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Supplementary file 3. Details of Econometric Models

All characteristics of the final models that have been specified and included in the final macro-structural econometric model.

Table S3: ARDL model for GDP (Gross Domestic Product)

Dependent Variable	Gross Domestic Product(GDP)			
Type of regression equation	ARDL(1, 0, 1)			
dynamic equation	LOG(GDP) = -1.357864 + 0.486*LOG(GDP(-1)) + 0.293*LOG(L) + 2.639*LOG(K)			
	(0.416) ¹	(0.057)	(0.040)	(0.319)
	+ 2.40*LOG(K(-1)) + 0.164*D4753 – 0.147*D5960			
	(0.288)	(0.023)	(0.031)	
R- squared	0.994			

¹ These numbers indicate the standard deviation of the estimated coefficients.

Banerjee, Dolado, and Master test	Banerjee St= $(0.86-1)/(0.057) = -9.01$
	Critical St = -3.91 Result: The existence of a long-run relationship is confirmed
long run equation	$GDP = -2.645 + 0.572*LOG(L) + 0.462*LOG(K) + 0.320*D4753 - 0.288*D5960$ (0.847) (0.078) (0.034) (0.038) (0.068)
Short run equation	$DLOG(GDP) = 0.293*DLOG(L) + 2.639*DLOG(K) + 0.164*D(D4753) - 0.147*D(D5960)$ (0.040) (0.319) (0.023) (0.031) $- 0.513*CointEQ$ (0.057)

Table S4: ARDL model for Total labour force

Dependent Variable	Total labour force
Type of regression equation	ARDL(1, 1, 0)
dynamic equation	$LOG(L) = 0.177 + 0.449*LOG(L(-1)) + 0.044*LOG(W/CPI) - 0.035*LOG(W(-1)/CPI(-1)) +$ (0.104) (0.066) (0.013) (0.012) $+ 0.536*LOG(F)$ (0.065)
R- squared	0.999
Banerjee, Dolado, and Master test	Banerjee St= $((0.449)-1)/(0.066) = -8.34$
	Critical St = -3.91 Result: The existence of a long-run relationship is confirmed
long run equation	$LOG(L) = 0.323 + 0.015*LOG(W/CPI) + 0.974*LOG(F)$ (0.191) (0.005) (0.011)
Short run equation	$DLOG(L) = 0.044*DLOG(W/CPI) + 0.536*DLOG(F) - 0.716*CointEQ(-1)$ (0.013) (0.065) (0.066)

Table S5: ARDL model for Active population

Dependent Variable	Active population
Type of regression equation	ARDL(1, 0)
dynamic equation	$LOG(F) = 0.875 + 0.733*LOG(F(-1)) + 0.208*LOG(POP2060) - 0.043*D9093 + 0.050*D9495$ (0.279) (0.077) (0.059) (0.007)
R- squared	0.999
Banerjee, Dolado, and Master test	Banerjee St= $((0.083)-1)/(0.021) = -3.46$
	Critical St = -3.28 Result: The existence of a long-run relationship is confirmed
long run equation	$LOG(F) = 3.288 + 0.783*LOG(POP2060) - 0.162*D9093$ (0.267) (0.016) (0.042)
Short run equation	$DLOG(F) = 0.208*DLOG(POP2060) - 0.043*D(D9093) - 0.266*CointEQ$ (0.059) (0.007) (0.077)

Table S6: OLS model for Consumer Price Index

Dependent Variable	Consumer Price Index
Type of regression equation	OLS
dynamic equation	$CPI = 0.274935613587 * P + 0.850610900925 * CPI(-1) + 0.39346369618 * D9192$
R- squared	0.999

Table S7: ARDL model for Total investment

Dependent Variable	Total investment
Type of regression equation	ARDL(1, 0, 0)
dynamic equation	$I = -24600.14 + 0.272 * I(-1) + 0.298 * GDP - 5531.063 * R - 56700.71 * D4753 - 87779.76 * D9194$ (11708.38) (0.083) (0.034) (1511.55) (15476.3) (15476.3)
R- squared	0.973
Banerjee, Dolado, and Master test	Banerjee St = $((0.272) - 1) / (0.083) = -8.77$ Critical St = -3.57 Result: The existence of a long-run relationship is confirmed
long run equation	$I = -33822.2 + 0.409 * GDP - 7604.53 * R - 77956.59 * D4753 - 120686.5 * D9194$ (16202.8) (0.019) (1890.7) (18050.6)
Short run equation	$D(I) = 0.298 * D(GDP) - 5531.06 * D(R) - 56700.7 * D(D4753) - 87779.76 * D(D9194)$ (0.034) (1511.55) (15476.3) (18353.55) $0.727 * CointEQ$ (0.083)

Capital accumulation of all sectors of the economy is specified as a definitional equation in the final model. The variables of this equation include total investment and the negative effect of the destruction of capital caused by the imposed Iraq war and Rudbar earthquake. The coefficients of this definitional equation are extracted from the reports of the Plan and Budget Organization and the Ministry of Economic Affairs and Finance. These coefficients have been used in other studies¹.

Table S8: Specified equation for Capital accumulation of all sectors of the economy

Dependent Variable	Capital accumulation of all sectors of the economy
Type of regression equation	OLS
dynamic equation	$k = 0.955 * k(-1) - 0.378527 * wd - 0.153215 * erd + i$
R- squared	

Table S9: ARDL model for Tax Revenue

Dependent Variable	Tax Revenue
Type of regression equation	ARDL(1, 1)
dynamic equation	$(TAXJ/P) = -85.858 + 0.651 * (TAXJ(-1)/P(-1)) + 0.064 * GDP - 0.043 * D9495$ (3964.57) (0.117) (0.019) (8723.04)

R- squared	0.918
Banerjee, Dolado, and Master test	Banerjee St= ((0.651)-1)/(0.117) = - 3.172 Critical St = - 2.93 ² Result: The existence of a long-run relationship is confirmed
long run equation	D(TAXJ/P) = -246.38 + 0.059*GDP + 99999.77*D9495 (0.125) (0.000) (7649.77) (5770.41)
Short run equation	(TAXJ/P) = 0.064*D(GDP) + 34847.4*D(D9495) – 0.348* *CointEQ(-1) (0.018) (8723.04) (0.117)

Table S10 ARDL model for Government Current Payments

Dependent Variable	Government expenditure
Type of regression equation	ARDL(1, 0, 0)
dynamic equation	(GEJ/P) = 14843.48 + 0.438*(GEJ(-1)/P(-1)) + 0.202*(XORJ/P) + 0.763*(TAXJ/P) - (5118.02) (0.063) (0.029) (0.082) 21683.07*D8992 (7153.19)
R- squared	0.958
Banerjee, Dolado, and Master test	Banerjee St= ((0.438)-1)/(0.063) = - 15.17 Critical St = - 3.57 Result: The existence of a long-run relationship is confirmed
long run equation	(GEJ/P) = 26443.5 + 0.361*(XORJ/P) + 1.360*(TAXJ/P) – 38628.17*D8992 (7887.8) (0.039) (0.104) (13747.7)
Short run equation	D(GEJ/P) = 0.202*D(XORJ/P) + 0.763*(D(TAXJ/P) -21683.07*D(D8992) –0.561*CointEQ(-1) (0.029) (0.082) (7153.19) (0.063)

Table S11: ARDL model for Total government expenditure

Dependent Variable	Total government expenditure
Type of regression equation	ARDL(1, 1, 1)
dynamic equation	(GEPJ/P) = 12032.7 + 0.545*(GEPJ(-1)/P(-1)) + 1.521*(TAXJ/P) -0.883*(TAXJ(-1)/P(-1)) (7675.9) (0.092) (0.215) (0.312) +0.811*(XORJ/P) – 0.315*(GRJ(-1)/P(-1)) + 66385*D85 + 719717.6*D87 (0.058) (0.110) (20266.3) (20449.8)
R- squared	0.975
Banerjee, Dolado, and Master test	Banerjee St= ((0.545)-1)/(0.092) = - 4.94 Critical St = - 3.57 Result: The existence of a long-run relationship is confirmed
long run equation	(GEPJ/P) = 26485.6 + 1.402*(TAXJ/P) + 1.092*(XORJ/P) + 146122.2*D85 + 158300*D87

² $\alpha = 0.10$

	(16198)	(0.217)	(0.084)	(53312)	(52902.13)
	D(GEPJ/P) = 1.521*D(TAXJ/P) + 0.811*D(XORJ/P) + 66385*D(D85) + 71917.6*D(D87)				
	(0.215)	(0.058)	(20266.3)	(20449.83)	
Short run equation	- 0.454*CointEQ(-1)				
	(0.092)				

Table S12: ARDL model for Government Revenue

Dependent Variable	Government Revenue				
Type of regression equation	ARDL(1, 2, 1)				
	(GRJ/P) = -2225.99 + 0.587*(GRJ(-1)/P(-1)) + 1.509*(TAXJ/P) - 1.018*(TAXJ(-1)/P(-1))+				
	(3219.78)	(0.123)	(0.096)	(0.226)	
dynamic equation	1.164*(TAXJ(-2)/P(-2))+0.987*(XORJ/P) - 0.596*(GRJ(-1)/P(-1)) - 10389.64*D7982				
	(0.097)	(0.024)	(0.121)	(4239.89)	
R- squared	0.994				
Banerjee, Dolado, and Master test	Banerjee St= ((0.587)-1)/(0.123) = - 3.35				
	Critical St = - 3.20		³ Result: The existence of a long-run relationship is confirmed		
long run equation	(GRJ/P) = -5395 + 1.587*(TAXJ/P) + 0.948*(XORJ/P) - 25180.73*D7982				
	(7629.7)	(0.100)	(0.036)	(13446.45)	
Short run equation	D(GRJ/P) = 1.509*D(TAXJ/P) - 0.164*(TAXJ(-1)/P(-1))+ 0.987*D(XORJ/P) -				
	(0.096)	(0.097)	(0.024)		
	10389.6*D(D7982) - 0.412*CointEQ(-1)				
	(4239.89)	(0.123)			

Table S13: ARDL model for GDP deflator

Dependent Variable	GDP deflator				
Type of regression equation	ARDL(1, 0, 1)				
	LOG(P) = 0.841 + 0.826*LOG(P(-1)) + 1.016*LOG(M2J) - 0.84*LOG(M2J(-1)) -				
	(0.645)	(0.042)	(0.171)	(0.157)	
dynamic equation	0.436*LOG(GDP) + 0.464*LOG(GDP(-1)) - 0.256*LOG(GDP(-2)) - 0.258*D9495				
	(0.145)	(0.234)	(0.158)	(0.053)	
R- squared	0.999				
Banerjee, Dolado, and Master test	Banerjee St= ((0.826)-1)/(0.042) = -4.14				
	Critical St = -3.57		Result: The existence of a long-run relationship is confirmed		

³ $\alpha = 0.10$

long run equation	$\text{LOG}(P) = 4.842 + 1.006*\text{LOG}(M2J) - 1.31*\text{LOG}(GDP) - 1.486*D9495$
	(3.416) (0.038) (0.279) (0.443)
Short run equation	$\text{DLOG}(P) = 1.016*\text{DLOG}(M2J) - 0.436*\text{DLOG}(GDP) + 0.256*\text{DLOG}(GDP(-1)) -$
	(0.171) (0.145) (0.158)
	$0.258*D(D9495)-0.173*\text{CointEQ}(-1)$
	(0.053) (0.042)

Table S14: ARDL model for Healthcare Consumer Price Index

Dependent Variable	Healthcare Consumer Price Index
Type of regression equation	ARDL(1, 1, 1)
dynamic equation	$\text{LOG}(\text{HCPI}) = 0.077 + 0.89*\text{LOG}(\text{HCPI}(-1)) + 0.73*\text{LOG}(M2J) - 0.626*\text{LOG}(M2J(-1))$
	(0.66) (0.03) (0.181) (0.176)
	$-0.395*\text{LOG}(GDP) + 0.293*\text{LOG}(GDP(-1))$
	(0.145) (0.155)
R- squared	0.999
Banerjee, Dolado, and Master test	Banerjee St= ((0.896)-1)/(0.03) = - 3.66
	Critical St = -3.57 Result: The existence of a long-run relationship is confirmed
long run equation	$\text{LOG}(\text{HCPI}) = 0.756 + 1.01*\text{LOG}(M2J) - 0.987*\text{LOG}(GDP)$
	(0.137) (0.036) (0.074)
Short run equation	$\text{DLOG}(\text{HCPI}) = 0.730*\text{DLOG}(M2J) - 0.395*\text{DLOG}(GDP) - 0.103*\text{CointEQ}(-1)$
	(0.181) (0.145) (0.038)

Table S15: ARDL model for Liquidity

Dependent Variable	Liquidity
Type of regression equation	ARDL(1, 0, 1)
dynamic equation	$\text{LOG}(M2J) = -0.075 + 0.903*\text{LOG}(M2J(-1)) + 0.03*\text{LOG}(XOG) + 0.26*\text{LOG}(GEJ(-1))$
	(0.047) (0.021) (0.045) (0.051)
	$-0.156*\text{LOG}(GEJ(-1)) + 0.1*D58 - 0.069*D8790$
	(0.048) (0.025)
R- squared	0.999
Banerjee, Dolado, and Master test	Banerjee St= ((0.903)-1)/(0.021) = - 4.61
	Critical St = -3.57 Result: The existence of a long-run relationship is confirmed
long run equation	$\text{LOG}(M2J) = -0.786 + 0.319*\text{LOG}(XOG) + 1.081*\text{LOG}(GEJ) + 1.049*D85 - 0.720*D8790$
	(0.535) (0.112) (0.041) (0.571) (0.306)
Short run equation	$\text{DLOG}(M2J) = 0.03*\text{DLOG}(XOG) + 0.260*\text{DLOG}(GEJ) + 0.109*D(D85) - 0.069*D(D8790) -$
	(0.007) (0.045) (0.048) (0.025)

Banerjee, Dolado, and Master test	Banerjee St= ((0.418)-1)/(0.117) = -4.97
	Critical: -3.57 Result: The existence of a long-run relationship is confirmed
long run equation	ICOV= -2341142 + 5.222*POPT – 43.22*GDP + 13271372*D7677 (20785053) (0.483) (8.252) (4554389.5)
Short run equation	D(ICOV)= 3.04*D(POPT) + 1.946*D(GDP) + 25.59*D(GDP(-1)) +7716325*D7677 (0.657) (8.425) (9.810) (1908139.8) - 0.581*CointEQ(-1) (0.117)

Table S18: ARDL model for Prepaid Private Health Expenditure

Dependent Variable	Prepaid Private Health Expenditure
Type of regression equation	ARDL(1, 0, 1, 1)
dynamic equation	(PPHEXJ/HCP) = 0.383*(PPHEXJ(-1)/HCPI(-1)) + 7.845*GDP -0.047*(PIRJ/P) + (0.096) (1.376) (0.142) 0.384*(PIRJ(-1)/P(-1) – 3.315*POPT + 3.08*POPT(-1) + 3143117*D9192 (0.226) (2.220) (2.173) (456773.3)
R- squared	0.990
Banerjee, Dolado, and Master test	Banerjee St= ((0.383)-1)/(0.096) = -6.42 Critical: -3.91 Result: The existence of a long-run relationship is confirmed
long run equation	(PPHEXJ/HCPI)= 13.736*GDP + 0.547*(PIRJ/P) – 0.38*POPT + 5102305*D9192 (1.45) (0.200) (0.116) (1023789.8)
Short run equation	D(PPHEXJ/HCPI)= 7.845*D(GDP) -0.047*D(PIRJ/P) -3.315*D(POPT) + 3143116*D(D9192) (1.37) (0.142) (2.220) (456773.3) - 0.616*CointEQ(-1) (0.096)

Table S19: ARDL model for Commercial Health Insuran Revenue

Dependent Variable	Commercial Health Insuran Revenue
Type of regression equation	ARDL(1, 2)
dynamic equation	LOG(PIRJ/P) = -6.472 + 0.769*LOG(PIRJ(-1)/P(-1)) – 0.371*LOG(GDP) (4.836) (0.061) (1.441) – 2.323*LOG(GDP(-1)) + 3.4*LOG(GDP(-2)) (2.281) (1.413)
R- squared	0.0.977
Banerjee, Dolado, and Master test	Banerjee St= ((0.769)-1)/(0.061) = -3.786 Critical: -3.35 Result: The existence of a long-run relationship is confirmed

long run equation	LOG(PIRJ/P)= -28.131 + 3.068*LOG(GDP)		
	(15.31)	(1.056)	
Short run equation	DLOG(PIRJ/P) = -0.371*DLOG(GDP) -3.4*DLOG(GDP(-1)) -0.23* CointEQ(-1)		
	(1.441)	(1.413)	(0.061)

Private health expenditures equation was specified as a identity or definitional equation This equation is calculated as the sum of out-of-pocket health expenditure and prepaid private health expenditure.

$$phexj / hcpi = ohexj / hcpi + pphexj / hcpi$$

Table S20: ARDL model for Government Health Expenditure

Dependent Variable	Government Health Expenditure			
Type of regression equation	ARDL(1, 0, 1, 2)			
dynamic equation	$(GHEXJ/H CPI) = 30839592 + 0.145*(GHEXJ(-1)/HCPI(-1)) + 19.26*(GRJ/P)$ (15951117) (0.129) (6.255) $+ (2.65E+08)*POP15R - (3.26E+08)*POP15R(-1) + (2.63E+08)*URR - (1.83E+0.9)*URR(-1)$ (1.55E+08) (1.62E+08) (5.96E+08) (1.09E+09) $+ (1.60E+09)*URR(-2) - 6426336*D9192 + 6647172*D85$ (6.25E+08) (2346855) (2812242)			
R- squared	0.952			
Banerjee, Dolado, and Master test	Banerjee St= ((0.145)-1)/(0.129) = -6.62 Critical: -3.82 Result: The existence of a long-run relationship is confirmed			
long run equation	$(GHEXJ/H CPI) = 36080275 + 22.535*(GRJ/P) - 7163566*POP15R + 33776597*URR$ (18197722) (7.366) (22417105) (17356460) $-7518386*D9192 + 7776750*D85$ (2779547.2) (3548219.8)			
Short run equation	$D(GHEXJ/H CPI) = 19262*D(GRJ/P) + 26479364*D(POP15R) + 26286092*D(URR)$ (6.256) (154647486) (595739510) $-1596993*D(URR(-1)) - 6426336*D(D9192) + 6647172*D(D85) - 0.854**CointEQ(-1)$ (624944238) (234685.9) (2812241.6) (0.129)			

Table S21: ARDL model for Social Security Organization Health Expenditure

Dependent Variable	Social Security Organization Health Expenditure			
Type of regression equation	ARDL(1, 2, 2, 0)			
dynamic equation	$(SHIJ/H CPI) = -2265926 + 0.371*(SHIJ(-1)/HCPI(-1)) + 0.048*(SIRJ/P) - 0.027*(SIRJ(-1)/P(-1))$ (1419754) (0.101) (0.015) (0.026)			

	$+0.036*(SIRJ(-2)/P(-2)) - 0.046*SICOV - 0.305*SICOV(-1) + 0.404*SICOV(-2) +$ (0.019) (0.154) (0.290) (0.176)
	$6965552*POP60R + 1211763*D5456 + 1613306*D8687$ (30579493) (339164.7) (448541.4)
R- squared	0.988
Banerjee, Dolado, and Master test	Banerjee St= ((0.371)-1)/(0.101) = -6.227 Critical: -3.82 Result: The existence of a long-run relationship is confirmed
long run equation	$(SHIJ/HCPI) = -3607112 + 0.091*(SIRJ/P) + 0.083*SICOV + 11088415*POP60R +$ (2413274) (0.011) (0.031) (52254709) $1928997*D5456 + 2568211*D8687$ (556008.5) (718771.7)
Short run equation	$D(SHIJ/HCPI) = 0.048*D(SIRJ/P) - 0.036*D(SIRJ(-1)/P(-1) - 0.046*D(SICOV) -$ (0.015) (0.019) (0.154) $0.404*D(SICOV(-1)) + 69655522*D(POP60R) + 1211763*D(D5456) + 1613306*D(D8687)$ (0.176) (30579493) (339164.68) (448541.36) $- 0.628*CointEQ(-1)$ (0.101)

Table S22: ARDL model for Social Security Organization Insurance Coverage

Dependent Variable	Social Security Organization Insurance Coverage
Type of regression equation	ARDL(1, 2, 0, 0)
dynamic equation	$LOG(SICOV) = -6.451 + 0.735*LOG(SICOV(-1)) + 6.841*LOG(POPT) - 15.479*LOG(POPT(-1))$ (1.423) (0.046) (5.97) (12.01) $+ 9.779*LOG(POPT(-2)) + 0.187*LOG(GDP) - 0.729*LOG(L) - 0.185*D65$ (6.187) (0.033) (0.108) (0.026)
R- squared	0.998
	Banerjee St= ((0.735)-1)/(0.046) = - 5.76 Critical: -3.57 Result: The existence of a long-run relationship is confirmed
long run equation	$LOG(SICOV) = -24.349 + 4.309*LOG(POPT) + 0.708*LOG(GDP) - 2.752*LOG(L)$ (1.829) (0.406) (0.134) (0.505) $- 0.698*D65$ (3161606.6)
Short run equation	$DLOG(SICOV) = 6.841*DLOG(POPT) - 9.779*DLOG(POPT(-1)) + 0.187*DLOG(GDP)$ (5.978) (6.187) (0.033) $- 0.729*DLOG(L) - 0.185*D(D65) - 0.264*CointEQ(-1)$

(0.108) (0.026) (0.046)

Table S23: ARDL model for Social Security Organization Revenue

Dependent Variable	Social Security Organization Revenue			
Type of regression equation	ARDL(1, 0, 0, 0)			
dynamic equation	LOG(SIRJ/P) = -9.264 + 0.522*LOG(SIRJ(-1)/P(-1)) + 0.887*LOG(GDP)			
	(1.922)	(0.083)	(0.203)	
	+ 0.39*LOG(L) -0.124*LOG(XORJ/P) + 0.558*D5960 + 0.284*D9395			
	(0.183)	(0.054)	(0.112)	(0.112)
R- squared	0.976			
Banerjee, Dolado, and Master test	Banerjee St= ((0.522)-1)/(0.083) = - 5.75			
	Critical: -3.82		Result: The existence of a long-run relationship is confirmed	
	LOG(SIRJ/P) = -19.40 + 1.858*LOG(GDP) + 0.817*LOG(L) - 0.26*LOG(XORJ/P)			
long run equation	(2.267)	(0.383)	(0.325)	(0.109)
	+1.17*D5960 + 0.596*D9395			
	(0.263)	(0.23)		
Short run equation	DLOG(SIRJ/P) = 0.887*DLOG(GDP) + 0.39*DLOG(L) - 0.124*DLOG(XORJ/P)			
	(0.203)	(0.183)	(0.054)	
	+ 0.558*D(D5960) + 0.284*D(D9395) - 0.477*CointEQ(-1)			
	(0.112)	(0.112)	(0.083)	

Public health expenditures equation was specified as a identity or definitional equation This equation is calculated as the sum of government health expenditure and Social Security Organization health expenditure.

$$\text{pubhexj} / \text{hcpi} = \text{ghexj} / \text{hcpi} + \text{shij} / \text{hcpi}$$

Finally, total health expenditures have been calculated using the following equation as the sum of public health expenditures and private health expenditures.

$$\text{thexj} / \text{hcpi} = \text{pubhexj} / \text{hcpi} + \text{phexj} / \text{hcpi}$$