (2006, 2019, 2020) [6-8] has dedicated numerous works to evaluating the applicability of the Mundell-Fleming model across various countries and regions. In each study, he assesses the validity of the Mundell-Fleming model and consistently concludes its adequacy. Wong raises a pertinent question in his article: whether the Mundell-Fleming model is suitable for modeling the Chinese economy (Wang et al., 2019, pp. 11-28) [18]. Specifically, the linkage between interest rates and short-term capital account (BOP, cash-flow account) is examined. The authors deduce that adjusting interest rates alone during specific periods is insufficient; it necessitates a combination with fiscal policies and other measures to mitigate adverse external shocks.

Wang further explores the model's behaviour within closed and open economies (Wang et al., 2020, pp. 149-172) [19]. The authors conclude that economic openness enhances the effectiveness of monetary and fiscal policies. The direct application of monetary policy tools significantly impacts the economy's money market, exerting indirect effects on the real sector through the external sector, and vice versa. However, the authors acknowledge that while this phenomenon has positive implications, it may also lead to economic "disorder."

In summation, it can be affirmed that the practical application of the Mundell-Fleming model within the academic sphere remains relevant and pertinent to this day.

3. **Methodology**

Assessing the impact of trade policy on the economy is a complex endeavour due to the multitude of factors influencing the economy. One approach to addressing this challenge is the utilization of the IS-LM-BP model, which enables the evaluation of trade policy's influence on economic variables. The IS-LM-BP model (Investment-Saving/Liquidity preference-Money supply/Balance of Payments) extends the IS-LM model by incorporating the Balance of Payments. The model accommodates both internal and external factors impacting the economy. The IS-LM-BP model encompasses three core economic variables: output level (Y), interest rate (i), and exchange rate (e) (Blanchard, O., & Johnson, D, 2013) [1]. Evaluating the impact of trade policy on the economy using the IS-LM-BP model can be carried out as follows (Krugman, P., Obstfeld, M., & Melitz, M., 2012) [10]:

1. Exogenous variable determination: Identification of the set of exogenous variables influencing the economy, including trade policy.

2. Data collection: Gathering data on economic variables and trade policy.

3. Model estimation: Estimating the IS-LM-BP model to ascertain coefficients.

4. Results analysis: Analyzing modeling outcomes, encompassing regression coefficients and statistical significance.

5. Assessment of trade policy impact: Evaluating the effect of trade policy on economic variables through adjustments in exogenous variable values (Mankiw, N. G. 2014) [11]. This enables the assessment of how changes in trade policy influence output level, interest rate, and exchange rate. Moreover, one can gauge how variations in one variable impact other variables using regression coefficients (Salvatore, D., 2017) [16].

For constructing the IS-LM-BP model, yearly data from the period 2000-2022 were employed. In accordance with theory, all nominal variables were transformed into real ones. Specifically, Gross Domestic Product (GDP) and its component parts were adjusted using the deflator, while interest rates and exchange rates were normalized using the Consumer Price Index.

Subsequently, correlation relationships between relevant variables were assessed based on the following foundational model (Mankiw, N. G. 2014) [11]:

$$\text{IS: } Y = C + I + G + NX \tag{1}$$
$$C = c_0 + c_1 \times Y \tag{1.1}$$
$$I = I_0 + I_1 \times r \tag{1.2}$$
$$NX = nx_0 + nx_1 \times e \tag{1.3}$$
$$\text{LM: } \frac{M}{P} = L^D \tag{2}$$
$$L^D = m_0 + m_1 \times r + m_2 \times Y \tag{2.1}$$
$$\text{BP: } NX = CF \tag{3}$$
$$NX = nx_0 + nx_1 \times e \tag{3.1}$$
$$CF = cf_0 + \eta \times (r - r*) \tag{3.2}$$

Based on the correlation assessments, a corresponding regression analysis was conducted to estimate the model coefficients. Regression equations were enhanced (increasing explanatory power) through the introduction of time series components (trends) and dummy variables into the model. Subsequently, equilibrium values of endogenous variables - income, interest rate, and exchange rate - were obtained using the analytical solution of the system of equations (Cramer's method) in the Mundell-Fleming model.

Based on the derived sensitivity coefficients, simulation of trade policy scenarios was carried out. Notably, the key elements are the slope coefficients (differentials) of equations, rather than the constants determining the height relative to the axes. This is because the analysis of impact is determined by partial differentials, and the initial level of the policy simulation instrument series can be chosen (e.g., based on values from recent years or assumptions for the future):

$$\Delta e = e_1 - e_0 \tag{4}$$
$$\Delta Y = Y_1 - Y_0 \tag{5}$$
$$\Delta r = r_1 - r_0 \tag{6}$$

4. **Analysis**

Let's commence the analysis with the dynamics indicators (Table 1-5) and descriptive statistics (Table 6) of the core variables [21].

Table 1. *The indicators of the dynamics of model variables*

Year	Y	Yabsvalue	Ygrowth%	C	Cabsvalue	Cgrowth%
2000	1,045,982.05			1,052,279		
2001	1,129,564.65	83,582.60	8%	1,096,407	44,127.89	4%
2002	1,353,000.70	223,436.05	20%	1,246,713	150,306.31	14%
2003	1,553,195.70	200,195.00	15%	1,342,040	95,327.08	8%
2004	1,794,868.67	241,672.98	16%	1,536,373	194,332.76	14%

2005	2,173,334.21	378,465.53	21%	1,703,385	167,011.85	11%
2006	2,539,378.39	366,044.19	17%	1,905,476	202,091.11	12%
2007	3,022,344.91	482,966.52	19%	2,248,024	342,548.11	18%
2008	3,369,431.16	347,086.25	11%	2,503,690	255,665.83	11%
2009	3,062,038.01	(307,393.15)	-9%	2,552,730	49,039.97	2%
2010	3,209,835.53	147,797.52	5%	2,729,559	176,829.23	7%
2011	3,622,191.37	412,355.84	13%	3,135,425	405,865.30	15%
2012	4,318,279.86	696,088.49	19%	3,689,924	554,498.98	18%
2013	4,405,839.65	87,559.79	2%	3,804,445	114,521.77	3%
2014	4,720,064.81	314,225.16	7%	4,017,838	213,392.47	6%
2015	4,983,827.27	263,762.46	6%	3,861,352	(156,486.23)	-4%
2016	5,052,137.09	68,309.82	1%	3,830,893	(30,458.48)	-1%
2017	5,450,042.41	397,905.32	8%	4,324,364	493,470.74	13%
2018	5,853,147.08	403,104.67	7%	4,635,446	311,081.76	7%
2019	6,478,536.44	625,389.35	11%	5,363,165	727,719.43	16%
2020	6,072,595.87	(405,940.56)	-6%	4,539,949	(823,215.64)	-15%
2021	6,532,238.07	459,642.20	8%	4,669,505	129,555.17	3%
2022	7,867,386.94	1,335,148.87	20%	5,393,025	723,520.32	15%

Source: [**2**; **17** https://statbank.armstat.am/pxweb/hy/ArmStatBank/?rxid=9ba7b0d1-2ff8-40fa-a309-fae01ea885bb]

Table 2. *The indicators of the dynamics of model variables*

Year	G	Gabsvalue	Ggrowth%	I	Iabsvalue	Igrowth%
2000	112,403			195,008.52		
2001	116,008	3,604.85	3%	223,178.96	28,170.44	14%
2002	122,964	6,955.29	6%	293,155.91	69,976.95	31%
2003	144,270	21,306.56	17%	376,773.14	83,617.23	29%
2004	166,158	21,888.06	15%	446,533.87	69,760.73	19%
2005	208,670	42,512.28	26%	662,134.98	215,601.11	48%
2006	233,169	24,499.00	12%	911,792.54	249,657.56	38%
2007	279,797	46,627.13	20%	1,141,919.48	230,126.94	25%
2008	313,646	33,849.54	12%	1,377,125.02	235,205.54	21%
2009	371,619	57,972.83	18%	1,061,599.81	(315,525.22)	-23%
2010	381,796	10,177.00	3%	1,055,048.33	(6,551.47)	-1%
2011	426,121	44,324.99	12%	988,157.14	(66,891.19)	-6%
2012	471,123	45,001.88	11%	1,065,792.61	77,635.47	8%
2013	525,840	54,717.07	12%	976,003.19	(89,789.42)	-8%
2014	570,460	44,620.27	8%	1,004,573.31	28,570.12	3%
2015	653,459	82,999.27	15%	1,033,173.81	28,600.50	3%
2016	679,723	26,263.15	4%	910,168.20	(123,005.62)	-12%
2017	671,366	(8,356.22)	-1%	1,003,992.65	93,824.46	10%
2018	672,333	966.57	0%	1,311,089.69	307,097.03	31%
2019	814,000	141,666.72	21%	1,127,817.92	(183,271.77)	-14%
2020	908,984	94,984.09	12%	1,194,105.11	66,287.19	6%
2021	1,031,643	122,659.43	13%	1,351,592.70	157,487.60	13%
2022	1,156,682	125,038.63	12%	1,526,045.28	174,452.57	13%

Source: [**2**; **17**, https://statbank.armstat.am/pxweb/hy/ArmStatBank/?rxid=9ba7b0d1-2ff8-40fa-a309-fae01ea885bb]

Table 3. *The indicators of the dynamics of model variables*

Year	NX	NXabsvalue	NXgrowth%
2000	(313,709.01)		
2001	(306,029.59)	7,679.42	-2%
2002	(309,832.09)	(3,802.50)	1%
2003	(309,887.96)	(55.87)	0%
2004	(354,196.53)	(44,308.58)	14%
2005	(400,856.24)	(46,659.71)	13%
2006	(511,059.72)	(110,203.48)	27%
2007	(647,395.37)	(136,335.65)	27%
2008	(825,030.03)	(177,634.66)	27%
2009	(923,910.77)	(98,880.73)	12%
2010	(956,568.01)	(32,657.24)	4%
2011	(927,511.27)	29,056.74	-3%
2012	(908,559.11)	18,952.16	-2%
2013	(900,448.74)	8,110.37	-1%
2014	(872,806.45)	27,642.29	-3%
2015	(564,157.53)	308,648.92	-35%
2016	(368,646.76)	195,510.77	-35%
2017	(549,680.41)	(181,033.65)	49%
2018	(765,721.11)	(216,040.70)	39%
2019	(826,446.14)	(60,725.03)	8%
2020	(570,442.34)	256,003.80	-31%
2021	(520,502.34)	49,940.00	-9%
2022	(208,365.00)	312,137.34	-60%

Source: [**2**; **17**, https://statbank.armstat.am/pxweb/hy/ArmStatBank/?rxid=9ba7b0d1-2ff8-40fa-a309-fae01ea885bb]

Table 4. *The indicators of the dynamics of model variables*

Year	e	eabsvalue	egrowth%	r	rabsvalue	rgrowth%
2000	543.85			33%		
2001	538.41	(5.44)	-1%	22%	(0.12)	-35%
2002	567.16	28.75	5%	18%	(0.03)	-16%
2003	552.82	(14.34)	-3%	16%	(0.03)	-15%
2004	498.60	(54.22)	-10%	12%	(0.04)	-25%
2005	454.97	(43.63)	-9%	14%	0.03	23%
2006	404.28	(50.69)	-11%	11%	(0.03)	-20%
2007	327.68	(76.59)	-19%	13%	0.01	12%
2008	280.73	(46.95)	-14%	10%	(0.02)	-18%
2009	351.35	70.62	25%	16%	0.05	52%
2010	345.38	(5.98)	-2%	11%	(0.05)	-33%
2011	345.87	0.49	0%	13%	0.02	22%
2012	391.62	45.75	13%	11%	(0.02)	-13%
2013	387.15	(4.47)	-1%	12%	0.01	8%
2014	403.79	16.64	4%	14%	0.02	13%
2015	460.85	57.06	14%	16%	0.02	17%
2016	487.32	26.47	6%	17%	0.01	5%
2017	477.92	(9.40)	-2%	12%	(0.05)	-30%

2018	471.22	(6.70)	-1%	10%	(0.02)	-19%
2019	473.77	2.55	1%	11%	0.01	13%
2020	483.20	9.43	2%	10%	(0.01)	-12%
2021	469.96	(13.24)	-3%	5%	(0.05)	-52%
2022	401.20	(68.77)	-15%	7%	0.03	61%

Source: [**2**; **17**, https://statbank.armstat.am/pxweb/hy/ArmStatBank/?rxid=9ba7b0d1-2ff8-40fa-a309-fae01ea885bb]

Table 5. *The indicators of the dynamics of model variables*

Year	M/P	M/P abs	M/P %
2003	127,543.02		
2004	137,081.75	9,538.73	7.48%
2005	217,831.29	80,749.54	58.91%
2006	327,271.46	109,440.17	50.24%
2007	538,410.32	211,138.87	64.51%
2008	507,986.92	(30,423.40)	-5.65%
2009	439,451.87	(68,535.05)	-13.49%
2010	483,889.57	44,437.70	10.11%
2011	632,249.88	148,360.31	30.66%
2012	746,945.91	114,696.03	18.14%
2013	820,160.46	73,214.56	9.80%
2014	799,880.09	(20,280.38)	-2.47%
2015	850,273.35	50,393.26	6.30%
2016	1,070,518.88	220,245.53	25.90%
2017	1,355,412.49	284,893.62	26.61%
2018	1,524,148.33	168,735.84	12.45%
2019	1,884,288.13	360,139.80	23.63%
2020	2,145,289.29	261,001.16	13.85%
2021	2,303,865.27	158,575.98	7.39%
2022	2,586,786.24	282,920.97	12.28%

Source: [**2**]

This table presents the dynamic indicators showcasing the trends of the key variables over the specified time period (2000-2022). It provides insights into the changes, fluctuations, and patterns exhibited by these variables. The variables under scrutiny encompass [list the variables, such as GDP, interest rate, exchange rate, etc.].

Table 6. *Descriptive Statistics*

Statistics	Y	C	G	I	NX	e	r	M/P
Mean	3,896,055	3,094,870	479,662	923,338	(601,816)	439.96	0.14	974,964
Standard Error	405,612	293,701	63,567	79,115	52,477	16.33	0.01	167,057
Median	3,622,191	3,135,425	426,121	1,004,573	(564,158)	460.85	0.12	773,413
Standard Deviation	1,945,245	1,408,540	304,858	379,423	251,669	78.31	0.06	747,102
Kurtosis	(0.88)	(1.31)	(0.41)	(0.38)	(1.56)	(0.75)	6.21	(0.22)
Skewness	0.21	0.02	0.64	(0.70)	(0.05)	(0.22)	1.97	0.94
Range	6,821,405	4,340,746	1,044,278	1,331,037	748,203	286.43	0.29	2,459,243
Minimum	1,045,982	1,052,279	112,403	195,009	(956,568)	280.73	0.05	127,543
Maximum	7,867,387	5,393,025	1,156,682	1,526,045	(208,365)	567.16	0.33	2,586,786
Count	23.00	23.00	23.00	23.00	23.00	23.00	23.00	20.00

Source: Author's calculations

In this table, we provide descriptive statistics of the central variables. These statistics encompass measures such as mean, standard deviation, minimum, maximum, and other relevant parameters. These statistics offer a comprehensive overview of the distribution and variation of the variables, offering crucial insights into their characteristics and behaviors.

Both tables are integral components of our initial analysis, providing an essential foundation for understanding the trajectory and characteristics of the key variables under study.

Let's proceed with the analysis by examining the relationships using a correlation matrix of the variables in the equations.

Table 7. *Correlation Matrix of Money Demand*

L~r+Y	L	r	Y
L	1.00		
r	(0.65)	1.00	
Y	0.95	(0.51)	1.00

Source: Author's calculations

Table 8. *Correlation Matrix of Consumption Function*

C~Y	C	Y
C	1.00	
Y	0.99	1.00

Source: Author's calculations

Table 9. *Correlation Matrix of Net Export Function*

NX~e	NX	e*[1]
NX	1.00	
e	(0.67)	1.00

Source: Author's calculations

Table 10. *Correlation Matrix of Investment Function*

I~r	I	r
I	1.00	
r	(0.76)	1.00

Source: Author's calculations

Table 11. *Correlation Matrix of Financial Function*

Fin~r-r*	Fin	r-r**[2]
Fin	1.00	
r-r*	(0.04)	1.00

Source: Author's calculations

As evident from the correlation matrices:

• All coefficients bear signs that align with theory.

• All coefficients are statistically significant except for the financial account and the interest rate differential. This implies that capital is not particularly mobile; hence, a substantial difference between global and RA interest rates may not lead to a notable influx of investments.

• The most highly correlated pair is consumption-income and money demand-income.

Based on the calculated correlation coefficients, it is notable that only the consumption equation does not require further refinement. The remaining equations will be enhanced by incorporating trend components and dummy variables into the model.

These improvements have ceased once the models reached an explanatory power exceeding 90% and confirmed the hypothesis of residuals' stationarity. The results of the model estimations are presented in Tables 12-15.

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[1] The dram-to-dollar exchange rate is calculated by dividing 1 by the dollar/dram exchange rate. This approach is adopted because the initial quotation is in terms of the dram's value relative to the dollar.

[2] The real interest rate differential between Armenia (RA) and the United States is determined as the difference between the real interest rate in RA and that in the US.
Furthermore, the correlation coefficient of the financial account of RA's balance of payments with the differences between RA and LIBOR rates has been calculated. However, this correlation is found to be statistically insignificant.

Table 12. *Consumption model estimation*

Regression Statistics				
Multiple R	**0.99**			
R Square	**0.97**			
Adjusted R Square	**0.97**			
Standard Error	238,284.51			
F	**Significance F**			
747.72	**0.0000**			
	Coefficients	**Standard Error**	**t Stat**	**P-value**
Intercept	**312,559.61**	113,233.29	2.76	**0.0117**
Y	**0.71**	0.03	27.34	**0.0000**

Source: Author's calculations

Table 13. *Investment model estimation*

Regression Statistics				
Multiple R	**0.96**			
R Square	**0.92**			
Adjusted R Square	**0.91**			
Standard Error	114,536.59			
F	**Significance F**			
74.14	**0.0000**			
	Coefficients	**Standard Error**	**t Stat**	**P-value**
Intercept	**884,906.02**	125,665.82	7.04	**0.0000**
r	**(3,395,263.53)**	583,183.94	(5.82)	**0.0000**
t	**35,644.96**	4,824.06	7.39	**0.0000**
f	**424,026.69**	68,556.71	6.19	**0.0000**

Source: Author's calculations

Table 14. *Net export model estimation*

Regression Statistics				
Multiple R	**0.99**			
R Square	**0.98**			
Adjusted R Square	**0.97**			
Standard Error	39,879.60			
F	**Significance F**			
214.54	**0.0000**			
	Coefficients	**Standard Error**	**t Stat**	**P-value**
Intercept	**196,437.89**	48,366.17	4.06	**0.0007**
e amd_usd	**(262,346,386.23)**	19,878,192.59	(13.20)	**0.0000**

f1	**(292,197.88)**	20,032.47	(14.59)	**0.0000**
f2	**439,434.49**	45,735.07	9.61	**0.0000**
t	**(8,275.14)**	1,421.42	(5.82)	**0.0000**

Source: Author's calculations

Table 15. *Money demand model estimation*

Regression Statistics				
Multiple R	**0.98**			
R Square	**0.96**			
Adjusted R Square	**0.95**			
Standard Error	166,453.13			
F	*Significance F*			
122.25	**0.0000**			
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	**46,860.43**	254,491.86	0.18	**0.8562**
r	**(4,997,858.74)**	1,476,266.74	(3.39)	**0.0038**
Y	**0.35**	0.03	13.48	**0.0000**
f	**456,181.32**	176,350.05	2.59	**0.0199**

Source: Author's calculations

From the presented tables, it is evident that the regressors in all models hold statistical significance. Based on the results, the IS-LM-BP model for Armenia (RA) can be formulated as follows[1]:

$$\text{IS: } \hat{Y} = 312{,}559.61 + 0.71 \times \hat{Y} + 1{,}344{,}577.67 \\ - 3{,}395{,}263.53 \times \hat{r} + 479{,}662.32 \\ + 33{,}713.80 - 255{,}016{,}122 \\ \times \hat{e} \qquad (\hat{1})$$

$$\text{LM: } 974{,}964.23 \\ = 69{,}669.50 - 4{,}997{,}858.74 \times \hat{r} \\ + 0.35 \times \hat{Y} \qquad (\hat{2})$$

$$\text{BP: } 33{,}713.80 - 255{,}016{,}122 \times \hat{e} \\ = -601{,}815.76 \qquad (\hat{3})$$

Table 16. *Equilibrium values*

Variable	Value
Y	4,187,006.59
r	11%
e (AMD/USD)	0.0025
e (USD/AMD)	401.27

Source: Author's calculations

This table presents the equilibrium values of the endogenous variables within the model. These values represent the stable points where the economy's various components come into balance. The equilibrium values provide insights into the long-term behavior of the economy under the specified conditions.

The equilibrium values offer a snapshot of the economy's state when all relevant factors and interactions reach a steady state. These values serve as reference points for analyzing the effects of different policy changes or external shocks on the economy's performance.

By presenting the equilibrium values, this table enhances our understanding of the model's implications and provides a foundation for assessing the model's predictive capabilities and policy recommendations.

Before we proceed with the scenario analysis, it's important to highlight a few crucial points:

Trade Policy: Trade policy refers to a set of measures implemented by countries to either expand or restrict the entry of foreign goods into their domestic markets.

Central Bank of Armenia (CBA) Exchange Rate Policy: The CBA follows a floating exchange rate policy, meaning it does not fix the exchange rate. Instead, the exchange rate is determined through the free market forces of supply and demand for currency.

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[1] Certainly, incorporating constant values, such as G (government spending), M/P (money supply relative to price level), and CF (current account of the balance of payments), into the model as their average levels is a valid approach. This strategy aligns with the concept of using average or steady-state values for certain variables, which can enhance the model's stability and help capture the long-term relationships within the economy.

In the model, the effect of trade policy will be incorporated through an autonomous variable not dependent on the exchange rate ((nx_0)). The initial value of the trade policy instrument ((nx_0)) is set to the 2022 level.

With these considerations in mind, we can proceed to the simulation analysis.

Table 17. *Scenario Analysis of Trade Policy in Armenia*

N	Description	nx_0	$n\dot{x}_0$	Δe	Δr	ΔY
Scenario 1	Stimulation of Export through Subsidies, Leading to a 10% Increase in Net Exports	(208,365)	(187,529)	(0.00008)	0.0028	39,804
		+10%		-3.19%	+2.34%	+0.44%
Scenario 2	Challenges in the Primary Export Sector of Armenia, Leading to a 10% Decrease in Net Exports	(208,365)	(229,201)	0.00008	(0.0028)	(39,804)
		-10%		+3.19%	-2.34%	-0.44%

Source: Author's calculations

The calculations from Table 9 reveal that a 10% increase in net exports leads to the following effects on the Armenian economy:

GDP Increase: The GDP of the economy experiences a rise of 39,804 million Armenian Drams, equivalent to a growth of 0.44%. This demonstrates the positive influence of increased net exports on the overall economic output.

Interest Rate Impact: The interest rate is observed to increase by 0.28 percentage points, representing a relative increase of 2.34%. This outcome indicates that the heightened net export activity has influenced the interest rate dynamics within the economy.

These results underscore the substantial impact that trade policy adjustments, in this case, the stimulation of net exports, can have on key macroeconomic variables. The increase in GDP and the adjustment in interest rates highlight the interconnectedness of trade policies with broader economic indicators, revealing the intricate mechanisms through which trade policy changes can shape economic performance.

5. Conclusion

Based on the conducted analysis, the following conclusions can be drawn:

Immobility of Capital: In Armenia, capital is not mobile due to factors like country risk and the investment environment.

Consumption and Income: A one-unit increase in income leads to a 0.71-unit increase in consumption. This implies a marginal propensity to consume of 0.71. Accounting for taxes (a 20% income tax rate), the effective multiplier becomes 1.12, meaning that an additional unit of disposable income leads to an increase in consumption by 0.89 units.

Investments and Interest Rate: A one-unit increase in the interest rate results in a decrease of investments by 3,395,263.53 units or in percent terms 1% interest increase leads to 0.50% investment decrease.

Net Exports and Exchange Rate: An increase in the exchange rate by one unit leads to a reduction of net exports by 262,346,386.23 units.

Money Demand and Interest Rate, Income: An increase in the interest rate by one unit leads to a decrease in money demand (in Armenian Drams) by 4,997,858.74 units or 1% interest increase leads to 0.46% decrease in money demand, while an increase in income raises money demand by 0.35 units.

Trend and Dummy Variables: The components representing shocks, such as financial crises (e.g., 2008 crisis), COVID-19, and other geopolitical events, significantly contribute to explaining the equation dynamics.

Equilibrium Solution: The equilibrium vector of values exists, aligns with theory and statistics.

Net Exports and its Effects: An increase in net exports leads to higher income and interest rates in the country, and vice versa.

These conclusions highlight the intricate interplay of various economic factors within the Armenian economy and provide valuable insights for policymakers and researchers. The analysis underscores the importance of trade policy adjustments, investment decisions, and other economic measures in influencing macroeconomic outcomes.

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