An Equilibrium Model with Applications for some of the North and Central American Countries

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Abstract: The model presented in this article is an adaptation of the IS-LM model for an open economy in which we took into account the temporal variable to more accurately determine the equilibrium levels of the macroeconomic indicators. We analyzed the periods during which the values of the indicators exceeded the level of equilibrium and we identified the possible causes that led to these situations.

Keywords: equilibrium; GDP; investments; interest rate; consumption

JEL Classification: E17; E27

1. The Model Equations ([1])

The first equation of the model is the formula of the aggregate demand:

(1) $D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)$

where

- D(t) – the aggregate demand at the moment t;
- C(t) – the actual final consumption of households at the moment t;
- G(t) – the actual final consumption of the government at the moment t;
- I(t) – the investment at the moment t;
- EX(t) – the exports at the moment t;
- IM(t) – the imports at the moment t

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A second equation relates the actual final consumption of households according to disposable income:

(2)$C(t)=c_V DI(t)+C_0$, $C_0 \in R$, $c_V>0$

where

- $DI(t)$ – the disposable income at the moment t;
- c_V – the marginal propensity to consume, $c_V=\frac{dC}{dDI}>0$;
- C_0 – the intrinsic achieved autonomous consumption of households

(3) $G(t)=i_G TI(t)+G_0$, $i_G \in (0,1)$

where

- $TI(t)$ – the total income at the moment t;
- i_G – the marginal index of final consumption of the government according to total income
- G_0 - the intrinsic achieved autonomous consumption of government

(4) $TI(t)=TR(t)+OR(t)$

where:

- $TR(t)$ – tax rate at the moment t;
- $OR(t)$ – other revenues at the moment t

(5) $OR(t)=i_{OR}Y(t)+OR_0$, $i_{OR} \in (0,1)$, $OR_0 \in R$

where:

- $Y(t)$ – the output at the moment t;
- i_{OR} – the marginal index of other revenues according to the output;
- OR_0 – the autonomous other revenues

(6) $I(t)=i_Y Y(t)+i_r r(t)+I_0$, $i_Y \in (0,1)$, $i_r<0$

where:

- $I(t)$ – investments at the moment t;
- $r(t)$ – the real interest rate at the moment t;
- i_Y – the rate of investments;
- i_r – a factor of influence on the investment rate

- I_0 - the autonomous investments

(7) $DI(t)=Y(t)+TF(t)-TR(t)$

(8) $TF(t)=c_{TF}Y(t)+TF_0$, $c_{TF}\in(0,1)$, $TF_0\in R$

where:

- $TF(t)$ – the government transfers at the moment t;
- c_{TF} – the marginal index of government transfers according to the output;
- TF_0 – the autonomous government transfers

(9) $TR(t)=t_YY(t)+TR_0$, $t_Y\in(0,1)$, $TR_0\in R$

where:

- t_Y – the marginal index of tax rate according to the output;
- TR_0 – the intercept of the regression

(10) $IM(t)=im_YY(t)+IM_0$, $im_Y>0$, $IM_0\in\mathbf{R}$

where:

- $CH(t)$ – the exchange rate of the national currency based on the euro at the moment t;
- im_Y – the rate of imports;
- IM_0 – the autonomous imports

(11) $EX(t)=ex_YY(t)+EX_0$, $ex_Y>0$, $EX_0\in\mathbf{R}$

where:

- ex_Y – the rate of exports;
- EX_0 – the autonomous exports

(12) $D(t)=Y(t)$ – the equation of equilibrium at the moment t

(13) $MD(t)=md_YY(t)+md_rr(t)+MD_0$, $md_Y\in(0,1)$, $md_r<0$

where:

- $MD(t)$ – the money demand in the economy at the moment t;
- md_Y – the rate of money demand in the economy;
- md_r – a factor of influencing the demand for currency from the interest rate
- MD_0 - the autonomous money demand

(14) $MS(t)=m_S t+MS_0$, $m_M, M_0 \in R$

where:

- $MS(t)$ – the money supply in the economy at the moment t;
- m_S – the marginal index of the money supply according to time;
- MS_0 – the intercept of the regression

(15) $MD(t)=MS(t)$ – the equation of equilibrium at the moment t

2 The equilibrium at a fixed moment ([1])

From (4), (5), (11) we get:

(16) $TI(t)=(t_Y+i_{OR})Y(t)+TR_0+OR_0$

From (3), (16):

(17) $G(t)=(i_G t_Y+i_G i_{OR})Y(t)+i_G(TR_0+OR_0)+G_0$

From (7), (8), (9) we get:

(18) $DI(t)=(1+c_{TF}-t_Y)Y(t)+TF_0-TR_0$

From (2), (18):

(19) $C(t)=(c_V+c_V c_{TF}-c_V t_Y)Y(t)+c_V(TF_0-TR_0)+C_0$

Now, from (1), (6), (10), (11), (17), (19) we have:

(20) $D(t)=(c_V+c_V c_{TF}-c_V t_Y+i_G t_Y+i_G i_{OR}+i_Y+ex_Y-im_Y)Y(t)+i_r r(t)+c_V(TF_0-TR_0)+i_G(TR_0+OR_0)+C_0+G_0+ I_0+EX_0-IM_0$

From (12) and (20) we get the first equation of the equilibrium:

(21) $(c_V+c_V c_{TF}-c_V t_Y+i_G t_Y+i_G i_{OR}+i_Y+ex_Y-im_Y-1)Y(t)+i_r r(t)+c_V(TF_0-TR_0)+i_G(TR_0+OR_0)+C_0+G_0+ I_0+EX_0-IM_0=0$

and from (13), (14), (15) we get the second equation of the equilibrium

(22) $md_Y Y(t)+md_r r(t)-m_S t+MD_0-MS_0=0$

Let note now:

(23) $\alpha=c_V+c_V c_{TF}-c_V t_Y+i_G t_Y+i_G i_{OR}+i_Y+ex_Y-im_Y-1$

(24) $\beta=c_V(TF_0-TR_0)+i_G(TR_0+OR_0)+C_0+G_0+I_0+EX_0-IM_0$

(25) $\gamma=MD_0-MS_0$

The equilibrium equations become:

(26) $\begin{cases} \alpha Y(t) + i_r r(t) = -\beta \\ md_Y Y(t) + md_r r(t) = m_S t - \gamma \end{cases}$

The solutions of equilibrium are:

(27) $\begin{cases} Y^*(t) = -\dfrac{m_S i_r}{\alpha md_r - md_Y i_r} t + \dfrac{i_r \gamma - \beta md_r}{\alpha md_r - md_Y i_r} \\ r^*(t) = \dfrac{m_S \alpha}{\alpha md_r - md_Y i_r} t + \dfrac{\beta md_Y - \alpha\gamma}{\alpha md_r - md_Y i_r} \end{cases}$

At equilibrium, replacing (27) in (1)-(16), we have:

(28) $TI^*(t)=(t_Y+i_{OR})Y^*(t)+TR_0+OR_0= -\dfrac{m_S i_r (t_Y + i_{OR})}{\alpha md_r - md_Y i_r} t + \dfrac{(i_r\gamma - \beta md_r)(t_Y + i_{OR})}{\alpha md_r - md_Y i_r} + TR_0 + OR_0$

(29) $G^*(t)= -\dfrac{m_S i_r i_G (t_Y + i_{OR})}{\alpha md_r - md_Y i_r} t + \dfrac{i_G (i_r\gamma - \beta md_r)(t_Y + i_{OR})}{\alpha md_r - md_Y i_r} + i_G (TR_0 + OR_0) + G_0$

(30) $DI^*(t)= -\dfrac{m_S i_r (1 + c_{TF} - t_Y)}{\alpha md_r - md_Y i_r} t + \dfrac{(i_r\gamma - \beta md_r)(1 + c_{TF} - t_Y)}{\alpha md_r - md_Y i_r} + TF_0 - TR_0$

(31) $C^*(t)= -\dfrac{m_S i_r c_V (1 + c_{TF} - t_Y)}{\alpha md_r - md_Y i_r} t + \dfrac{c_V (i_r\gamma - \beta md_r)(1 + c_{TF} - t_Y)}{\alpha md_r - md_Y i_r} + c_V (TF_0 - TR_0) + C_0$

(32) $OR^*(t)= -\dfrac{m_S i_r i_{OR}}{\alpha md_r - md_Y i_r} t + \dfrac{i_{OR} (i_r\gamma - \beta md_r)}{\alpha md_r - md_Y i_r} + OR_0$

(33) $TR^*(t)= -\dfrac{m_S i_r t_Y}{\alpha md_r - md_Y i_r} t + \dfrac{t_Y (i_r\gamma - \beta md_r)}{\alpha md_r - md_Y i_r} + TR_0$

(34) $TF^*(t)= -\dfrac{m_S i_r c_{TF}}{\alpha md_r - md_Y i_r} t + \dfrac{c_{TF} (i_r\gamma - \beta md_r)}{\alpha md_r - md_Y i_r} + TF_0$

(35) $I^*(t)= \dfrac{m_S i_r (\alpha - i_Y)}{\alpha md_r - md_Y i_r} t + \dfrac{i_r (\beta md_Y - \alpha\gamma) + i_Y (i_r\gamma - \beta md_r)}{\alpha md_r - md_Y i_r} + I_0$

(36) $IM^*(t)= -\dfrac{m_S i_r im_Y}{\alpha md_r - md_Y i_r} t + \dfrac{im_Y (i_r\gamma - \beta md_r)}{\alpha md_r - md_Y i_r} + IM_0$

(37) $EX^*(t)= -\dfrac{m_S i_r ex_Y}{\alpha md_r - md_Y i_r} t + \dfrac{ex_Y (i_r\gamma - \beta md_r)}{\alpha md_r - md_Y i_r} + EX_0$

(38) $MD^*(t)= \dfrac{m_S (md_r\alpha - i_r md_Y)}{\alpha md_r - md_Y i_r} t + \dfrac{(md_Y i_r - \alpha md_r)\gamma}{\alpha md_r - md_Y i_r} + MD_0$

(39) $MS^*(t)=m_S t+MS_0$

3 Analysis of the countries

3.1. Bahamas, The

After the analysis during 2000-2016 the model equations are:

(40) D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)
(41) C(t)=0.4837DI(t)+1969145434
(42) G(t)=0.3320TI(t)+687595731
(43) TI(t)=TR(t)+OR(t)
(44) OR(t)=0.0393Y(t)-182343167
(45) I(t)=0.7957Y(t)-2528119r(t)-4252081001
(46) DI(t)=Y(t)+TF(t)-TR(t)
(47) TF(t)=0.1884Y(t)-710500374
(48) TR(t)=0.2100Y(t)-615076869
(49) IM(t)=1.2311Y(t)-5439646466
(50) EX(t)=0.7092Y(t)-2212090226
(51) D(t)=Y(t)
(52) MD(t)=2.0493Y(t)-6340283r(t)-10935674607
(53) MS(t)=122840884t-241403614836
(54) MD(t)=MS(t)

Solving the equations (1)-(15) we find that at equilibrium ("t" being the year):

(55) Y(t)=49611699.47t-91740703939.98
(56) r(t)=-3.3390t+6697.0841
(57) TI(t)=12366301.98t-23664873902.31
(58) G(t)=4105984.91t-7169855527.85
(59) DI(t)=48543026.88t-89859965032.39
(60) C(t)=23480626.15t-41496793554.81
(61) OR(t)=1949834.17t-3787927353.06
(62) TR(t)=10416467.81t-19876946549.25
(63) TF(t)=9347795.22t-17996207641.67
(64) I(t)=47918630.59t-94183296516.34
(65) IM(t)=61076070.73t-118379976727.38
(66) EX(t)=35182528.55t-67270735068.35
(67) MD(t)=MS(t)=122840883.82t-241403614835.84

From the relationships (16)-(28) we can draw the following conclusions:

The analysis of "Actual final consumption of households" emphasizes that in 2000, 2001, 2002, 2003, 2005, 2006, 2007, 2008, 2014 is above the equilibrium value and in 2004, 2009, 2010, 2011, 2012, 2013, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Actual final consumption of households" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of households" was registered in 2007 (110.13%) and the minimum in 2013 (92.16%). The excess of equilibrium

values is due, in the corresponding periods, to the large share of GDP, between 73.02-75.40%.

The analysis of "Actual final consumption of the government" emphasizes that in 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of the government" was registered in 2011 (112.08%) and the minimum in 2001 (89.32%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 12.98-15.31%.

The analysis of "Other revenues" emphasizes that in 2001, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2014 is above the equilibrium value and in 2000, 2002, 2003, 2004, 2012, 2013, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2009, 2010, 2011 is above the equilibrium value and in 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Other revenues" was registered in 2009 (148.92%) and the minimum in 2003 (72.48%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 1.53-2.47%.

The analysis of "Investment" emphasizes that in 2000, 2001, 2005, 2006, 2007, 2008, 2012, 2014 is above the equilibrium value and in 2002, 2003, 2004, 2009, 2010, 2011, 2013, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Investment" emphasizes that in 2008, 2012 is above the equilibrium value and in 2009, 2010, 2011 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Investment" was registered in 2006 (128.31%) and the minimum in 2016 (79.44%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 23.46-30.37%.

The analysis of "Government transfers" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011 is above the equilibrium value and in 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Government transfers" emphasizes that in 2008, 2009, 2010, 2011 is above the equilibrium value and in 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Government transfers" was registered in 2008 (150.56%) and the minimum in 2016 (-37.52%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 9.29-14.34%.

The analysis of "Tax revenue" emphasizes that in 2000, 2005, 2006, 2007, 2008, 2009, 2010, 2011 is above the equilibrium value and in 2001, 2002, 2003, 2004,

2012, 2013, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Tax revenue" emphasizes that in 2008, 2009, 2010, 2011 is above the equilibrium value and in 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Tax revenue" was registered in 2011 (122.19%) and the minimum in 2014 (83.98%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 12.77-16.44%.

The analysis of "Broad money" emphasizes that in 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Broad money" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Broad money" was registered in 2011 (112.67%) and the minimum in 2016 (76.34%).

The analysis of "Exports" emphasizes that in 2004, 2005, 2006, 2007, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2008, 2009, 2010, 2011 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Exports" emphasizes that in 2012 is above the equilibrium value and in 2008, 2009, 2010, 2011 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Exports" was registered in 2013 (109.95%) and the minimum in 2000 (92.68%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 40.47-49.41%.

The analysis of "Imports" emphasizes that in 2000, 2005, 2006, 2007, 2008, 2012, 2014, 2015, 2016 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2009, 2010, 2011, 2013 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Imports" emphasizes that in 2008, 2012 is above the equilibrium value and in 2009, 2010, 2011 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Imports" was registered in 2006 (119.36%) and the minimum in 2010 (88.87%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 53.36-64.50%.

The analysis of "Trade balance" emphasizes that in 2000, 2001, 2005, 2006, 2007, 2008, 2014 is above the equilibrium value and in 2002, 2003, 2004, 2009, 2010, 2011, 2012, 2013, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Trade balance" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Trade balance" was registered in 2006 (181.54%) and the minimum in 2013 (33.48%).

The analysis of "Output" emphasizes that in 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2012, 2013 is above the equilibrium value and in 2000, 2009, 2010, 2011, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Output" emphasizes that in 2008, 2012 is above the equilibrium value and in 2009, 2010, 2011 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Output" was registered in 2007 (106.29%) and the minimum in 2016 (94.50%).

The analysis of "Real interest rate (%)" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Real interest rate (%)" emphasizes that in 2008, 2009, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Real interest rate (%)" was registered in 2012 (97.59%) and the minimum in 2006 (-460.88%).

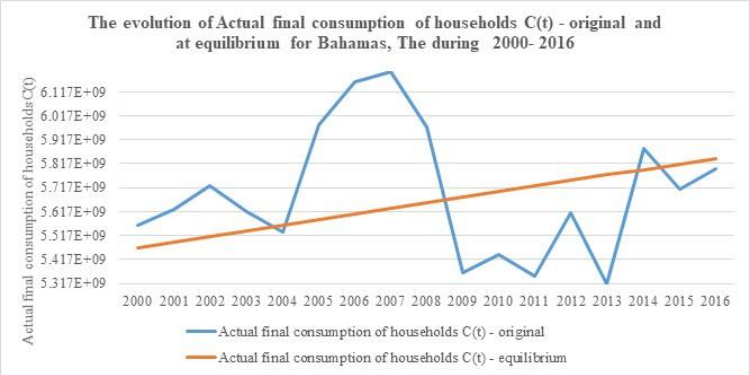


Figure 3.1.1

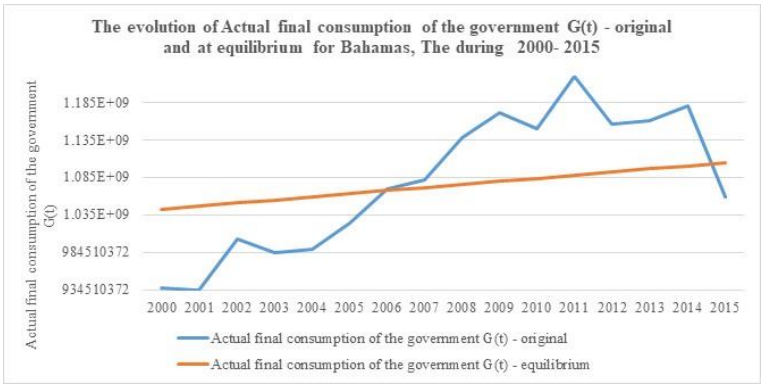


Figure 3.1.2

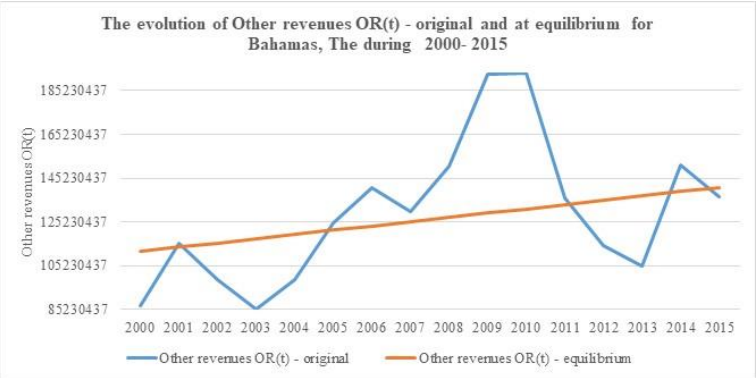


Figure 3.1.3

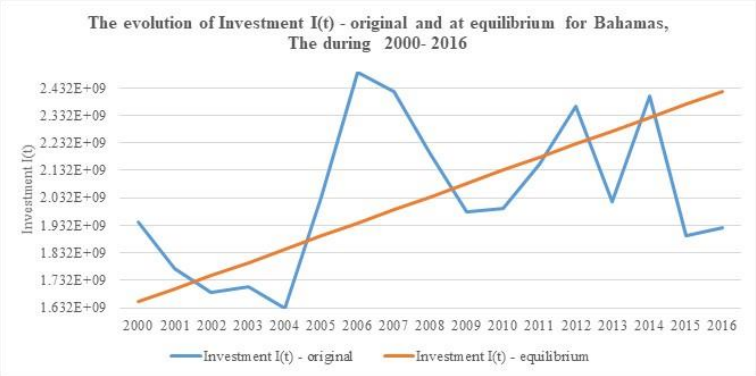
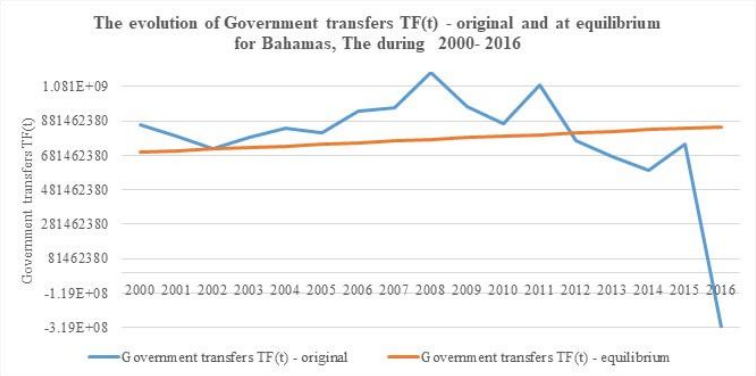


Figure 3.1.4



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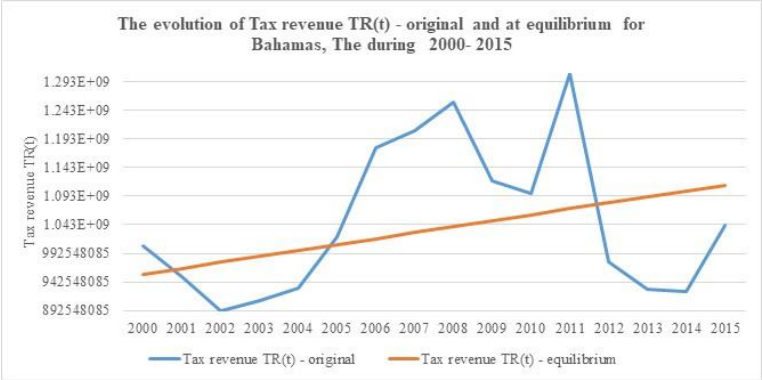

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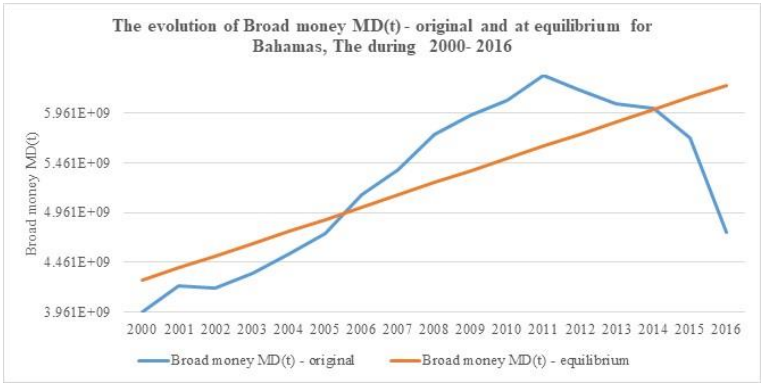

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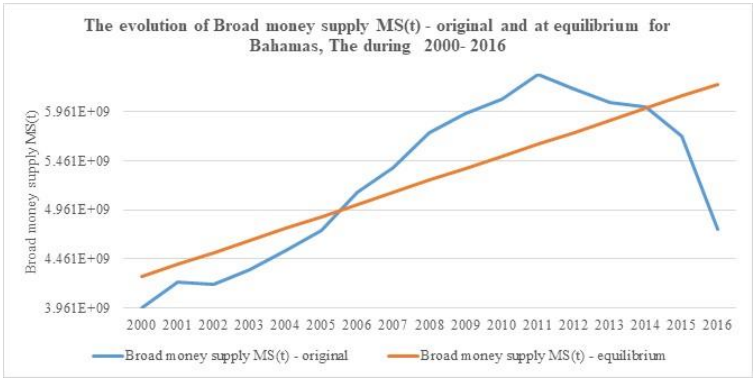

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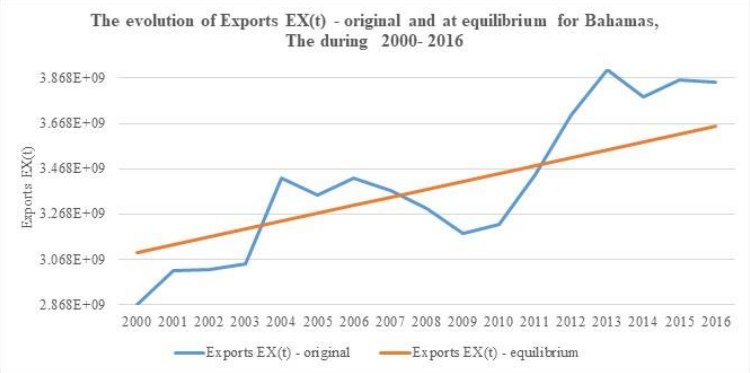

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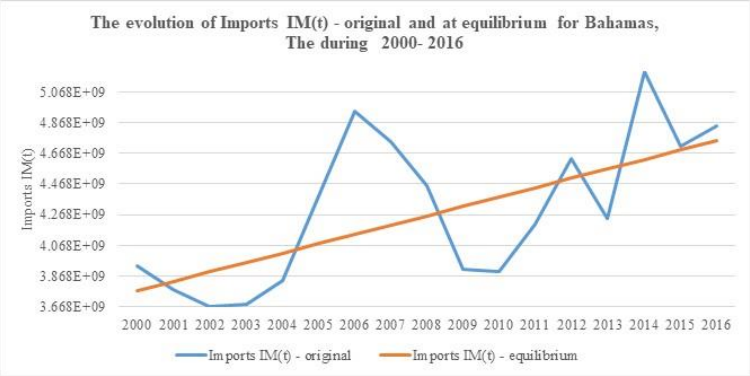


Figure 3.1.10

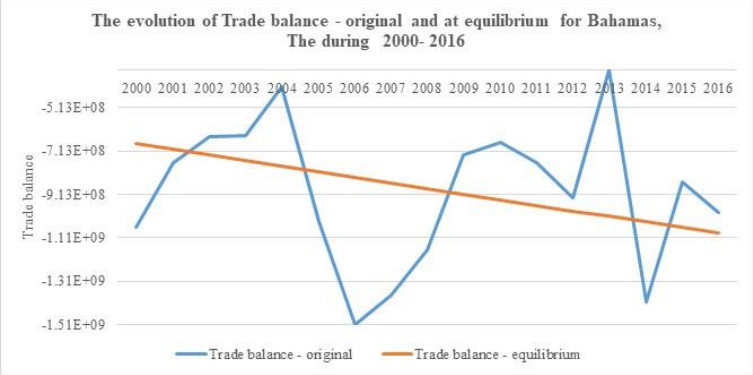


Figure 3.1.11

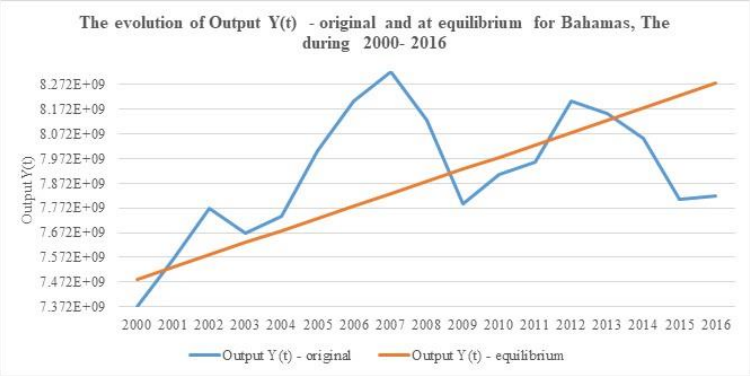


Figure 3.1.12

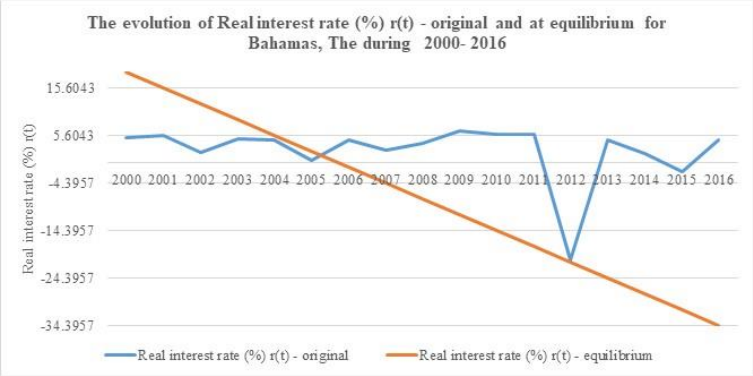


Figure 3.1.13

3.2. Belize

After the analysis during 2000-2016 the model equations are:

(68) D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)
(69) C(t)=0.5980DI(t)+235752617
(70) G(t)=0.4830TI(t)+41144469
(71) TI(t)=TR(t)+OR(t)
(72) OR(t)=0.0573Y(t)-37791730
(73) I(t)=-0.0002Y(t)-660992r(t)+306170665
(74) DI(t)=Y(t)+TF(t)-TR(t)
(75) TF(t)=-0.6576Y(t)+902675720
(76) TR(t)=0.3285Y(t)-144226248
(77) IM(t)=0.5191Y(t)+184440739
(78) EX(t)=0.7767Y(t)-284909840

(79) D(t)=Y(t)
(80) MD(t)=1.4268Y(t)+11606897r(t)-1116041206
(81) MS(t)=53564568t-106657945744
(82) MD(t)=MS(t)

Solving the equations (1)-(15) we find that at equilibrium ("t" being the year):

(83) Y(t)=-6537498.60t+14278233359.09
(84) r(t)=5.4185t-10848.1715
(85) TI(t)=-2521929.07t+5326004884.24
(86) G(t)=-1218177.16t+2613785224.54
(87) DI(t)=-90939.32t+1245518120.44
(88) C(t)=-54379.76t+980545653.63
(89) OR(t)=-374475.12t+780081195.51
(90) TR(t)=-2147453.95t+4545923688.73
(91) TF(t)=4299105.33t-8486791549.92
(92) I(t)=-3580510.29t+7474368213.95
(93) IM(t)=-3393442.52t+7595893837.60
(94) EX(t)=-5077873.92t+10805428104.56
(95) MD(t)=MS(t)=53564567.56t-106657945743.77

From the relationships (16)-(28) we can draw the following conclusions:

The analysis of "Actual final consumption of households" emphasizes that in 2003, 2004, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2000, 2001, 2002, 2005, 2006 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Actual final consumption of households" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of households" was registered in 2015 (133.54%) and the minimum in 2000 (87.67%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 65.69-79.20%.

The analysis of "Actual final consumption of the government" emphasizes that in 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of the government" was registered in 2014 (151.46%) and the minimum in 2000 (75.04%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 14.03-15.93%.

The analysis of "Other revenues" emphasizes that in 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014 is above the equilibrium value and in 2000, 2001, 2002, 2003,

2004, 2005, 2006 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Other revenues" was registered in 2011 (201.54%) and the minimum in 2001 (67.37%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 2.53-3.82%.

The analysis of "Investment" emphasizes that in 2000, 2008, 2013, 2014, 2015 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2009, 2010, 2011, 2012 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Investment" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Investment" was registered in 2015 (156.21%) and the minimum in 2010 (66.50%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 19.66-39.14%.

The analysis of "Government transfers" emphasizes that in 2005, 2006, 2009, 2010, 2011, 2012, 2013, 2014 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2007, 2008, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Government transfers" emphasizes that in 2009, 2010, 2011, 2012 is above the equilibrium value and in 2008 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Government transfers" was registered in 2013 (137.20%) and the minimum in 2016 (-881.32%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 10.93-15.30%.

The analysis of "Tax revenue" emphasizes that in 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Tax revenue" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Tax revenue" was registered in 2014 (164.41%) and the minimum in 2000 (67.43%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 21.30-23.60%.

The analysis of "Broad money" emphasizes that in 2000, 2001, 2008, 2009, 2010, 2011, 2016 is above the equilibrium value and in 2002, 2003, 2004, 2005, 2006, 2007, 2012, 2013, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Broad money" emphasizes that in 2008, 2009, 2010, 2011 is above the equilibrium value and in 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Broad money" was registered in 2009 (108.61%) and the minimum in 2006 (94.14%).

The analysis of "Exports" emphasizes that in 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Exports" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Exports" was registered in 2015 (165.14%) and the minimum in 2000 (71.94%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 50.31-60.25%.

The analysis of "Imports" emphasizes that in 2003, 2007, 2008, 2010, 2011, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2000, 2001, 2002, 2004, 2005, 2006, 2009 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Imports" emphasizes that in 2008, 2010, 2011, 2012 is above the equilibrium value and in 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Imports" was registered in 2015 (154.65%) and the minimum in 2009 (89.16%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 57.42-73.38%.

The analysis of "Trade balance" emphasizes that in 2000, 2001, 2002, 2003, 2015 is above the equilibrium value and in 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Trade balance" emphasizes that in 2008, 2009, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Trade balance" was registered in 2000 (200.60%) and the minimum in 2010 (-5.87%).

The analysis of "Output" emphasizes that in 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2000, 2001, 2002, 2003 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Output" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Output" was registered in 2015 (144.56%) and the minimum in 2000 (78.91%).

The analysis of "Real interest rate (%)" emphasizes that in 2003, 2004 is above the equilibrium value and in 2000, 2001, 2002, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Real interest rate (%)" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Real interest rate (%)" was registered in 2003 (344.70%) and the minimum in 2002 (-3906.33%).

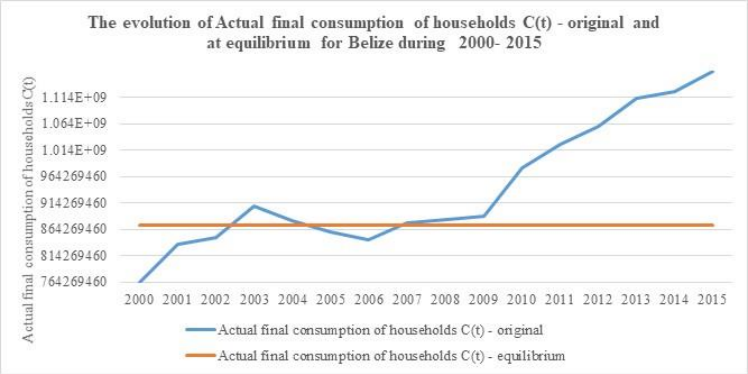


Figure 3.2.1

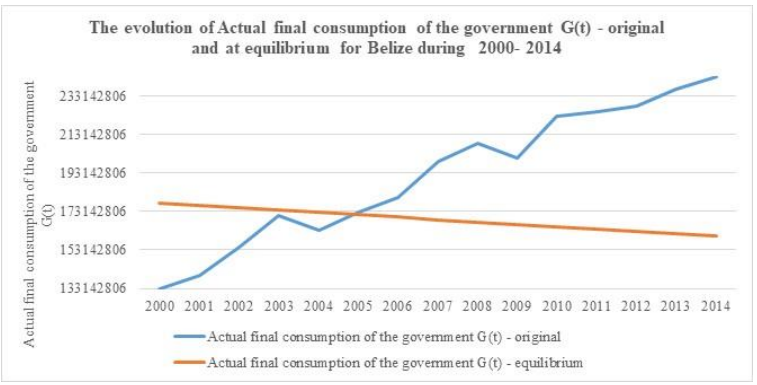
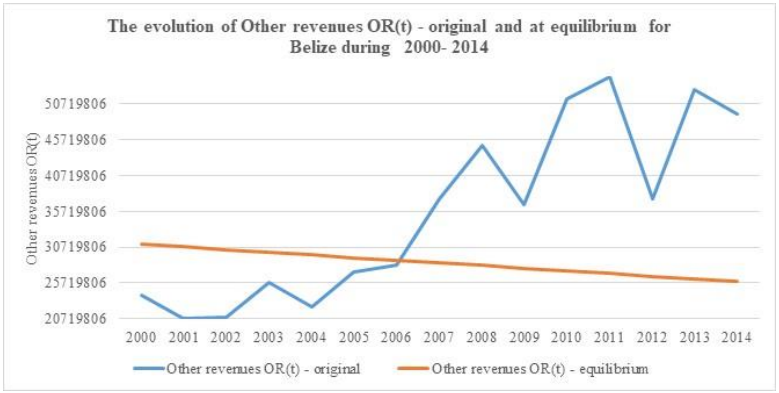


Figure 3.2.2



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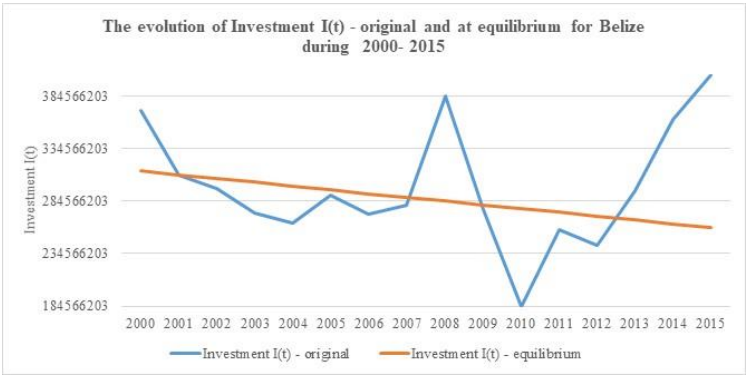
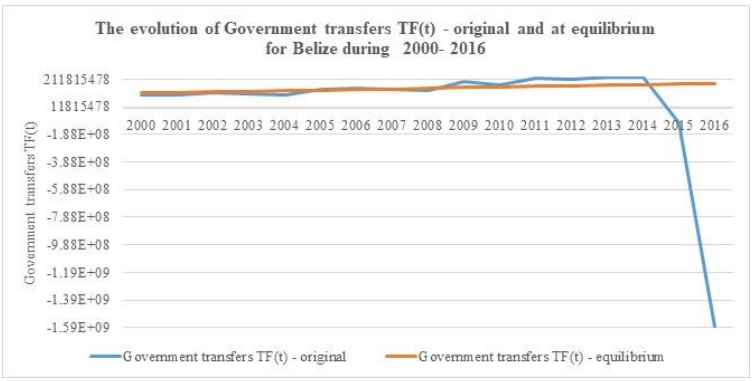


Figure 3.2.4



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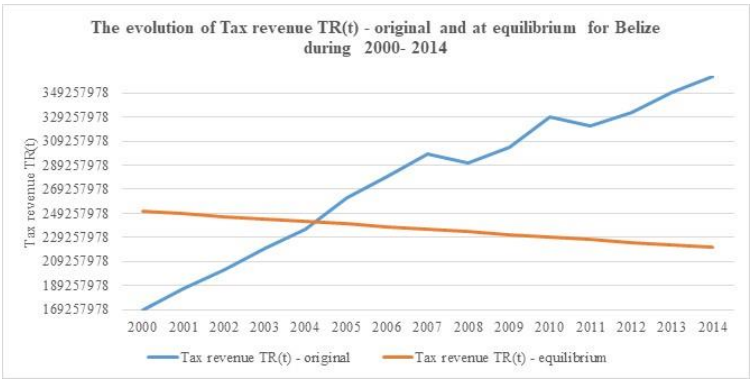

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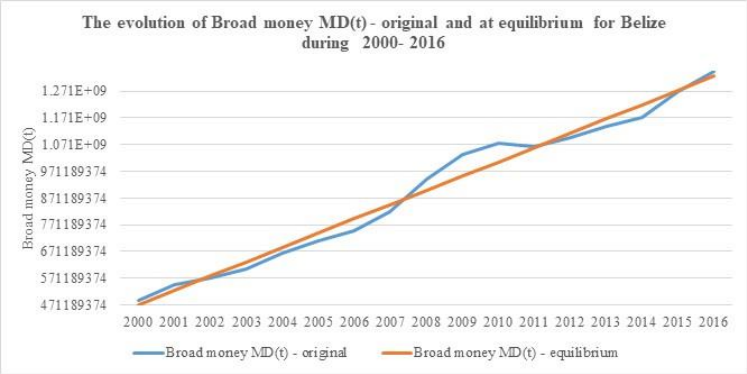
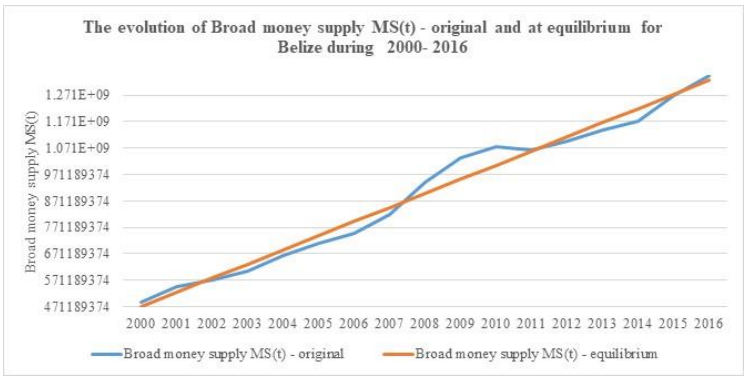


Figure 3.2.7



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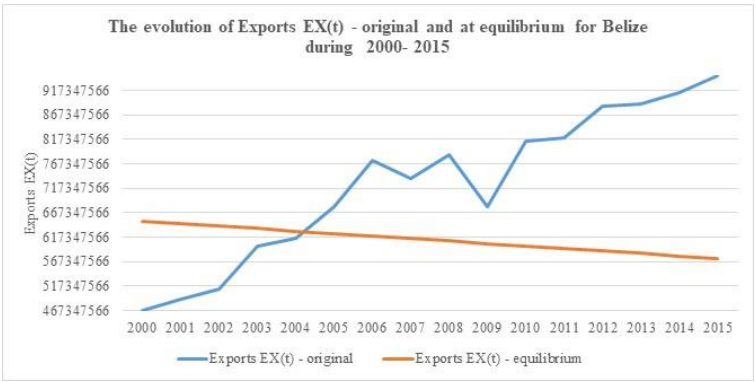

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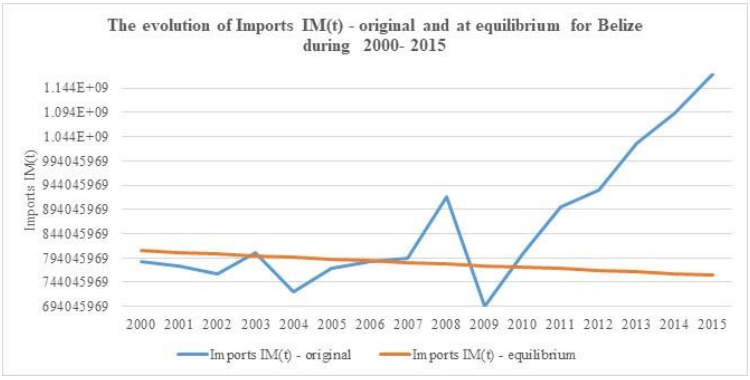
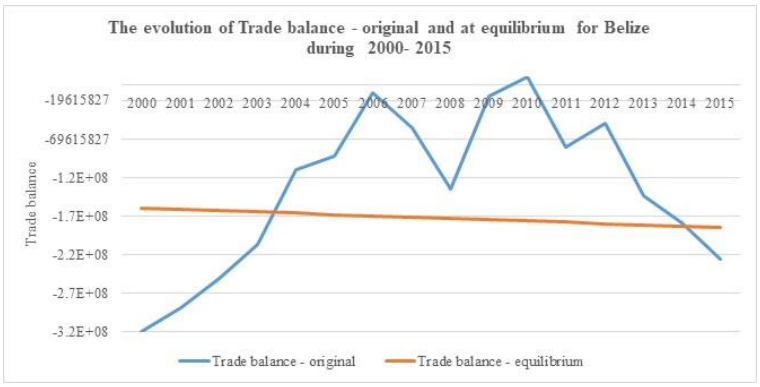


Figure 3.2.10



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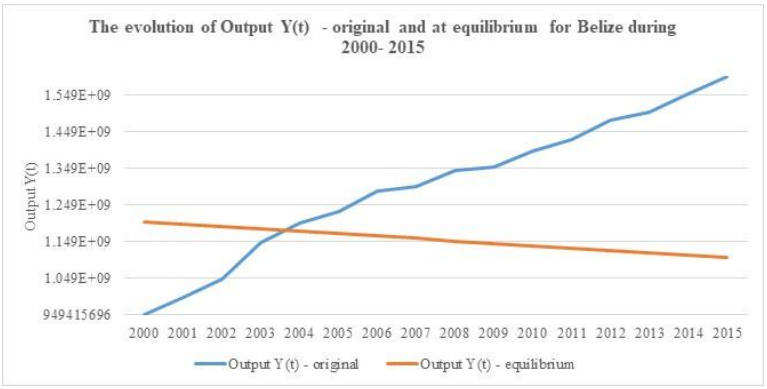


Figure 3.2.12

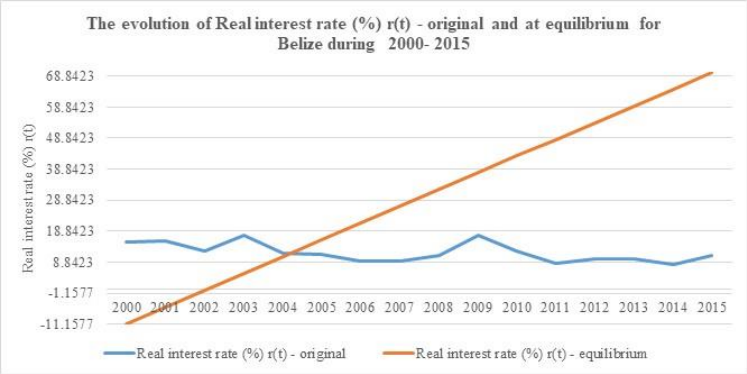


Figure 3.2.13

3.3. Canada

After the analysis during 2000-2016 the model equations are:

(96) D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)
(97) C(t)=0.6872DI(t)-196885680200
(98) G(t)=2.1599TI(t)-301490742498
(99) TI(t)=TR(t)+OR(t)
(100) OR(t)=0.0314Y(t)+36218958307
(101) I(t)=0.3510Y(t)-7149482535r(t)-180427486289
(102) DI(t)=Y(t)+TF(t)-TR(t)
(103) TF(t)=0.0548Y(t)+84549053822
(104) TR(t)=0.0364Y(t)+143229651958
(105) IM(t)=0.4796Y(t)-284351612645
(106) EX(t)=0.1281Y(t)+306290173039
(107) D(t)=Y(t)
(108) MD(t)=2.7557Y(t)-8894793921r(t)-2326298243144
(109) MS(t)=102788969543t-204254558951775
(110) MD(t)=MS(t)

Solving the equations (1)-(15) we find that at equilibrium ("t" being the year):

(111) Y(t)=34872442053.30t-68397325239556.10
(112) r(t)=-0.7521t+1511.4068
(113) TI(t)=2364451571.92t-4458086178104.44
(114) G(t)=5106908958.23t-9930379111337.78
(115) DI(t)=35511514939.77t-69709456226988.40
(116) C(t)=24404840617.74t-48103829995436.90
(117) OR(t)=1093442045.33t-2108411781647.37
(118) TR(t)=1271009526.59t-2349674396457.07

(119) TF(t)=1910082413.06t-3661805383889.41
(120) I(t)=17617396339.75t-34993535779772.30
(121) IM(t)=16725048155.79t-33088149999075.80
(122) EX(t)=4468344293.38t-8457730352084.90
(123) MD(t)=MS(t)=102788969542.78t-204254558951775.00

From the relationships (16)-(28) we can draw the following conclusions:

The analysis of "Actual final consumption of households" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Actual final consumption of households" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of households" was registered in 2000 (99.66%) and the minimum in 2015 (94.79%).

The analysis of "Actual final consumption of the government" emphasizes that in 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of the government" was registered in 2011 (104.55%) and the minimum in 2000 (87.40%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 20.11-21.70%.

The analysis of "Other revenues" emphasizes that in 2000, 2001, 2002, 2003, 2013, 2015 is above the equilibrium value and in 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2014, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Other revenues" was registered in 2002 (104.16%) and the minimum in 2010 (93.40%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 5.34-6.02%.

The analysis of "Investment" emphasizes that in 2000, 2001, 2003, 2004, 2005, 2006, 2007, 2008 is above the equilibrium value and in 2002, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Investment" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Investment" was registered in 2000 (112.86%) and the minimum in 2016 (75.67%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 19.33-24.31%.

The analysis of "Government transfers" emphasizes that in 2000, 2004, 2005, 2006, 2007, 2008, 2015, 2016 is above the equilibrium value and in 2001, 2002, 2003, 2009, 2010, 2011, 2012, 2013, 2014 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Government transfers" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Government transfers" was registered in 2007 (110.57%) and the minimum in 2010 (88.91%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 10.42-12.36%.

The analysis of "Tax revenue" emphasizes that in 2000, 2001, 2004, 2005, 2006, 2007, 2014, 2015, 2016 is above the equilibrium value and in 2002, 2003, 2008, 2009, 2010, 2011, 2012, 2013 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Tax revenue" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Tax revenue" was registered in 2007 (106.08%) and the minimum in 2010 (92.54%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 11.77-14.91%.

The analysis of "Broad money" emphasizes that in 2002, 2003, 2004, 2005, 2006 is above the equilibrium value and in 2000, 2001, 2007, 2008 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Broad money" emphasizes that in 2008 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Broad money" was registered in 2002 (119.48%) and the minimum in 2000 (71.51%).

The analysis of "Exports" emphasizes that in 2000, 2001, 2002, 2004, 2005, 2006, 2007, 2014, 2015, 2016 is above the equilibrium value and in 2003, 2008, 2009, 2010, 2011, 2012, 2013 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Exports" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Exports" was registered in 2000 (104.83%) and the minimum in 2009 (84.73%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 30.78-37.39%.

The analysis of "Imports" emphasizes that in 2000, 2005, 2006, 2007, 2008 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Imports" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Imports" was registered in 2000 (105.77%) and the minimum in 2009 (85.76%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 28.51-31.15%.

The analysis of "Trade balance" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2010, 2011, 2012 is above the equilibrium value and in 2008, 2009, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Trade balance" emphasizes that in 2010, 2011, 2012 is above the equilibrium value and in 2008, 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Trade balance" was registered in 2010 (556.27%) and the minimum in 2016 (-9.64%).

The analysis of "Output" emphasizes that in 2005, 2006, 2007 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Output" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Output" was registered in 2006 (100.50%) and the minimum in 2009 (94.21%).

The analysis of "Real interest rate (%)" emphasizes that in 2006, 2007, 2009 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2008, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Real interest rate (%)" emphasizes that in 2009 is above the equilibrium value and in 2008, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Real interest rate (%)" was registered in 2009 (1178.83%) and the minimum in 2012 (-95.03%).

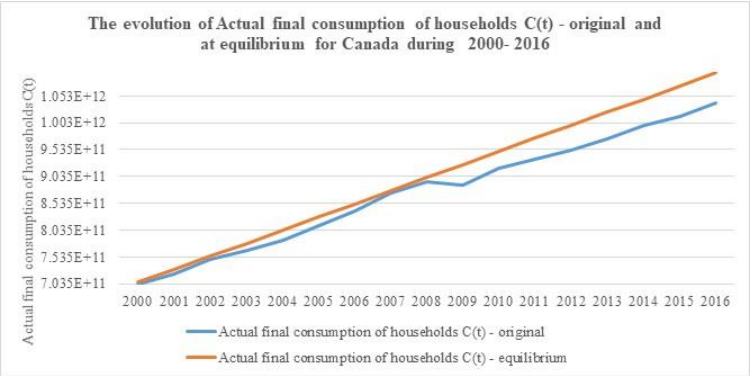


Figure 3.3.1

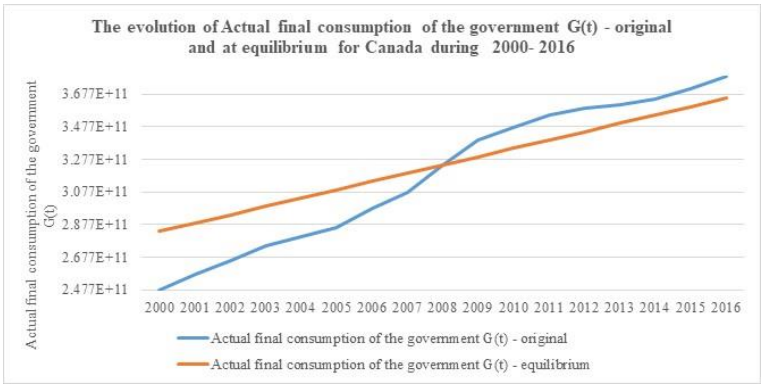


Figure 3.3.2

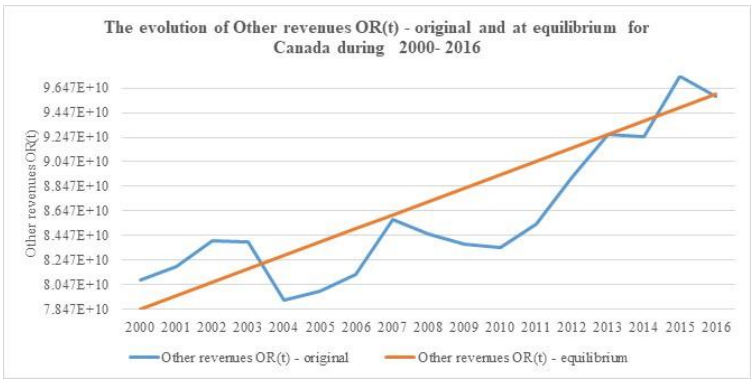


Figure 3.3.3

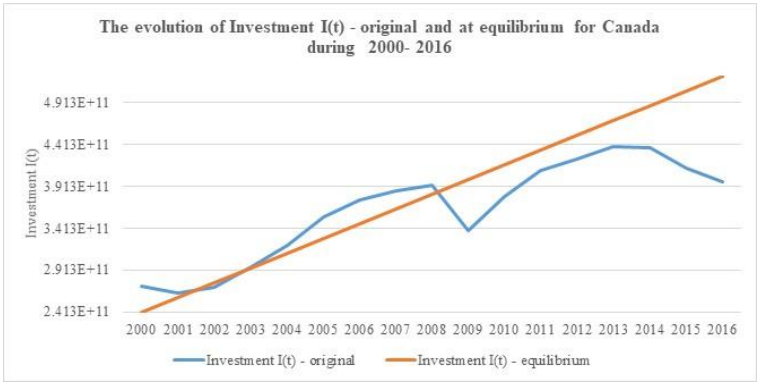
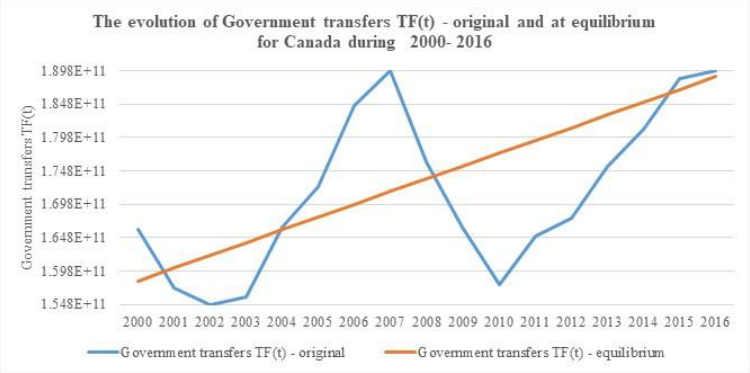


Figure 3.3.4



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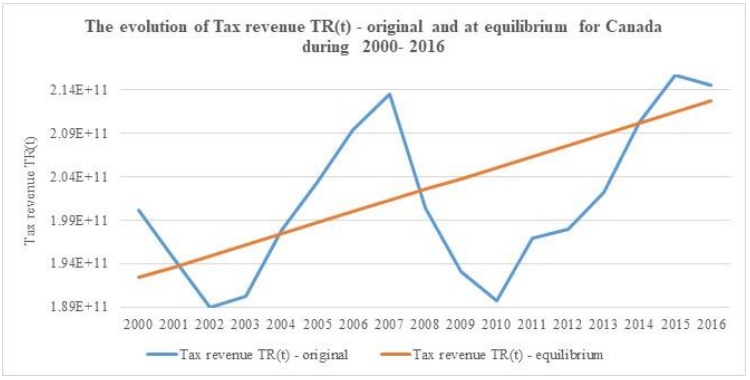


Figure 3.3.6

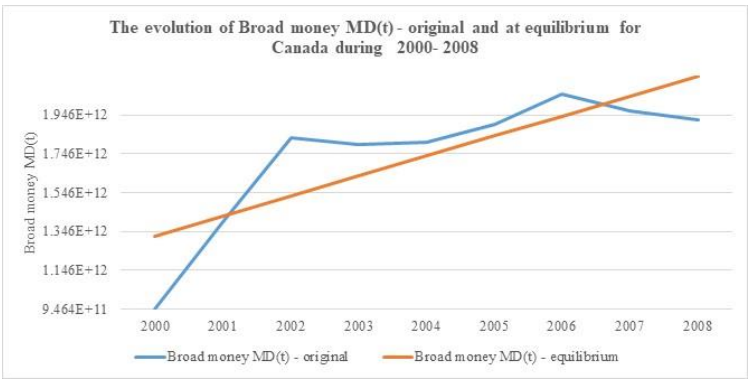


Figure 3.3.7

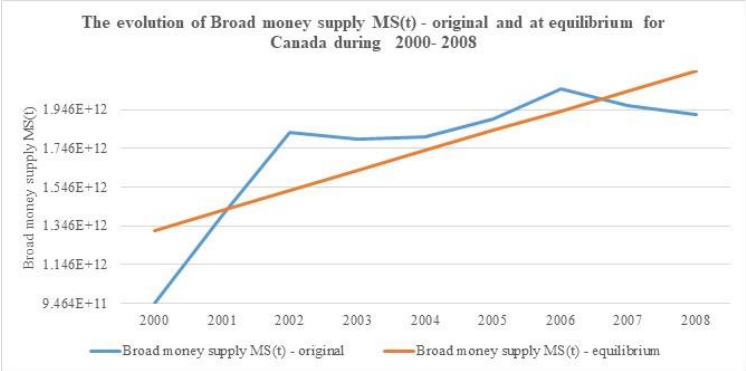
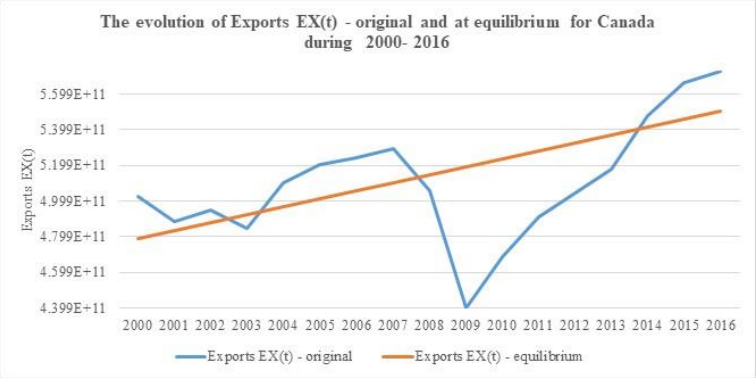


Figure 3.3.8



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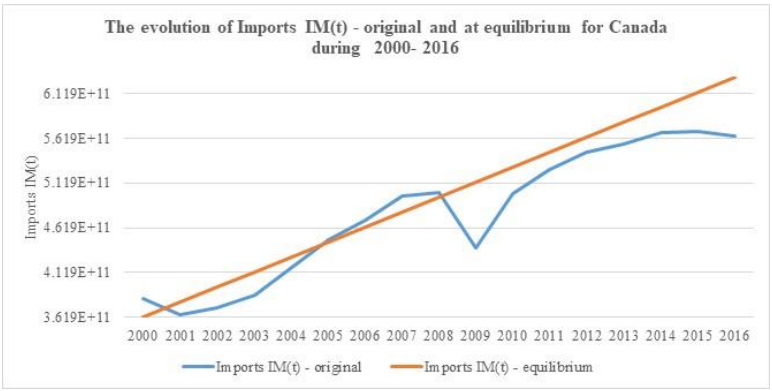

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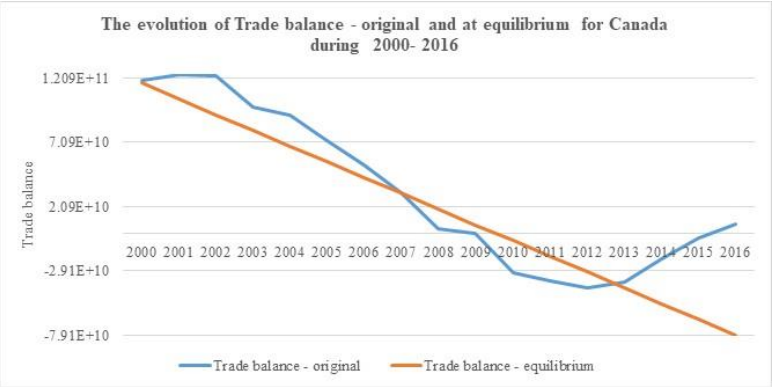

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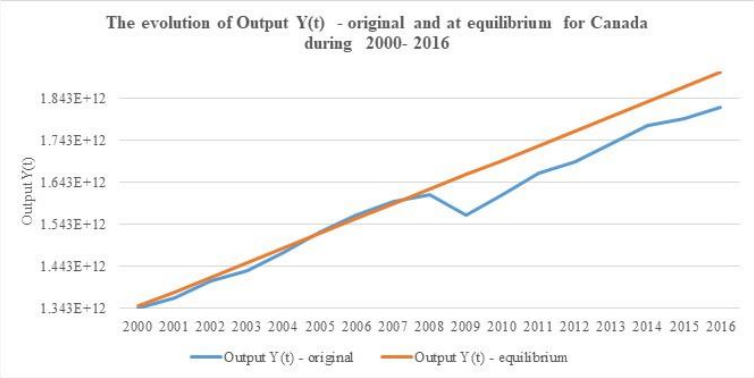


Figure 3.3.12

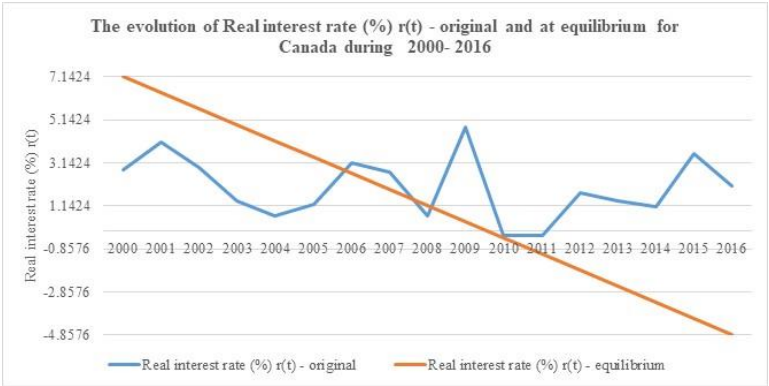


Figure 3.3.13

3.4. Dominican Republic

After the analysis during 2000-2016 the model equations are:

(124) D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)
(125) C(t)=0.6304DI(t)+6440404914
(126) G(t)=0.7102TI(t)-875243987
(127) TI(t)=TR(t)+OR(t)
(128) OR(t)=0.0391Y(t)-1025301578
(129) I(t)=0.1831Y(t)+101609882r(t)+3469039757
(130) DI(t)=Y(t)+TF(t)-TR(t)
(131) TF(t)=0.1076Y(t)-1069007936
(132) TR(t)=0.1357Y(t)-82514390
(133) IM(t)=0.1741Y(t)+8003985680
(134) EX(t)=0.2395Y(t)+39745266
(135) D(t)=Y(t)
(136) MD(t)=0.2989Y(t)+58969373r(t)-4551002129
(137) MS(t)=685334698t-1365315298478
(138) MD(t)=MS(t)

Solving the equations (1)-(15) we find that at equilibrium ("t" being the year):

(139) Y(t)=2229309189.16t-4427037782671.64
(140) r(t)=0.3228t-637.6119
(141) TI(t)=389632949.15t-774854138656.45
(142) G(t)=276720839.98t-551183652400.29
(143) DI(t)=2166567595.71t-4303429892399.23
(144) C(t)=1365874703.74t-2706581815580.96
(145) OR(t)=87056662.63t-173905374285.84
(146) TR(t)=302576286.51t-600948764370.61
(147) TF(t)=239834693.06t-477340874098.20
(148) I(t)=441038827.14t-872022080331.63
(149) IM(t)=388160987.38t-762819265423.95
(150) EX(t)=533835805.68t-1060069499782.71
(151) MD(t)=MS(t)=685334698.35t-1365315298477.63

From the relationships (16)-(28) we can draw the following conclusions:

The analysis of "Actual final consumption of households" emphasizes that in 2005, 2006, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2007, 2008, 2009 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Actual final consumption of households" emphasizes that in 2010, 2011, 2012 is above the equilibrium value and in 2008, 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of households" was registered

in 2006 (104.76%) and the minimum in 2004 (92.99%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 65.97-80.67%.

The analysis of "Actual final consumption of the government" emphasizes that in 2000, 2001, 2002, 2007, 2008, 2009, 2010, 2012, 2014, 2015, 2016 is above the equilibrium value and in 2003, 2004, 2005, 2006, 2011, 2013 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2009, 2010, 2012 is above the equilibrium value and in 2011 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of the government" was registered in 2016 (114.84%) and the minimum in 2004 (67.27%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 7.27-10.78%.

The analysis of "Other revenues" emphasizes that in 2000, 2001, 2002, 2003, 2015 is above the equilibrium value and in 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Other revenues" was registered in 2000 (266.63%) and the minimum in 2011 (68.62%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 1.41-4.98%.

The analysis of "Investment" emphasizes that in 2000, 2001, 2002, 2006, 2007, 2008, 2015, 2016 is above the equilibrium value and in 2003, 2004, 2005, 2009, 2010, 2011, 2012, 2013, 2014 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Investment" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Investment" was registered in 2000 (129.54%) and the minimum in 2004 (82.70%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 27.70-38.98%.

The analysis of "Government transfers" emphasizes that in 2000, 2001, 2002, 2006, 2007, 2008, 2009, 2012, 2014, 2015, 2016 is above the equilibrium value and in 2003, 2004, 2005, 2010, 2011, 2013 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Government transfers" emphasizes that in 2008, 2009, 2012 is above the equilibrium value and in 2010, 2011 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Government transfers" was registered in 2008 (123.41%) and the minimum in 2004 (41.49%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 7.60-10.62%.

The analysis of "Tax revenue" emphasizes that in 2001, 2002, 2005, 2006, 2007, 2008, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2003, 2004, 2009, 2010, 2011, 2012 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Tax revenue" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Tax revenue" was registered in 2007 (112.58%) and the minimum in 2003 (83.91%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 13.39-14.89%.

The analysis of "Broad money" emphasizes that in 2000, 2001, 2002, 2003, 2016 is above the equilibrium value and in 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Broad money" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Broad money" was registered in 2000 (168.08%) and the minimum in 2009 (79.98%).

The analysis of "Exports" emphasizes that in 2000, 2003, 2004, 2007, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2001, 2002, 2005, 2006, 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Exports" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Exports" was registered in 2000 (110.81%) and the minimum in 2009 (85.00%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 24.06-27.26%.

The analysis of "Imports" emphasizes that in 2000, 2001, 2002, 2006, 2008, 2010, 2011, 2012, 2015, 2016 is above the equilibrium value and in 2003, 2004, 2005, 2007, 2009, 2013, 2014 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Imports" emphasizes that in 2008, 2010, 2011, 2012 is above the equilibrium value and in 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Imports" was registered in 2000 (109.48%) and the minimum in 2009 (89.15%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 29.14-44.24%.

The analysis of "Trade balance" emphasizes that in 2000, 2001, 2002, 2005, 2006, 2008, 2009, 2010, 2011, 2012, 2015, 2016 is above the equilibrium value and in 2003, 2004, 2007, 2013, 2014 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Trade balance" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Trade balance" was registered in 2006 (134.71%) and the minimum in 2014 (56.89%).

The analysis of "Output" emphasizes that in 2000, 2001, 2007, 2010, 2014, 2015, 2016 is above the equilibrium value and in 2002, 2003, 2004, 2005, 2006, 2008, 2009, 2011, 2012, 2013 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Output" emphasizes that in 2010 is above the equilibrium value and in 2008, 2009, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Output" was registered in 2016 (109.40%) and the minimum in 2004 (89.81%).

The analysis of "Real interest rate (%)" emphasizes that in 2000, 2001, 2002, 2005, 2006, 2009, 2015, 2016 is above the equilibrium value and in 2003, 2004, 2007, 2008, 2010, 2011, 2012, 2013, 2014 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Real interest rate (%)" emphasizes that in 2009 is above the equilibrium value and in 2008, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Real interest rate (%)" was registered in 2000 (235.25%) and the minimum in 2004 (-94.04%).

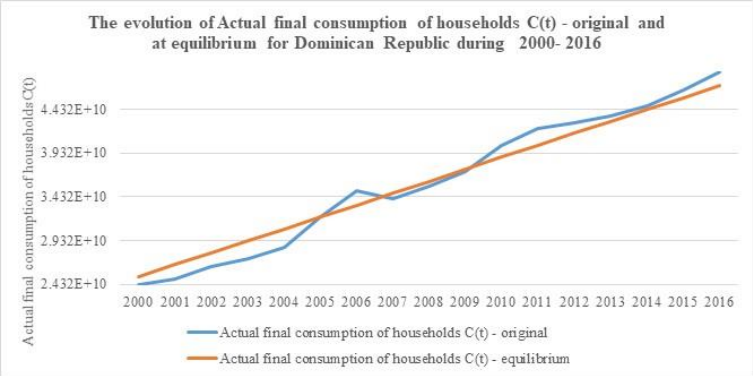


Figure 3.4.1

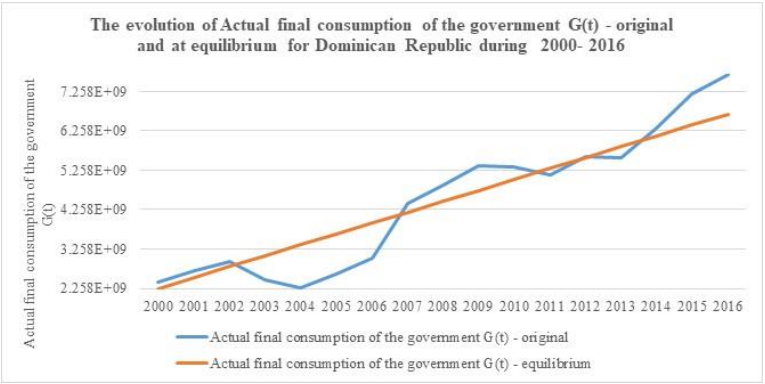


Figure 3.4.2

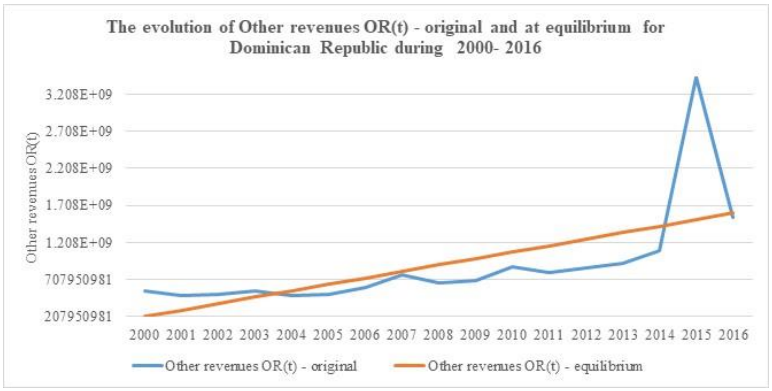


Figure 3.4.3

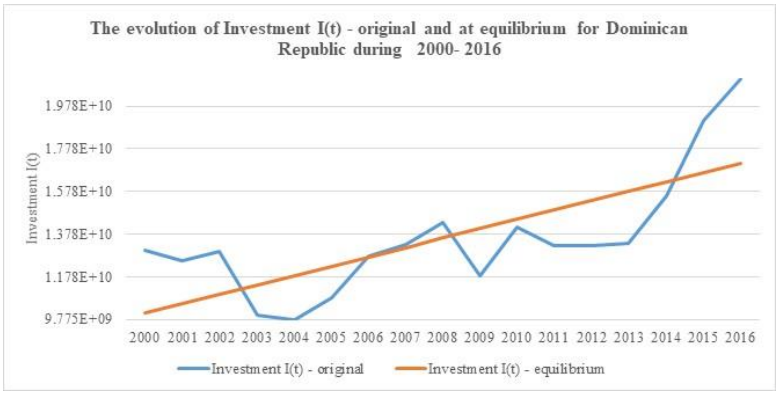


Figure 3.4.4

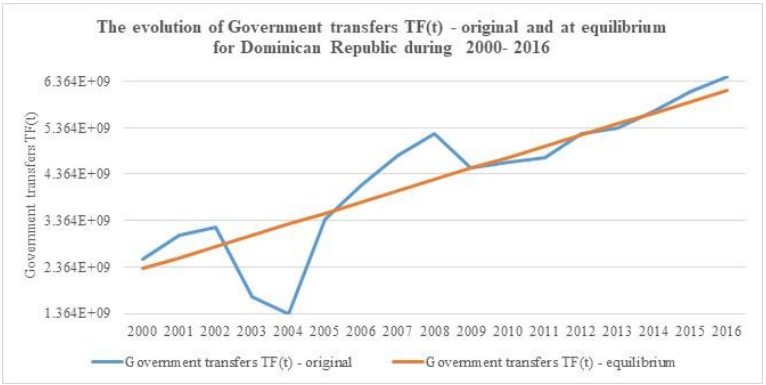


Figure 3.4.5

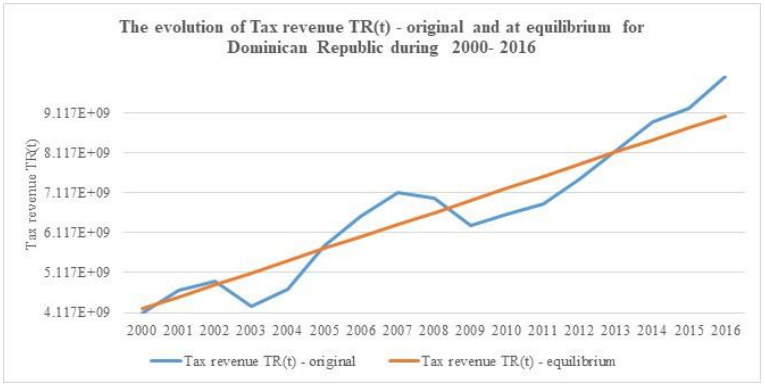


Figure 3.4.6

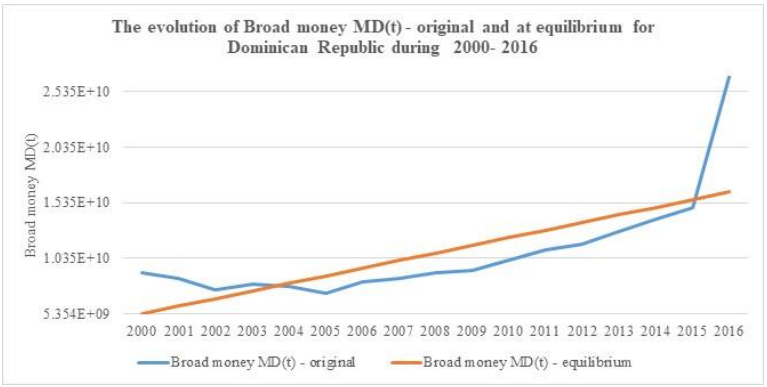


Figure 3.4.7

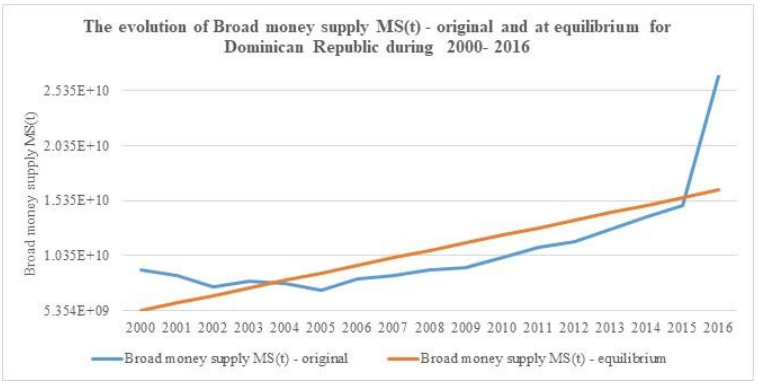


Figure 3.4.8

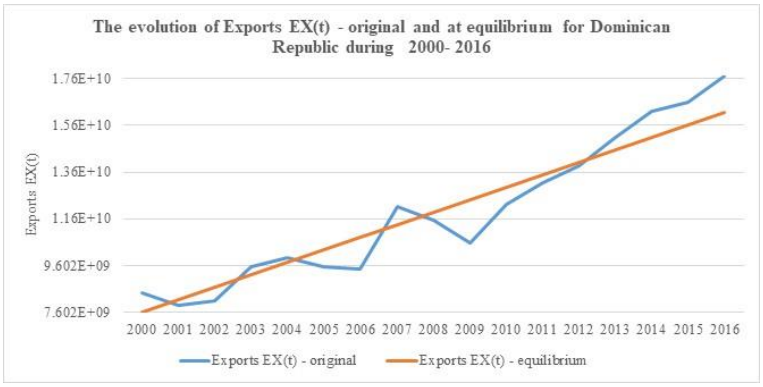


Figure 3.4.9

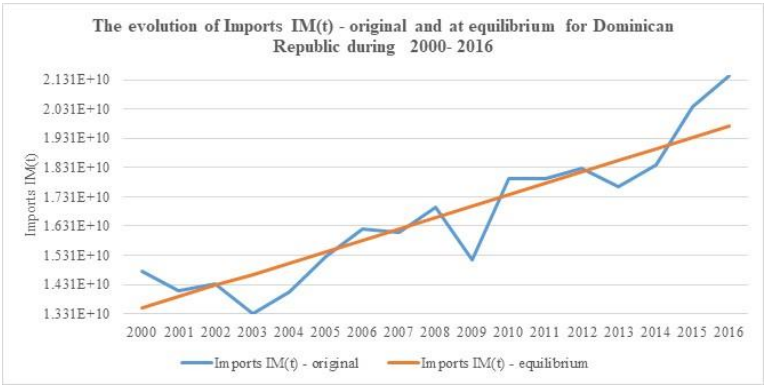


Figure 3.4.10

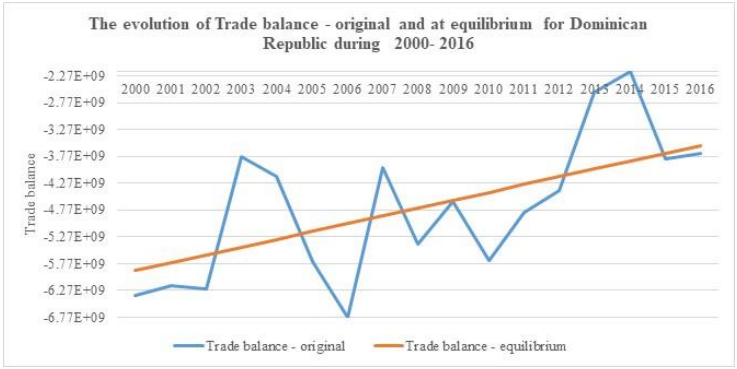


Figure 3.4.11

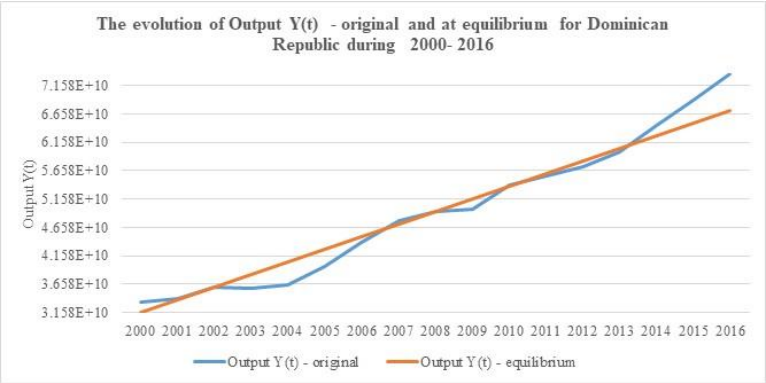


Figure 3.4.12

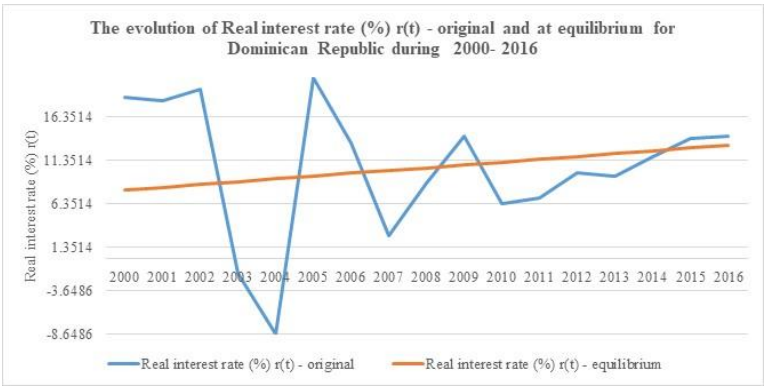


Figure 3.4.13

3.5. Guatemala

After the analysis during 2000-2016 the model equations are:

(152) D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)
(153) C(t)=0.9769DI(t)-3860867020
(154) G(t)=1.0824TI(t)-1222775700
(155) TI(t)=TR(t)+OR(t)
(156) OR(t)=0.0059Y(t)-941232
(157) I(t)=0.0457Y(t)-37819949r(t)+5312982218
(158) DI(t)=Y(t)+TF(t)-TR(t)
(159) TF(t)=-0.1713Y(t)+9269498314
(160) TR(t)=0.1007Y(t)+390788810
(161) IM(t)=0.3625Y(t)+1005491364
(162) EX(t)=0.2476Y(t)+627629906

(163) D(t)=Y(t)
(164) MD(t)=0.6691Y(t)-76621149r(t)-11962004016
(165) MS(t)=931249046t-1856185951947
(166) MD(t)=MS(t)

Solving the equations (1)-(15) we find that at equilibrium ("t" being the year):

(167) Y(t)=802371138.22t-1573379970508.85
(168) r(t)=-5.1473t+10329.9217
(169) TI(t)=85513487.62t-167294659285.42
(170) G(t)=92557563.69t-182298141858.29
(171) DI(t)=584181782.06t-1136650922923.52
(172) C(t)=570667143.93t-1114216163519.09
(173) OR(t)=4754815.27t-9324720151.42
(174) TR(t)=80758672.36t-157969939134.00
(175) TF(t)=-137430683.80t+278759108451.33
(176) I(t)=231368058.20t-457326389223.02
(177) IM(t)=290858073.99t-569341877917.57
(178) EX(t)=198636446.38t-388881153826.02
(179) MD(t)=MS(t)=931249045.51t-1856185951947.08

From the relationships (16)-(28) we can draw the following conclusions:

The analysis of "Actual final consumption of households" emphasizes that in 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Actual final consumption of households" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of households" was registered in 2016 (125.24%) and the minimum in 2000 (91.90%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 84.52-88.31%.

The analysis of "Actual final consumption of the government" emphasizes that in 2001, 2002, 2003, 2009, 2010, 2011, 2012, 2013 is above the equilibrium value and in 2000, 2004, 2005, 2006, 2007, 2008 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2009, 2010, 2011, 2012 is above the equilibrium value and in 2008 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of the government" was registered in 2013 (120.50%) and the minimum in 2000 (73.82%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 9.56-10.54%.

The analysis of "Other revenues" emphasizes that in 2001, 2006, 2007, 2008, 2010, 2011, 2012, 2013 is above the equilibrium value and in 2000, 2002, 2003, 2004,

2005, 2009 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2010, 2011, 2012 is above the equilibrium value and in 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Other revenues" was registered in 2001 (181.31%) and the minimum in 2000 (14.40%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 0.56-1.13%.

The analysis of "Investment" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007 is above the equilibrium value and in 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Investment" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Investment" was registered in 2007 (114.74%) and the minimum in 2009 (71.63%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 19.42-21.02%.

The analysis of "Government transfers" emphasizes that in 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Government transfers" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Government transfers" was registered in 2013 (187.40%) and the minimum in 2016 (-78.59%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 7.32-9.65%.

The analysis of "Tax revenue" emphasizes that in 2002, 2006, 2007, 2008, 2011, 2012, 2013 is above the equilibrium value and in 2000, 2001, 2003, 2004, 2005, 2009, 2010 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Tax revenue" emphasizes that in 2008, 2011, 2012 is above the equilibrium value and in 2009, 2010 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Tax revenue" was registered in 2007 (113.49%) and the minimum in 2000 (84.45%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 10.84-12.06%.

The analysis of "Broad money" emphasizes that in 2000, 2004, 2005, 2006, 2007, 2016 is above the equilibrium value and in 2001, 2002, 2003, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Broad money" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Broad money" was registered in 2016 (115.61%) and the minimum in 2002 (85.57%).

The analysis of "Exports" emphasizes that in 2000, 2007, 2008, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2001, 2002, 2003,

2004, 2005, 2006, 2009 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Exports" emphasizes that in 2008, 2010, 2011, 2012 is above the equilibrium value and in 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Exports" was registered in 2016 (118.13%) and the minimum in 2003 (94.10%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 25.23-29.02%.

The analysis of "Imports" emphasizes that in 2001, 2004, 2006, 2007, 2008, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2002, 2003, 2005, 2009, 2010 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Imports" emphasizes that in 2008, 2011, 2012 is above the equilibrium value and in 2009, 2010 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Imports" was registered in 2016 (122.58%) and the minimum in 2009 (91.01%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 36.92-41.65%.

The analysis of "Trade balance" emphasizes that in 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2008, 2009, 2010 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Trade balance" emphasizes that in 2011, 2012 is above the equilibrium value and in 2008, 2009, 2010 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Trade balance" was registered in 2016 (132.01%) and the minimum in 2009 (74.68%).

The analysis of "Output" emphasizes that in 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Output" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Output" was registered in 2016 (116.31%) and the minimum in 2001 (94.70%).

The analysis of "Real interest rate (%)" emphasizes that in 2006 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Real interest rate (%)" emphasizes that in 2008, 2009, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Real interest rate (%)" was registered in 2006 (167.42%) and the minimum in 2007 (-812.40%).

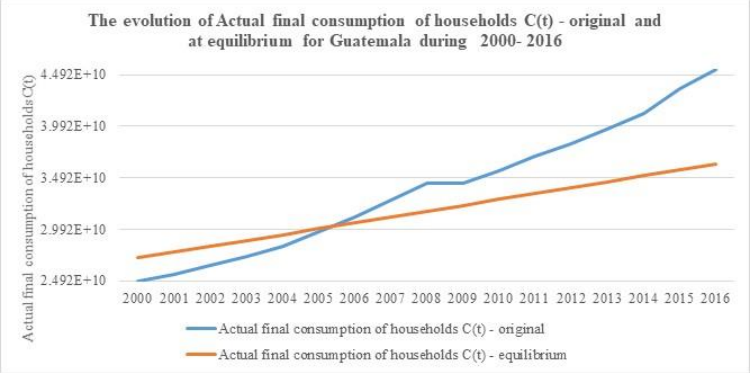


Figure 3.5.1

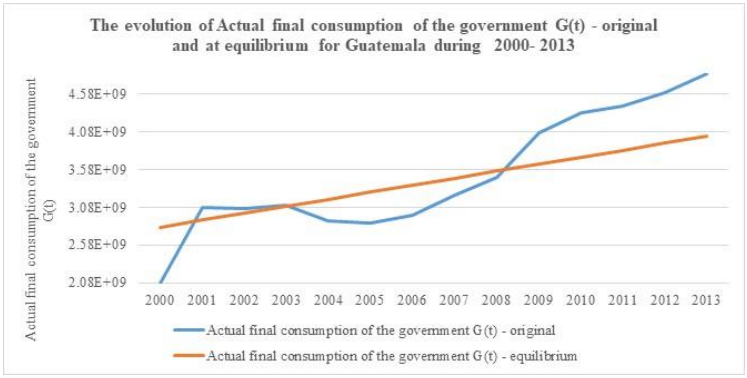


Figure 3.5.2

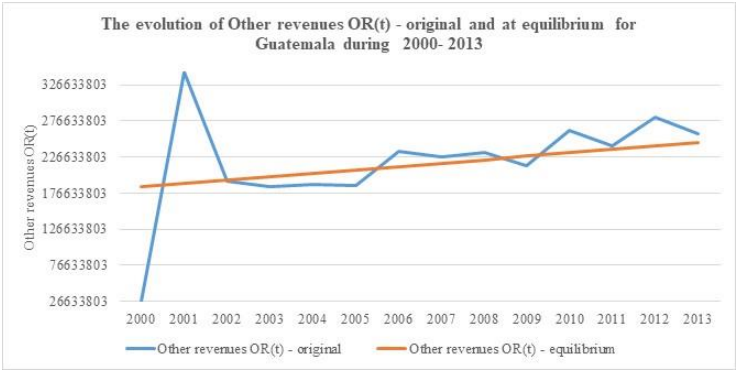


Figure 3.5.3

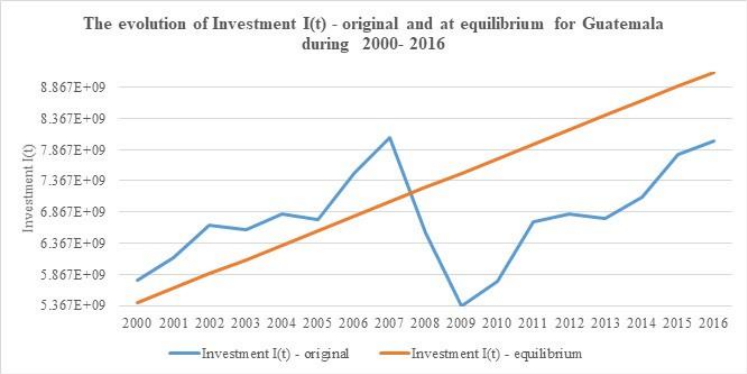


Figure 3.5.4

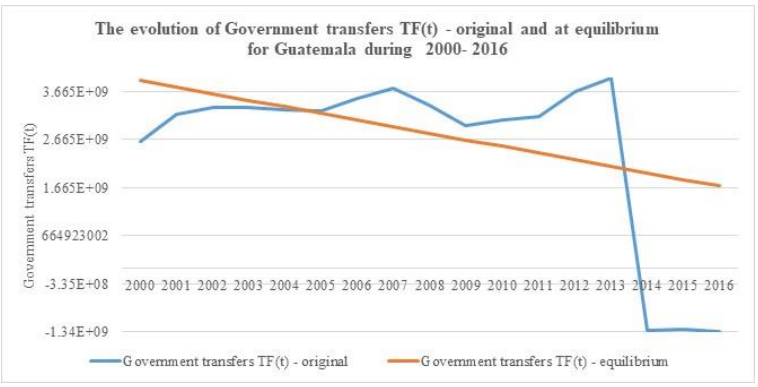


Figure 3.5.5

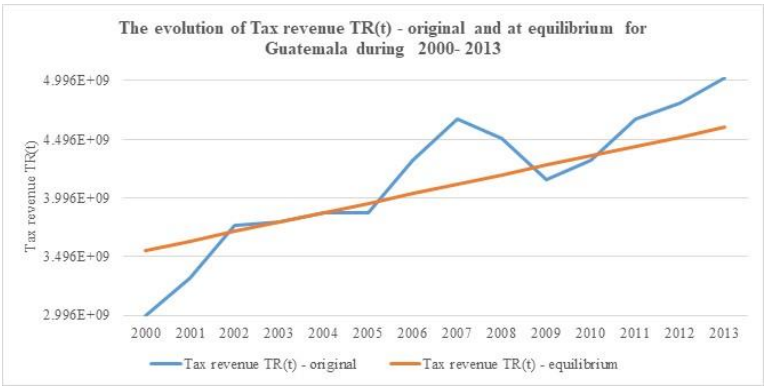


Figure 3.5.6

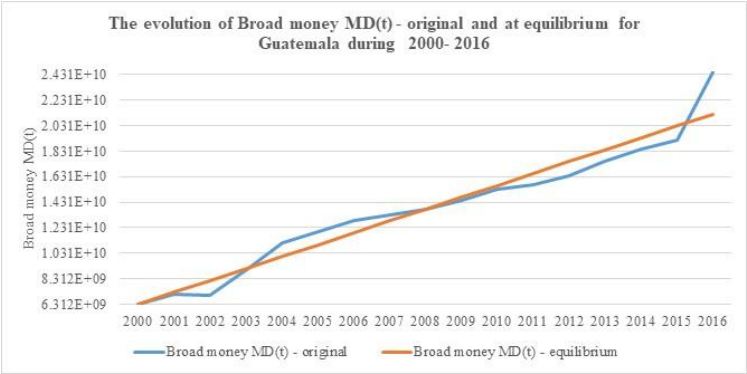


Figure 3.5.7

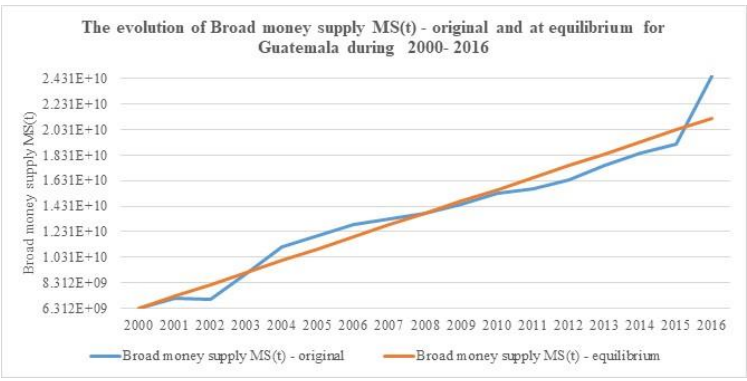


Figure 3.5.8

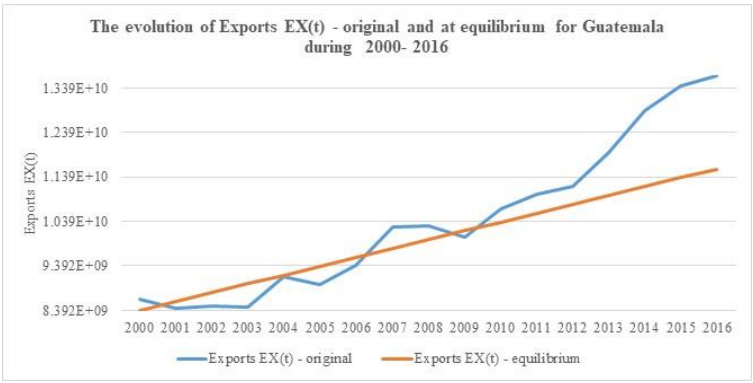


Figure 3.5.9

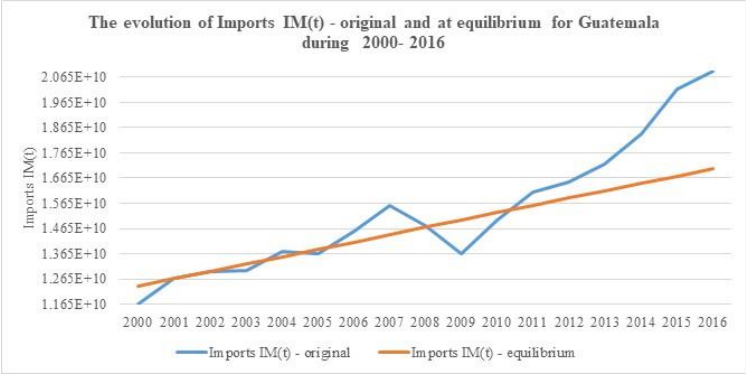


Figure 3.5.10

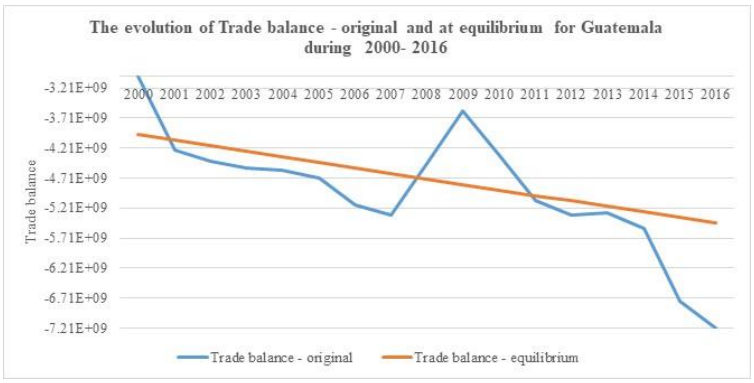


Figure 3.5.11

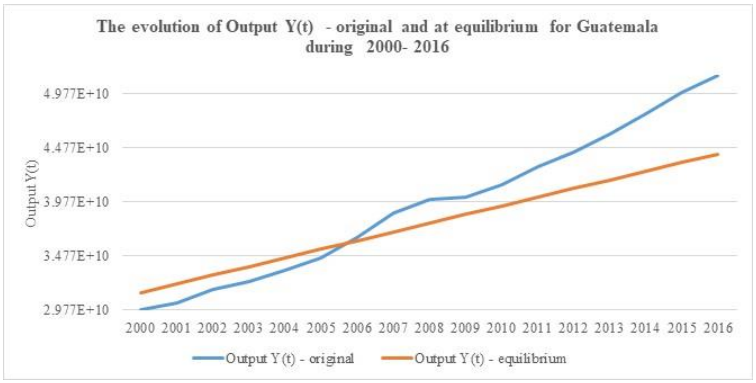


Figure 3.5.12

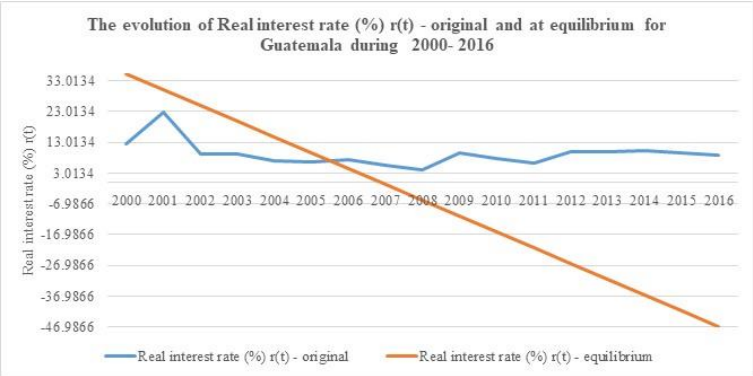


Figure 3.5.13

3.6. Honduras

After the analysis during 2000-2016 the model equations are:

(180) D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)
(181) C(t)=0.9326DI(t)-1488581219
(182) G(t)=0.4881TI(t)+880159508
(183) TI(t)=TR(t)+OR(t)
(184) OR(t)=0.0730Y(t)-154492201
(185) I(t)=0.1906Y(t)-46830379r(t)+1702297369
(186) DI(t)=Y(t)+TF(t)-TR(t)
(187) TF(t)=0.1143Y(t)-690139121
(188) TR(t)=0.2025Y(t)-767973316
(189) IM(t)=0.6222Y(t)+1077446509
(190) EX(t)=0.4639Y(t)+306842968
(191) D(t)=Y(t)
(192) MD(t)=0.7246Y(t)+387365r(t)-3563369349
(193) MS(t)=404726136t-805431917878
(194) MD(t)=MS(t)

Solving the equations (1)-(15) we find that at equilibrium ("t" being the year):

(195) Y(t)=558419717.33t-1106375193744.16
(196) r(t)=0.2047t-406.7607
(197) TI(t)=153834951.55t-305709651648.60
(198) G(t)=75094430.20t-148351805445.06
(199) DI(t)=509179542.02t-1008739721798.51
(200) C(t)=474880495.08t-942278182850.91
(201) OR(t)=40749197.56t-80889287101.27

(202) TR(t)=113085753.99t-224820364547.33
(203) TF(t)=63845578.68t-127184892601.67
(204) I(t)=96870367.16t-190168743100.50
(205) IM(t)=347466555.52t-687344480151.21
(206) EX(t)=259040980.41t-512920942498.91
(207) MD(t)=MS(t)=404726135.66t-805431917878.04

From the relationships (16)-(28) we can draw the following conclusions:

The analysis of "Actual final consumption of households" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value. During the financial crisis (2008-2012), the behavior of "Actual final consumption of households" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of households" was registered in 2006 (107.85%) and the minimum in 2009 (100.79%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 75.98-80.00%.

The analysis of "Actual final consumption of the government" emphasizes that in 2007, 2008, 2009, 2010, 2011, 2012, 2013 is above the equilibrium value and in 2003, 2004, 2005, 2006, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2011, 2012, 2013 is above the equilibrium value and in 2014, 2015 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of the government" was registered in 2009 (112.27%) and the minimum in 2003 (89.67%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 17.15-19.95%.

The analysis of "Other revenues" emphasizes that in 2004, 2005, 2008, 2012, 2013, 2014 is above the equilibrium value and in 2003, 2006, 2007, 2009, 2010, 2011, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2012, 2013, 2014 is above the equilibrium value and in 2011, 2015 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Other revenues" was registered in 2013 (112.45%) and the minimum in 2015 (93.34%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 7.21-8.09%.

The analysis of "Investment" emphasizes that in 2007, 2008 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Investment" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Investment" was registered in 2008 (126.86%) and the minimum in 2009 (69.04%). The excess of equilibrium

values is due, in the corresponding periods, to the large share of GDP, between 33.85-35.23%.

The analysis of "Government transfers" emphasizes that in 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2000, 2001, 2002, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Government transfers" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Government transfers" was registered in 2007 (205.37%) and the minimum in 2016 (-89.01%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 8.05-13.04%.

The analysis of "Tax revenue" emphasizes that in 2004, 2005, 2006, 2007, 2008, 2014, 2015 is above the equilibrium value and in 2003, 2009, 2010, 2011, 2012, 2013 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Tax revenue" emphasizes that in 2014, 2015 is above the equilibrium value and in 2011, 2012, 2013 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Tax revenue" was registered in 2007 (114.81%) and the minimum in 2009 (91.29%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 16.70-19.66%.

The analysis of "Broad money" emphasizes that in 2006, 2007, 2008, 2009, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2010, 2011, 2012, 2013, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Broad money" emphasizes that in 2008, 2009 is above the equilibrium value and in 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Broad money" was registered in 2007 (111.27%) and the minimum in 2011 (95.28%).

The analysis of "Exports" emphasizes that in 2003, 2004, 2005, 2006, 2007, 2008, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2000, 2001, 2002, 2009, 2010, 2011, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Exports" emphasizes that in 2008, 2012 is above the equilibrium value and in 2009, 2010, 2011 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Exports" was registered in 2005 (111.18%) and the minimum in 2009 (82.91%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 47.30-54.45%.

The analysis of "Imports" emphasizes that in 2004, 2005, 2006, 2007, 2008, 2012, 2015 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2009, 2010, 2011, 2013, 2014, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Imports" emphasizes that in 2008, 2012 is above the equilibrium value and in 2009, 2010, 2011 is below the equilibrium value. The

maximum ratio between real and equilibrium value of "Imports" was registered in 2007 (115.37%) and the minimum in 2009 (81.02%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 69.52-78.36%.

The analysis of "Trade balance" emphasizes that in 2004, 2005, 2006, 2007, 2008, 2011, 2015 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2009, 2010, 2012, 2013, 2014, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Trade balance" emphasizes that in 2008, 2011 is above the equilibrium value and in 2009, 2010, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Trade balance" was registered in 2008 (139.98%) and the minimum in 2009 (76.61%).

The analysis of "Output" emphasizes that in 2000, 2005, 2006, 2007, 2008, 2016 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Output" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Output" was registered in 2008 (104.81%) and the minimum in 2003 (97.02%).

The analysis of "Real interest rate (%)" emphasizes that in 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Real interest rate (%)" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Real interest rate (%)" was registered in 2002 (541.72%) and the minimum in 2000 (-114.23%).

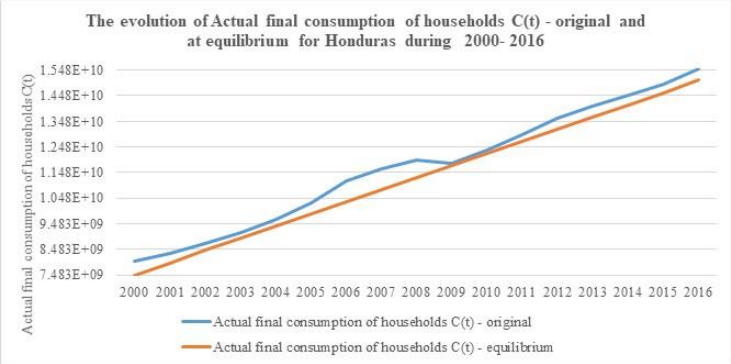


Figure 3.6.1

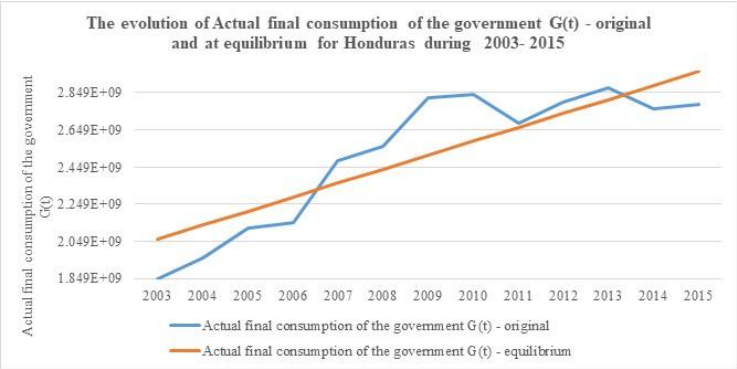


Figure 3.6.2

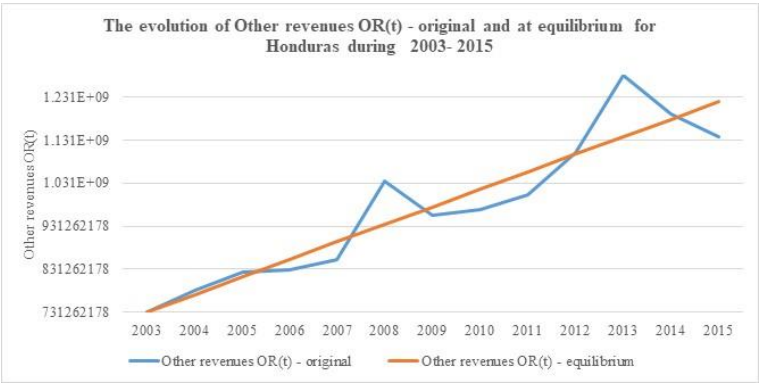


Figure 3.6.3

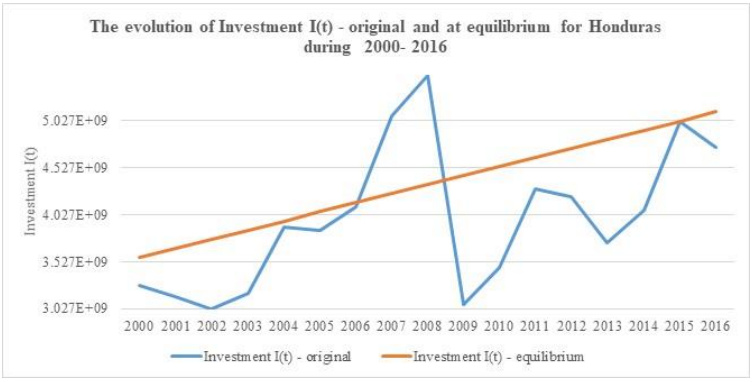


Figure 3.6.4

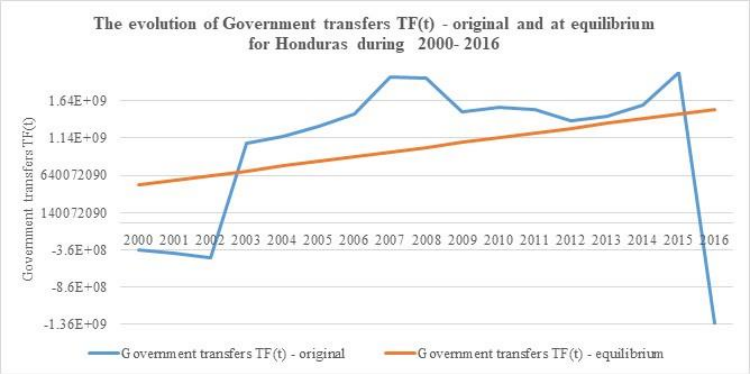


Figure 3.6.5

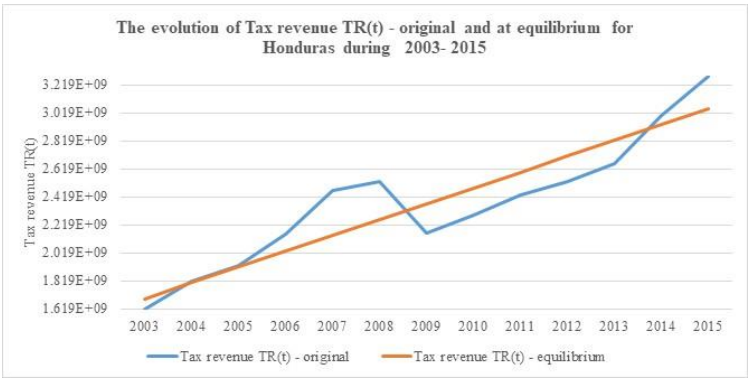


Figure 3.6.6

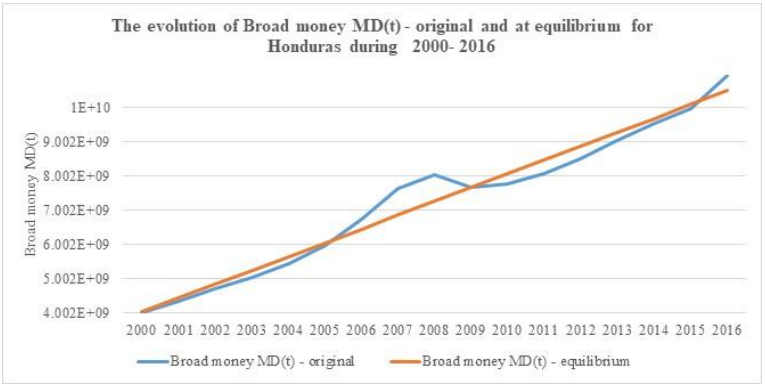


Figure 3.6.7

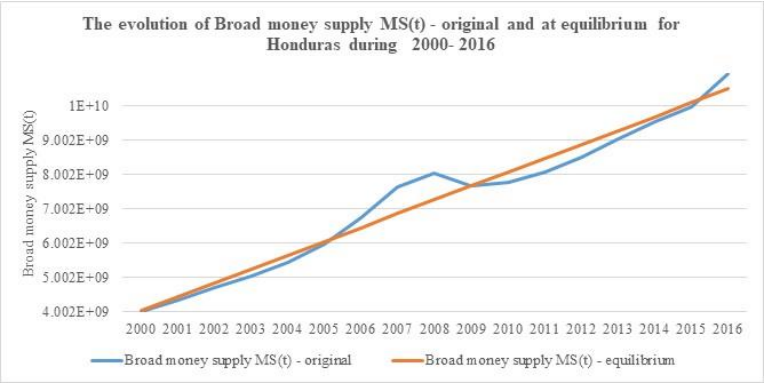


Figure 3.6.8

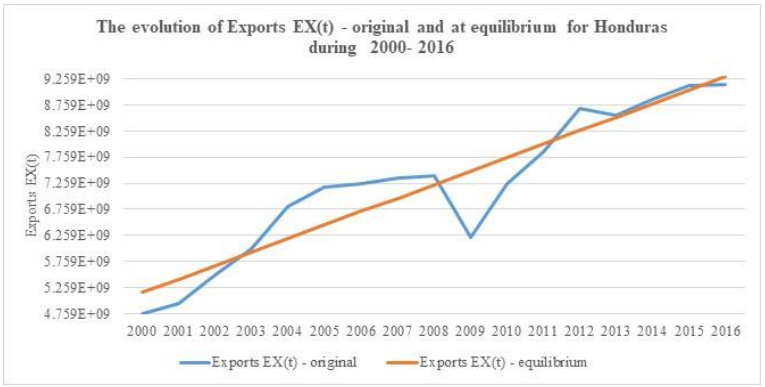


Figure 3.6.9

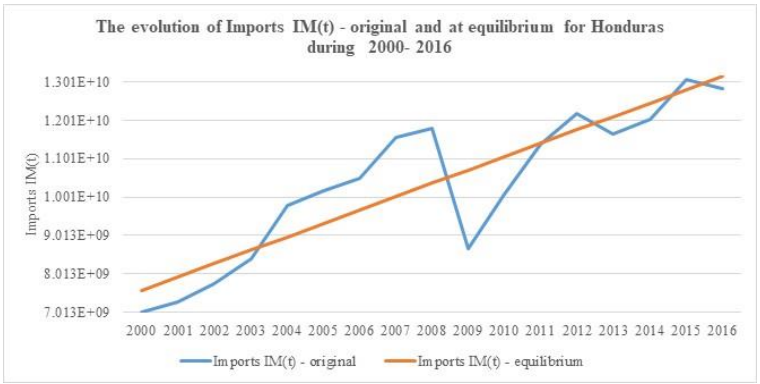


Figure 3.6.10

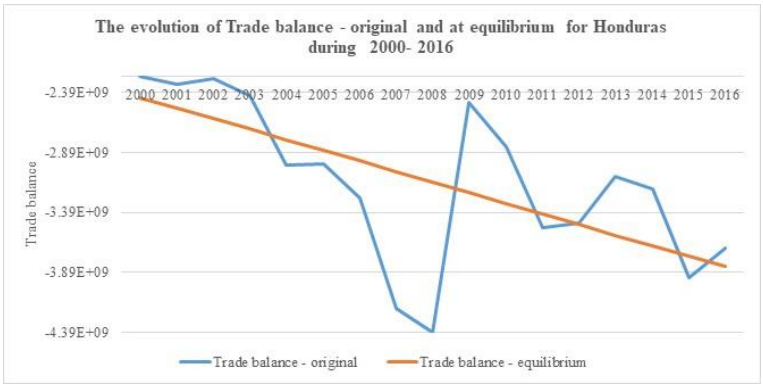


Figure 3.6.11

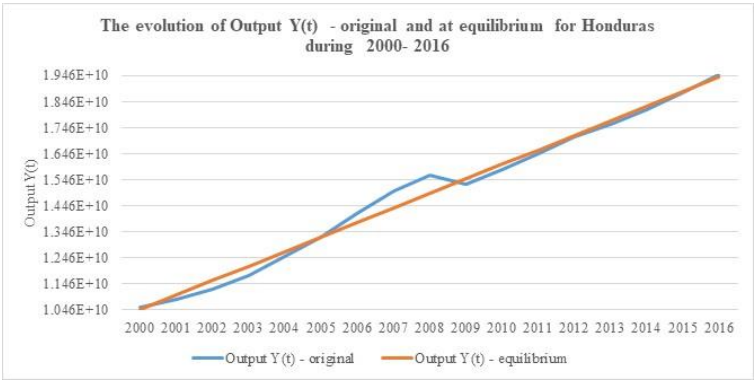


Figure 3.6.12

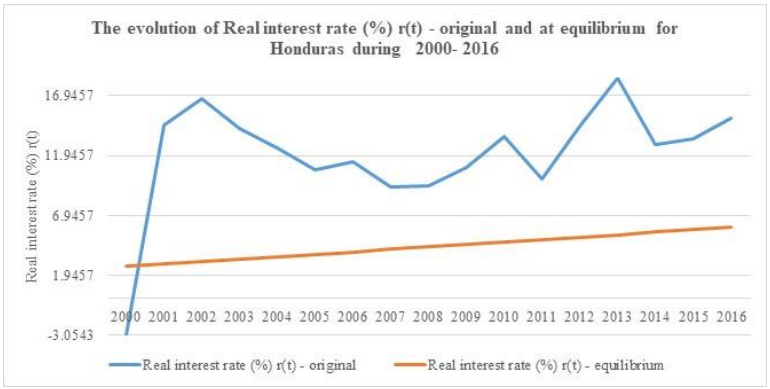


Figure 3.6.13

3.7. Haiti

After the analysis during 2000-2016 the model equations are:

(208) D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)
(209) C(t)=0.6687DI(t)+2630513513
(210) G(t)=0.6687TI(t)+2630513513
(211) TI(t)=TR(t)+OR(t)
(212) OR(t)=0.6687Y(t)+2630513513
(213) I(t)=0.4771Y(t)-2181838r(t)-1365383695
(214) DI(t)=Y(t)+TF(t)-TR(t)
(215) TF(t)=0.0626Y(t)-429228579
(216) TR(t)=0.0626Y(t)-429228579
(217) IM(t)=1.0365Y(t)-3306342971
(218) EX(t)=0.6226Y(t)-3300468804
(219) D(t)=Y(t)
(220) MD(t)=0.7447Y(t)-35091640r(t)-2043515295
(221) MS(t)=86151373t-170123304737
(222) MD(t)=MS(t)

Solving the equations (1)-(15) we find that at equilibrium ("t" being the year):

(223) Y(t)=-30659058.89t+29058257367.95
(224) r(t)=-3.1056t+5406.3674
(225) TI(t)=-22421438.44t+23452032751.20
(226) G(t)=-14994214.24t+18313932054.28
(227) DI(t)=-30659058.89t+29058257367.95
(228) C(t)=-20503077.82t+22063064081.99
(229) OR(t)=-20503077.82t+22063064081.99
(230) TR(t)=-1918360.62t+1388968669.21
(231) TF(t)=-1918360.62t+1388968669.21
(232) I(t)=-7851509.13t+702559817.31
(233) IM(t)=-31778592.64t+26812993934.08
(234) EX(t)=-19088850.34t+14791695348.45
(235) MD(t)=MS(t)=86151372.75t-170123304736.84

From the relationships (16)-(28) we can draw the following conclusions:

The analysis of "Actual final consumption of households" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Actual final consumption of households" emphasizes that in 2008, 2009, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of households" was registered in 2004 (-34.46%) and the minimum in 2016 (-40.79%).

The analysis of "Actual final consumption of the government" emphasizes that in is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of the government" was registered in (0.00%) and the minimum in (0.00%).

The analysis of "Other revenues" emphasizes that in is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in is below the equilibrium value. The maximum ratio between real and equilibrium value of "Other revenues" was registered in (0.00%) and the minimum in (0.00%).

The analysis of "Investment" emphasizes that in 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Investment" emphasizes that in 2014, 2015 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Investment" was registered in 2010 (-11.16%) and the minimum in 2016 (-15.79%).

The analysis of "Government transfers" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Government transfers" emphasizes that in 2008, 2009, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Government transfers" was registered in 2005 (3.86%) and the minimum in 2012 (-2.99%).

The analysis of "Tax revenue" emphasizes that in is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Tax revenue" emphasizes that in is below the equilibrium value. The maximum ratio between real and equilibrium value of "Tax revenue" was registered in (0.00%) and the minimum in (0.00%).

The analysis of "Broad money" emphasizes that in 2011, 2015, 2016 is above the equilibrium value and in 2006, 2007, 2008, 2009, 2010, 2012, 2013, 2014 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Broad money" emphasizes that in 2015, 2016 is above the equilibrium value and in 2014 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Broad money" was registered in 2016 (118.09%) and the minimum in 2009 (85.88%).

The analysis of "Exports" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Exports" emphasizes that in 2008, 2009, 2011, 2012 is below the equilibrium value. The

maximum ratio between real and equilibrium value of "Exports" was registered in 2002 (-2.68%) and the minimum in 2016 (-6.49%).

The analysis of "Imports" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Imports" emphasizes that in 2008, 2009, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Imports" was registered in 2002 (-8.60%) and the minimum in 2016 (-12.76%).

The analysis of "Trade balance" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Trade balance" emphasizes that in 2008, 2009, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Trade balance" was registered in 2004 (-18.61%) and the minimum in 2010 (-24.26%).

The analysis of "Output" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Output" emphasizes that in 2008, 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Output" was registered in 2000 (-20.22%) and the minimum in 2010 (-24.29%).

The analysis of "Real interest rate (%)" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Real interest rate (%)" emphasizes that in 2008, 2009, 2010 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Real interest rate (%)" was registered in 2010 (0.20%) and the minimum in 2001 (-1.93%).

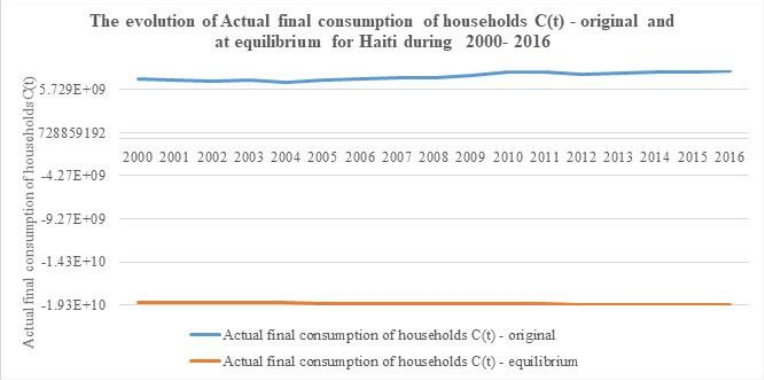


Figure 3.7.1

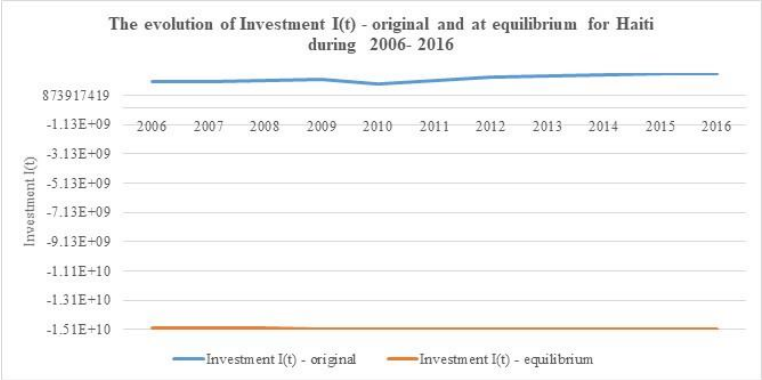


Figure 3.7.2

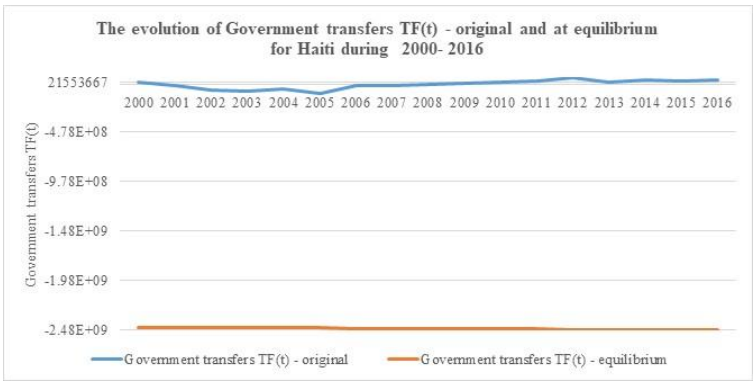


Figure 3.7.3

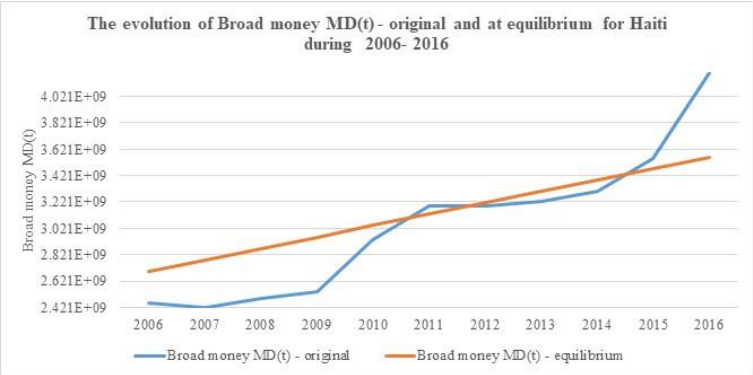


Figure 3.7.4

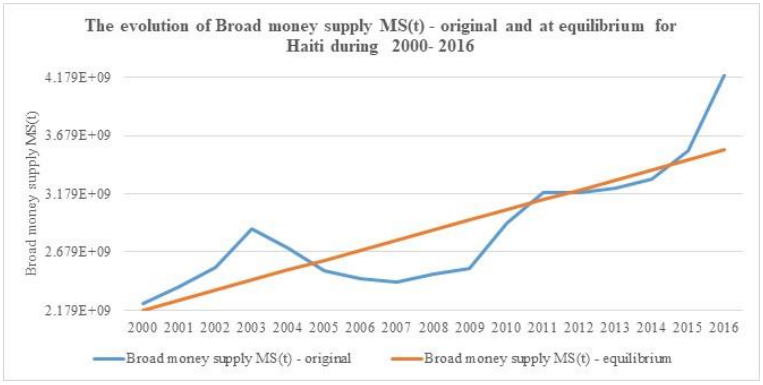


Figure 3.7.5

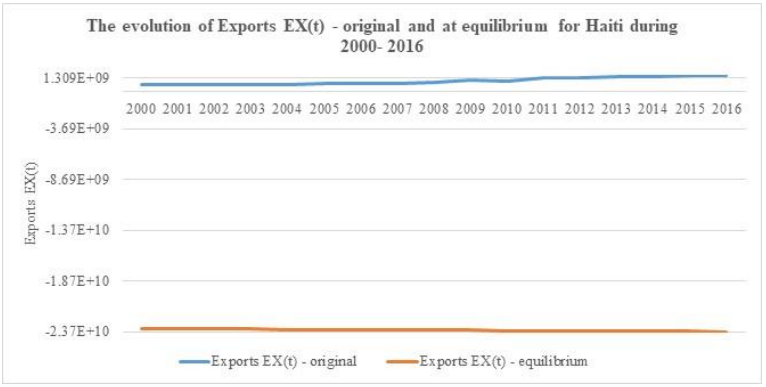


Figure 3.7.6

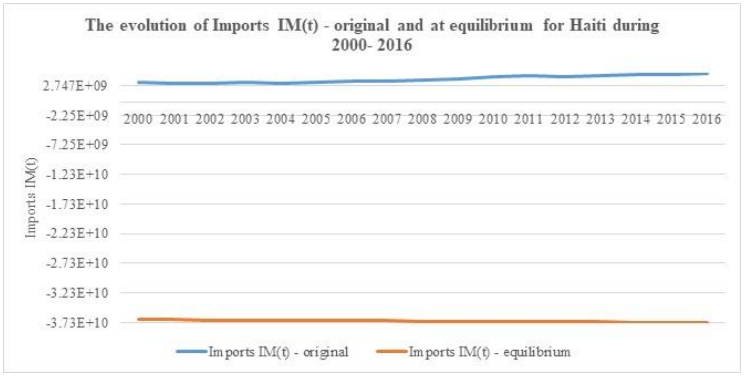


Figure 3.7.7

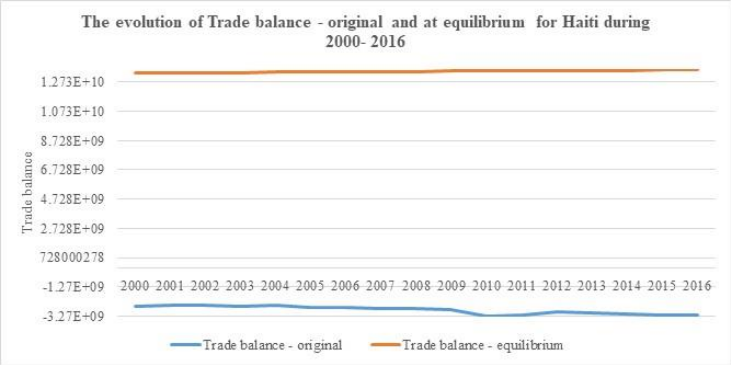


Figure 3.7.8

3.8. Jamaica

After the analysis during 2000-2016 the model equations are:

(236) D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)
(237) C(t)=1.5555DI(t)-9114512586
(238) G(t)=0.2336TI(t)+1205252343
(239) TI(t)=TR(t)+OR(t)
(240) OR(t)=0.0157Y(t)+196871638
(241) I(t)=0.8213Y(t)-17468174r(t)-8046793569
(242) DI(t)=Y(t)+TF(t)-TR(t)
(243) TF(t)=6.5402Y(t)-89951638726
(244) TR(t)=0.4707Y(t)-3089856254
(245) IM(t)=3.1172Y(t)-35149981902
(246) EX(t)=1.5718Y(t)-16888368170
(247) D(t)=Y(t)
(248) MD(t)=1.2729Y(t)+164542306r(t)-11992349879
(249) MS(t)=136203815t-267100491898
(250) MD(t)=MS(t)

Solving the equations (1)-(15) we find that at equilibrium ("t" being the year):

(251) Y(t)=1518628.75t+11175091945.42
(252) r(t)=0.8160t-1636.8627
(253) TI(t)=738582.67t+2542003538.58
(254) G(t)=172555.29t+1799141375.89
(255) DI(t)=10735927.88t-7859602995.39
(256) C(t)=16700130.66t-21340414097.52
(257) OR(t)=23778.87t+371852579.56
(258) TR(t)=714803.80t+2170150959.02

(259) TF(t)=9932102.93t-16864543981.79
(260) I(t)=-13007164.47t+29724766373.49
(261) IM(t)=4733871.00t-314974614.82
(262) EX(t)=2386978.27t+676623678.74
(263) MD(t)=MS(t)=136203814.88t-267100491897.96

From the relationships (16)-(28) we can draw the following conclusions:

The analysis of "Actual final consumption of households" emphasizes that in 2008 is above the equilibrium value and in 2007, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Actual final consumption of households" emphasizes that in 2015, 2016 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of households" was registered in 2008 (102.13%) and the minimum in 2010 (88.39%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 88.98-88.98%.

The analysis of "Actual final consumption of the government" emphasizes that in 2007, 2008, 2009 is above the equilibrium value and in 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2015, 2016 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of the government" was registered in 2008 (105.53%) and the minimum in 2015 (87.62%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 15.88-16.68%.

The analysis of "Other revenues" emphasizes that in 2000, 2003, 2004, 2005, 2007, 2008, 2009, 2013 is above the equilibrium value and in 2001, 2002, 2006, 2010, 2011, 2012, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2009 is above the equilibrium value and in 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Other revenues" was registered in 2007 (123.71%) and the minimum in 2012 (60.27%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 3.09-3.85%.

The analysis of "Investment" emphasizes that in 2007 is above the equilibrium value and in 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Investment" emphasizes that in 2015, 2016 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Investment" was registered in 2007 (101.28%) and the minimum in 2010 (74.46%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 25.98-25.98%.

The analysis of "Government transfers" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Government transfers" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Government transfers" was registered in 2012 (97.99%) and the minimum in 2006 (-345.50%).

The analysis of "Tax revenue" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Tax revenue" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Tax revenue" was registered in 2016 (99.62%) and the minimum in 2001 (75.12%).

The analysis of "Broad money" emphasizes that in 2001, 2002, 2003, 2006, 2010, 2015, 2016 is above the equilibrium value and in 2000, 2004, 2005, 2007, 2008, 2009, 2011, 2012, 2013, 2014 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Broad money" emphasizes that in 2010 is above the equilibrium value and in 2008, 2009, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Broad money" was registered in 2016 (116.67%) and the minimum in 2013 (88.85%).

The analysis of "Exports" emphasizes that in 2008 is above the equilibrium value and in 2007, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Exports" emphasizes that in 2015, 2016 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Exports" was registered in 2008 (100.27%) and the minimum in 2012 (71.67%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 39.19-39.19%.

The analysis of "Imports" emphasizes that in 2007, 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Imports" emphasizes that in 2015, 2016 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Imports" was registered in 2008 (104.19%) and the minimum in 2016 (68.87%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 65.36-68.42%.

The analysis of "Trade balance" emphasizes that in 2007, 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Trade balance" emphasizes that in 2015, 2016 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Trade balance" was registered in 2008 (109.95%) and the minimum in 2016 (51.60%).

The analysis of "Output" emphasizes that in 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Output" emphasizes that in 2015, 2016 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Output" was registered in 2007 (99.20%) and the minimum in 2010 (92.72%).

The analysis of "Real interest rate (%)" emphasizes that in 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value. During the financial crisis (2008-2012), the behavior of "Real interest rate (%)" emphasizes that in 2015, 2016 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Real interest rate (%)" was registered in 2007 (586.24%) and the minimum in 2015 (130.81%).

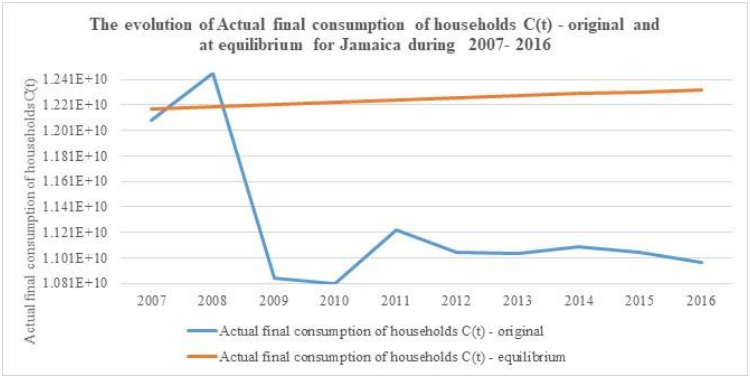


Figure 3.8.1

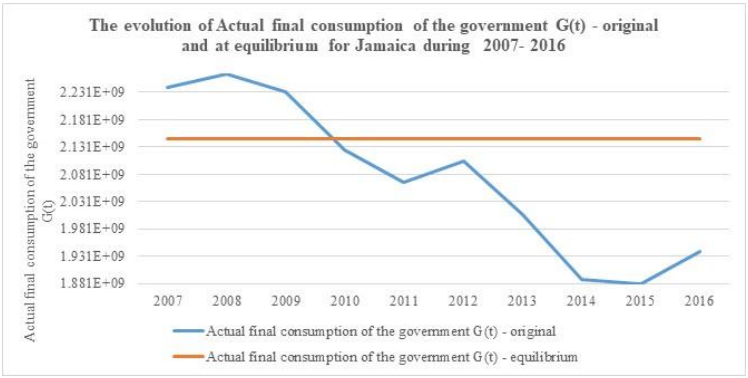


Figure 3.8.2

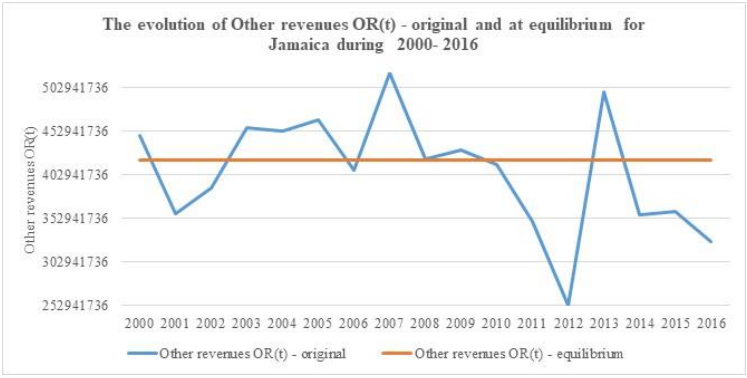


Figure 3.8.3

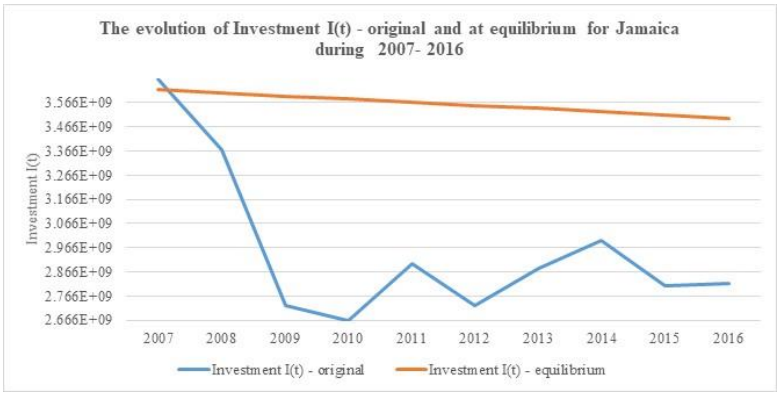


Figure 3.8.4

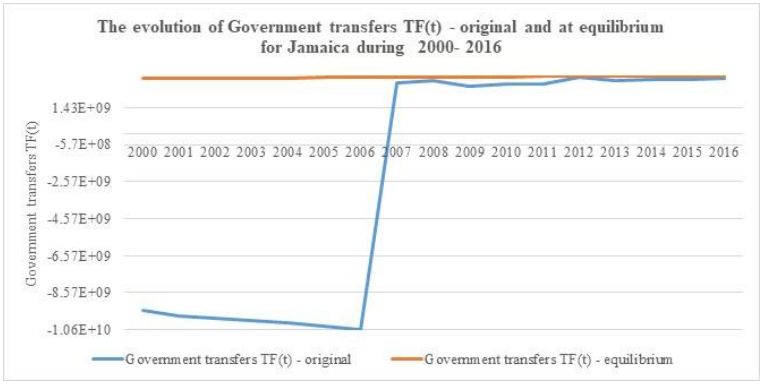


Figure 3.8.5

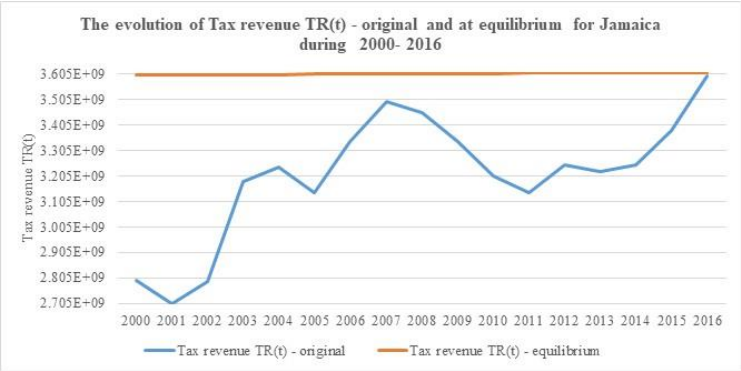


Figure 3.8.6

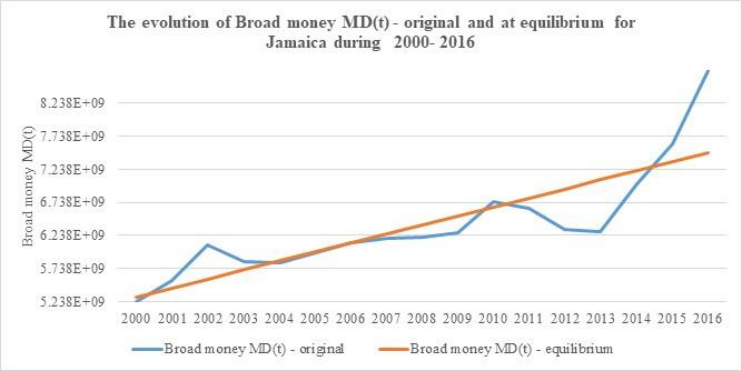


Figure 3.8.7

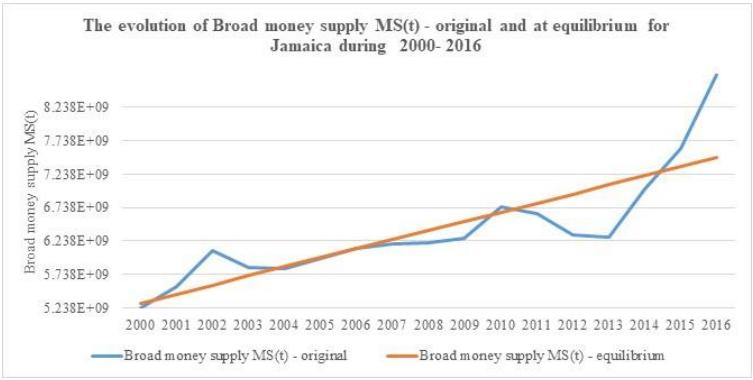


Figure 3.8.8

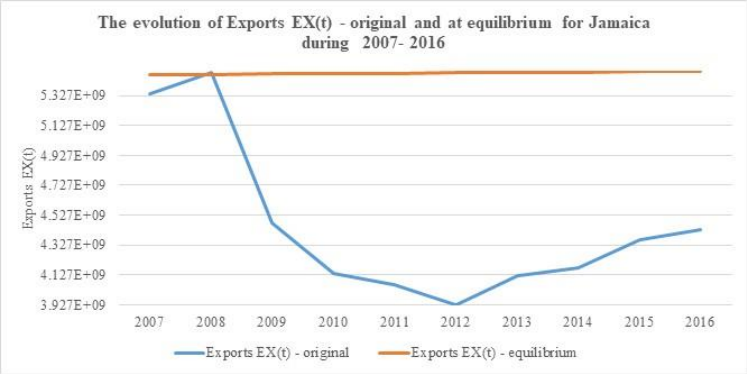


Figure 3.8.9

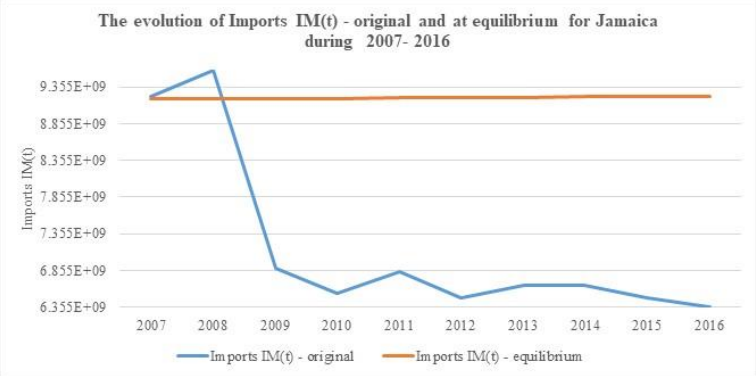


Figure 3.8.10

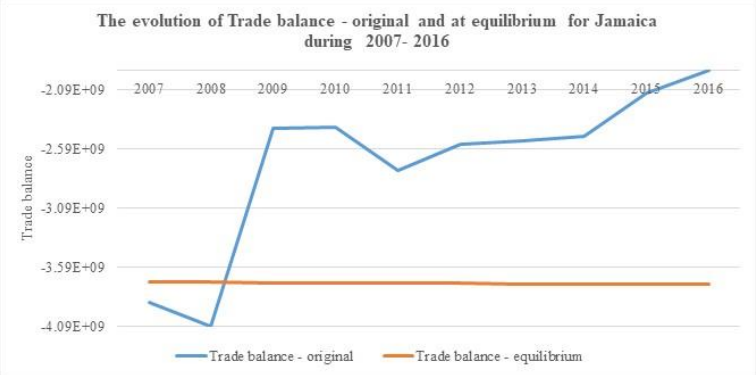


Figure 3.8.11

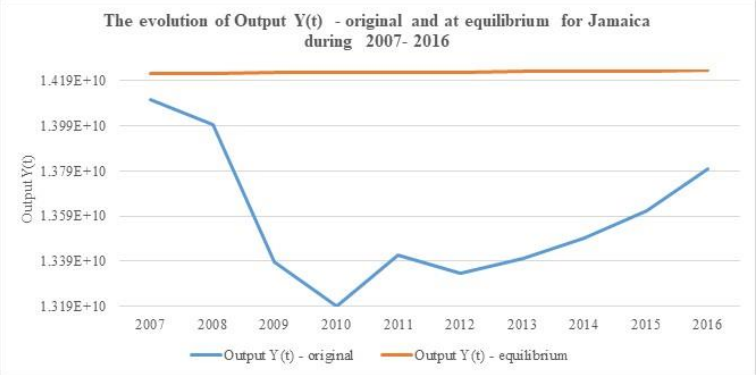


Figure 3.8.12

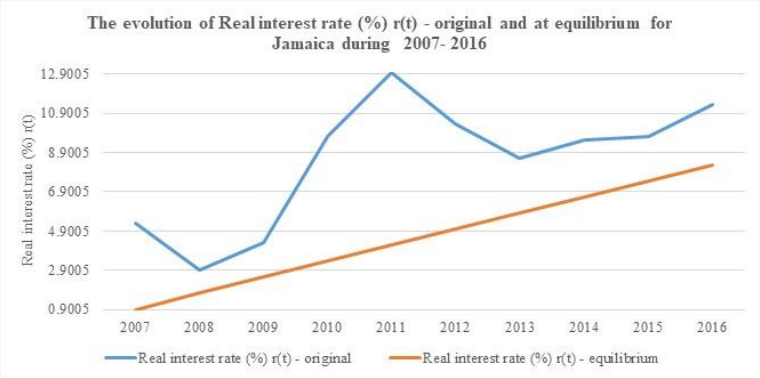


Figure 3.8.13

3.9. Mexico

After the analysis during 2000-2016 the model equations are:

(264) D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)
(265) C(t)=0.6379DI(t)+39411406094
(266) G(t)=0.1556TI(t)+98518859867
(267) TI(t)=TR(t)+OR(t)
(268) OR(t)=0.2939Y(t)-253536715951
(269) I(t)=0.2472Y(t)+1353116666r(t)-29548153404
(270) DI(t)=Y(t)+TF(t)-TR(t)
(271) TF(t)=0.4596Y(t)-411711877701
(272) TR(t)=0.4321Y(t)-375795734191
(273) IM(t)=0.6020Y(t)-308168604224
(274) EX(t)=0.5473Y(t)-257770951729

(275) D(t)=Y(t)
(276) MD(t)=0.7472Y(t)+15921194325r(t)-514047841761
(277) MS(t)=14910758582t-29654148102293
(278) MD(t)=MS(t)

Solving the equations (1)-(15) we find that at equilibrium ("t" being the year):

(279) Y(t)=12347012400.32t-23760132796223.00
(280) r(t)=0.3571t-715.2062
(281) TI(t)=8964089867.49t-17879494573855.40
(282) G(t)=1394920850.08t-2683746840132.19
(283) DI(t)=12686281862.03t-24448926510647.00
(284) C(t)=8092295923.87t-15556012887391.80
(285) OR(t)=3628808913.99t-7236682022120.66
(286) TR(t)=5335280953.51t-10642812551734.70
(287) TF(t)=5674550415.22t-11331606266158.80
(288) I(t)=3535514172.62t-6871098433795.26
(289) IM(t)=7432802040.92t-14611577219553.70
(290) EX(t)=6757083494.66t-13260851854457.40
(291) MD(t)=MS(t)=14910758582.33t-29654148102292.60

From the relationships (16)-(28) we can draw the following conclusions:

The analysis of "Actual final consumption of households" emphasizes that in 2007, 2008, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2009, 2010 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Actual final consumption of households" emphasizes that in 2008, 2011, 2012 is above the equilibrium value and in 2009, 2010 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of households" was registered in 2016 (109.24%) and the minimum in 2003 (91.36%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 66.29-67.86%.

The analysis of "Actual final consumption of the government" emphasizes that in 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2009, 2010, 2011, 2012 is above the equilibrium value and in 2008 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of the government" was registered in 2015 (115.32%) and the minimum in 2002 (86.05%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 11.71-12.10%.

The analysis of "Other revenues" emphasizes that in 2000, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Other revenues" was registered in 2008 (224.85%) and the minimum in 2016 (101.04%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 2.63-10.71%.

The analysis of "Investment" emphasizes that in 2006, 2007, 2008, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2009, 2010 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Investment" emphasizes that in 2008, 2011, 2012 is above the equilibrium value and in 2009, 2010 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Investment" was registered in 2008 (111.79%) and the minimum in 2002 (88.09%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 21.53-24.31%.

The analysis of "Government transfers" emphasizes that in 2000, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2005, 2006, 2007 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Government transfers" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Government transfers" was registered in 2000 (392.25%) and the minimum in 2001 (-69.78%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 7.79-13.30%.

The analysis of "Tax revenue" emphasizes that in 2000, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value. During the financial crisis (2008-2012), the behavior of "Tax revenue" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Tax revenue" was registered in 2000 (314.66%) and the minimum in 2012 (122.62%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 9.73-13.94%.

The analysis of "Broad money" emphasizes that in 2000, 2001, 2002, 2016 is above the equilibrium value and in 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Broad money" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Broad money" was registered in 2016 (167.83%) and the minimum in 2010 (83.66%).

The analysis of "Exports" emphasizes that in 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Exports" emphasizes that in 2011, 2012 is above the equilibrium value and in 2008, 2009, 2010 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Exports" was registered in 2015 (120.92%) and the minimum in 2009 (83.08%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 31.03-35.43%.

The analysis of "Imports" emphasizes that in 2007, 2008, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2009, 2010 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Imports" emphasizes that in 2008, 2011, 2012 is above the equilibrium value and in 2009, 2010 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Imports" was registered in 2015 (118.68%) and the minimum in 2002 (83.83%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 30.33-35.84%.

The analysis of "Trade balance" emphasizes that in 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Trade balance" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Trade balance" was registered in 2008 (550.20%) and the minimum in 2000 (-2165.49%).

The analysis of "Output" emphasizes that in 2007, 2008, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2009, 2010 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Output" emphasizes that in 2008, 2011, 2012 is above the equilibrium value and in 2009, 2010 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Output" was registered in 2016 (109.43%) and the minimum in 2002 (91.46%).

The analysis of "Real interest rate (%)" emphasizes that in 2003, 2004, 2005, 2006, 2007, 2008 is above the equilibrium value and in 2000, 2001, 2002, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Real interest rate (%)" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Real interest rate (%)" was registered in 2003 (1786.98%) and the minimum in 2002 (-876.38%).

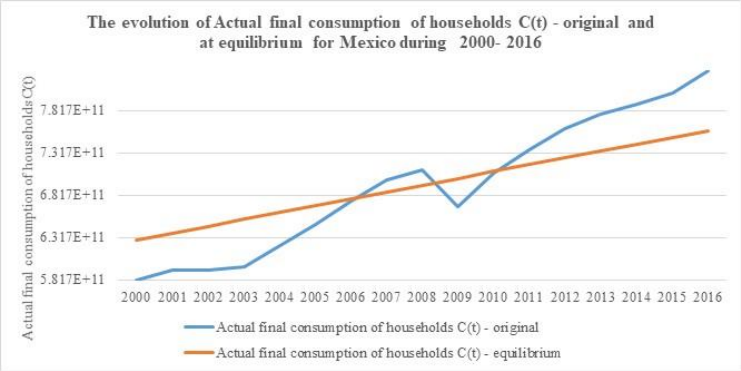


Figure 3.9.1

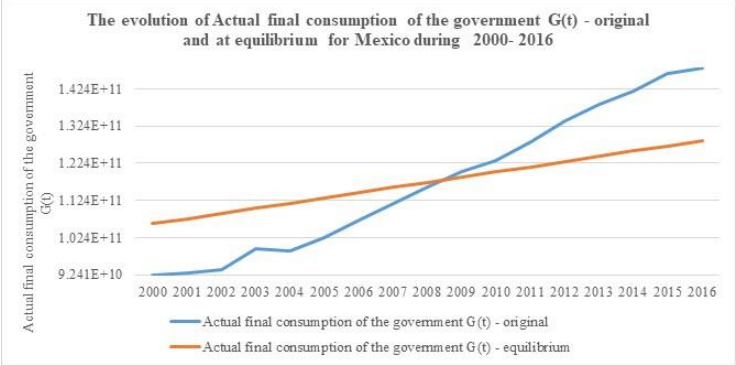


Figure 3.9.2

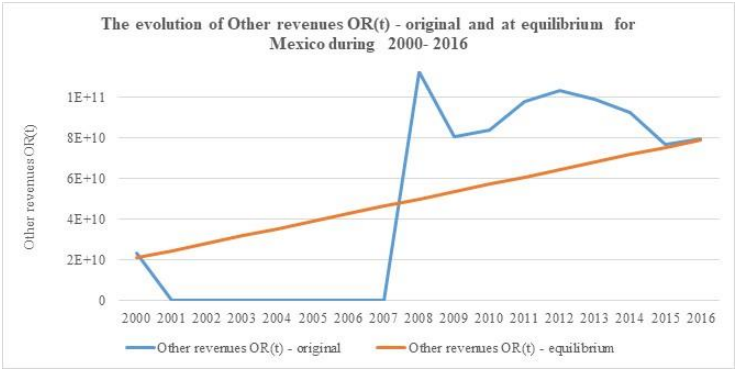


Figure 3.9.3

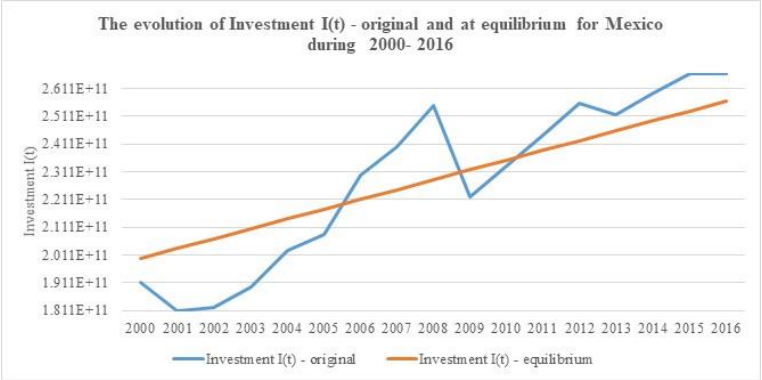


Figure 3.9.4

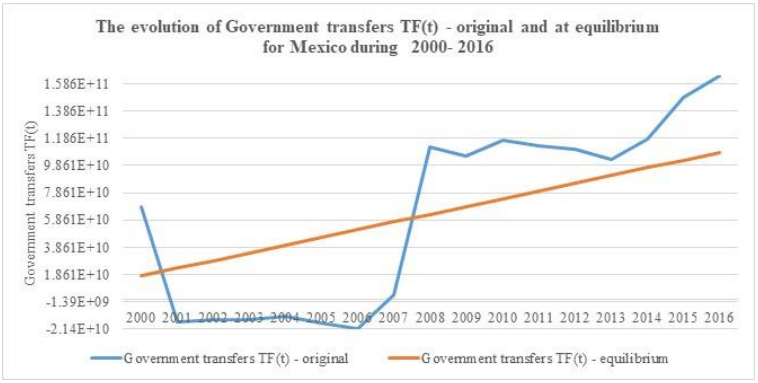


Figure 3.9.5

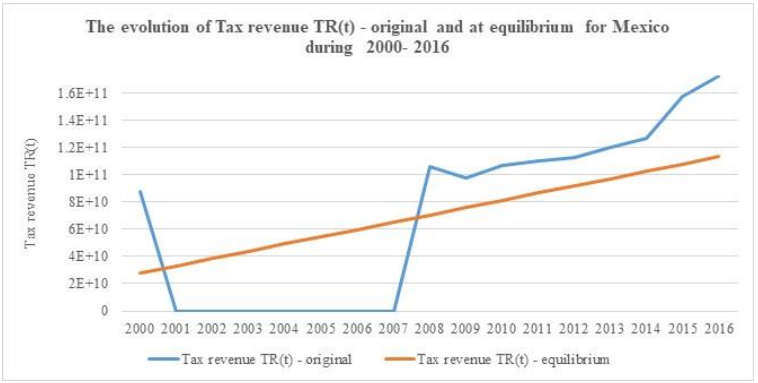


Figure 3.9.6

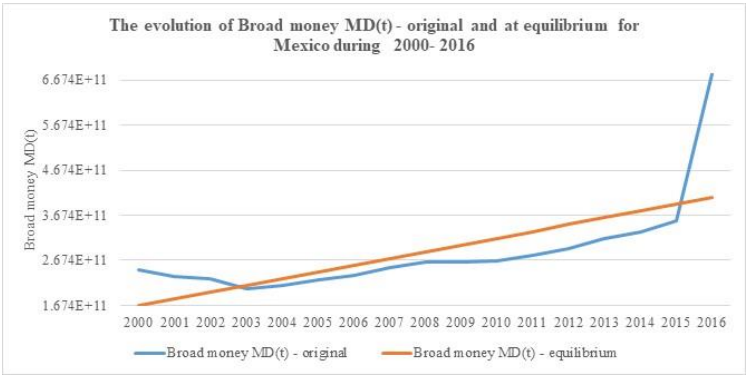


Figure 3.9.7

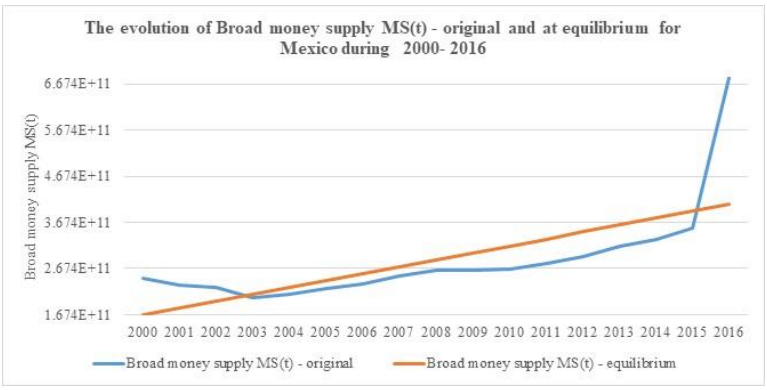


Figure 3.9.8

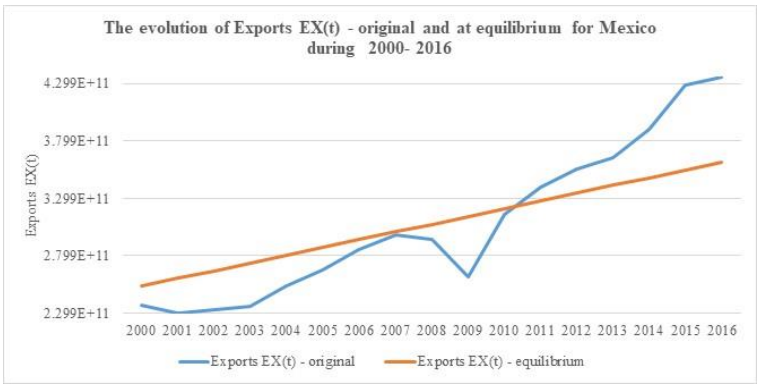


Figure 3.9.9

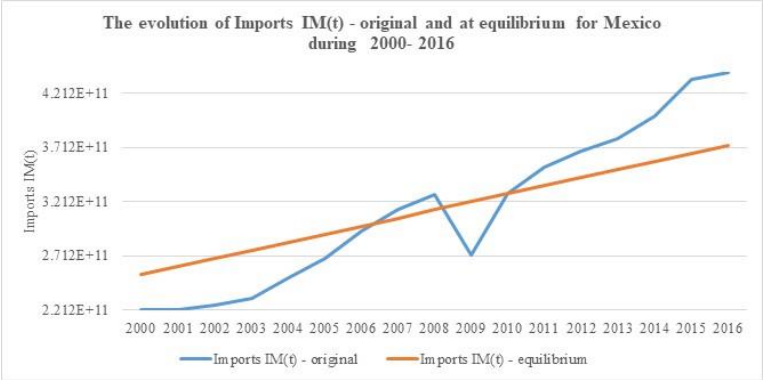


Figure 3.9.10

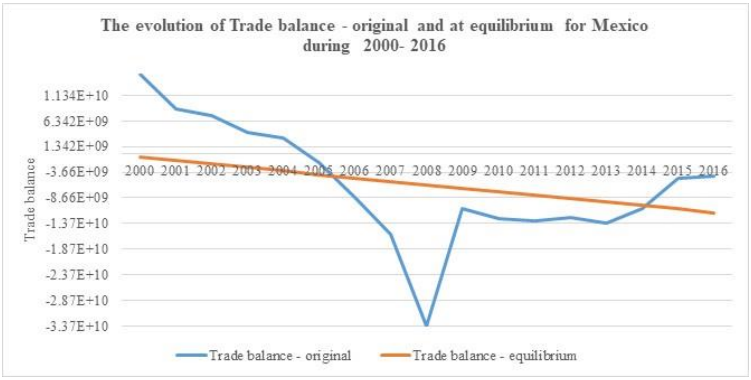


Figure 3.9.11

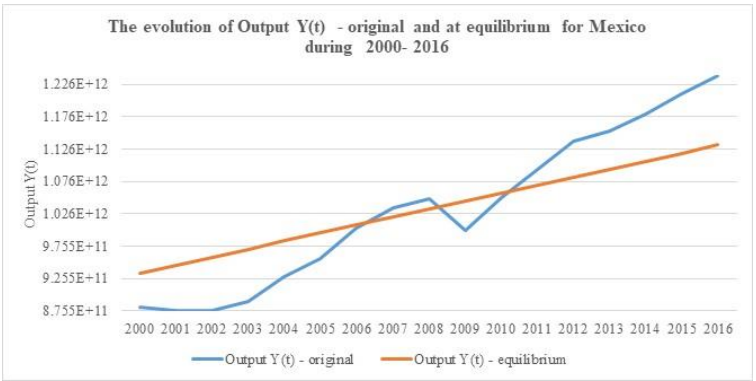


Figure 3.9.12

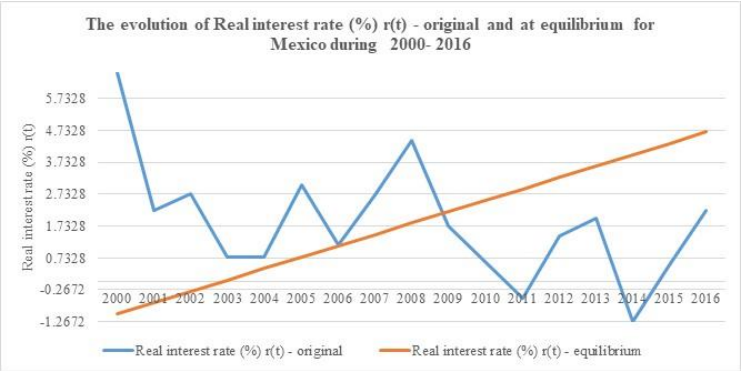


Figure 3.9.13

3.10. Nicaragua

After the analysis during 2000-2016 the model equations are:

(292) D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)
(293) C(t)=0.6976DI(t)+1321261636
(294) G(t)=0.2678TI(t)+361372385
(295) TI(t)=TR(t)+OR(t)
(296) OR(t)=0.0155Y(t)-38811200
(297) I(t)=0.3780Y(t)-18602341r(t)-679774275
(298) DI(t)=Y(t)+TF(t)-TR(t)
(299) TF(t)=0.2918Y(t)-1479884119
(300) TR(t)=0.2292Y(t)-807603579
(301) IM(t)=0.9420Y(t)-3360472203
(302) EX(t)=0.7457Y(t)-3458596153
(303) D(t)=Y(t)
(304) MD(t)=0.3408Y(t)+49065851r(t)-561912339
(305) MS(t)=88978530t-175969141532
(306) MD(t)=MS(t)

Solving the equations (1)-(15) we find that at equilibrium ("t" being the year):

(307) Y(t)=286568980.51t-566702285467.15
(308) r(t)=-0.1767t+360.6740
(309) TI(t)=70150503.88t-139572004707.51
(310) G(t)=18783278.89t-37009989822.36
(311) DI(t)=304482556.87t-602799421291.19
(312) C(t)=212406577.55t-419190715609.20
(313) OR(t)=4455749.42t-8850244221.77
(314) TR(t)=65694754.47t-130721760485.74
(315) TF(t)=83608330.83t-166818896309.79

(316) I(t)=111605535.07t-221593563128.63
(317) IM(t)=269934647.25t-537167659747.32
(318) EX(t)=213708236.25t-426075676654.27
(319) MD(t)=MS(t)=88978530.38t-175969141532.35

From the relationships (16)-(28) we can draw the following conclusions:

The analysis of "Actual final consumption of households" emphasizes that in 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Actual final consumption of households" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of households" was registered in 2016 (108.21%) and the minimum in 2006 (96.51%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 80.92-81.55%.

The analysis of "Actual final consumption of the government" emphasizes that in 2000, 2001, 2003, 2004, 2005, 2006, 2014, 2015, 2016 is above the equilibrium value and in 2002, 2007, 2008, 2009, 2010, 2011, 2012, 2013 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of the government" was registered in 2016 (119.94%) and the minimum in 2009 (88.11%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 7.73-9.07%.

The analysis of "Other revenues" emphasizes that in 2000, 2002, 2007, 2011, 2012, 2013, 2015, 2016 is above the equilibrium value and in 2001, 2003, 2004, 2005, 2006, 2008, 2009, 2010, 2014 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2011, 2012 is above the equilibrium value and in 2008, 2009, 2010 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Other revenues" was registered in 2012 (122.01%) and the minimum in 2009 (82.57%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 0.98-1.41%.

The analysis of "Investment" emphasizes that in 2000, 2001, 2007, 2008, 2012, 2013, 2015, 2016 is above the equilibrium value and in 2002, 2003, 2004, 2005, 2006, 2009, 2010, 2011, 2014 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Investment" emphasizes that in 2008, 2012 is above the equilibrium value and in 2009, 2010, 2011 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Investment" was registered in 2000 (123.40%) and the minimum in 2009 (75.00%). The excess of

equilibrium values is due, in the corresponding periods, to the large share of GDP, between 27.10-33.08%.

The analysis of "Government transfers" emphasizes that in 2000, 2008, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2009, 2010 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Government transfers" emphasizes that in 2008, 2011, 2012 is above the equilibrium value and in 2009, 2010 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Government transfers" was registered in 2016 (111.31%) and the minimum in 2001 (71.87%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 6.51-16.14%.

The analysis of "Tax revenue" emphasizes that in 2000, 2006, 2007, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2005, 2008, 2009, 2010, 2011 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Tax revenue" emphasizes that in 2012 is above the equilibrium value and in 2008, 2009, 2010, 2011 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Tax revenue" was registered in 2016 (113.06%) and the minimum in 2009 (87.54%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 10.65-16.23%.

The analysis of "Broad money" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2014, 2015, 2016 is above the equilibrium value and in 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Broad money" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Broad money" was registered in 2016 (139.01%) and the minimum in 2009 (76.56%).

The analysis of "Exports" emphasizes that in 2000, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Exports" emphasizes that in 2010, 2011, 2012 is above the equilibrium value and in 2008, 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Exports" was registered in 2012 (110.66%) and the minimum in 2003 (79.50%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 21.01-43.84%.

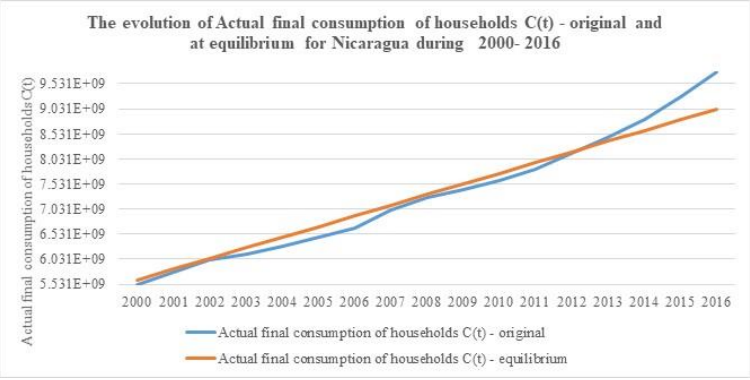
The analysis of "Imports" emphasizes that in 2000, 2007, 2008, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2005, 2006, 2009, 2010 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Imports" emphasizes that in 2008, 2011, 2012 is above

the equilibrium value and in 2009, 2010 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Imports" was registered in 2016 (109.90%) and the minimum in 2003 (86.34%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 43.94-64.46%.

The analysis of "Trade balance" emphasizes that in 2000, 2001, 2002, 2007, 2008, 2011, 2015, 2016 is above the equilibrium value and in 2003, 2004, 2005, 2006, 2009, 2010, 2012, 2013, 2014 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Trade balance" emphasizes that in 2008, 2011 is above the equilibrium value and in 2009, 2010, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Trade balance" was registered in 2016 (121.96%) and the minimum in 2014 (85.23%).

The analysis of "Output" emphasizes that in 2000, 2001, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Output" emphasizes that in 2012 is above the equilibrium value and in 2008, 2009, 2010, 2011 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Output" was registered in 2016 (108.61%) and the minimum in 2009 (93.05%).

The analysis of "Real interest rate (%)" emphasizes that in 2000, 2001, 2002, 2003, 2009, 2010, 2012, 2013, 2016 is above the equilibrium value and in 2004, 2005, 2006, 2007, 2008, 2011, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Real interest rate (%)" emphasizes that in 2009, 2010, 2012 is above the equilibrium value and in 2008, 2011 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Real interest rate (%)" was registered in 2002 (210.60%) and the minimum in 2008 (-44.50%).



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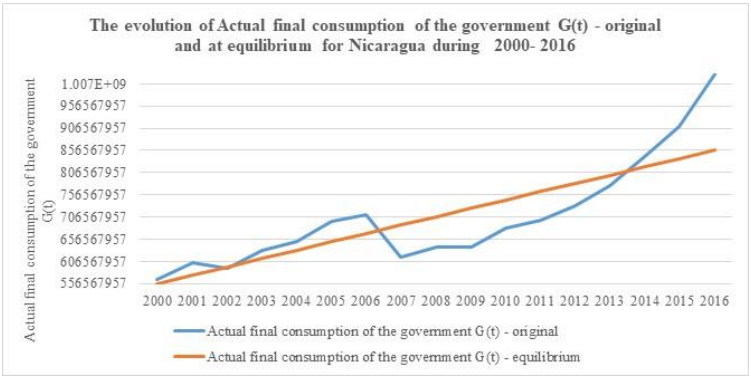


Figure 3.10.2

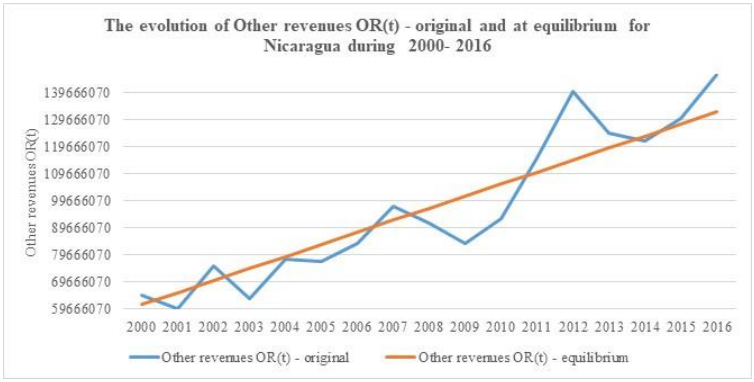


Figure 3.10.3

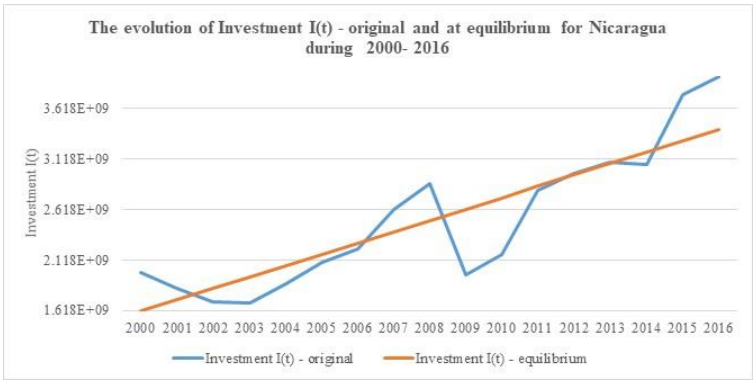


Figure 3.10.4

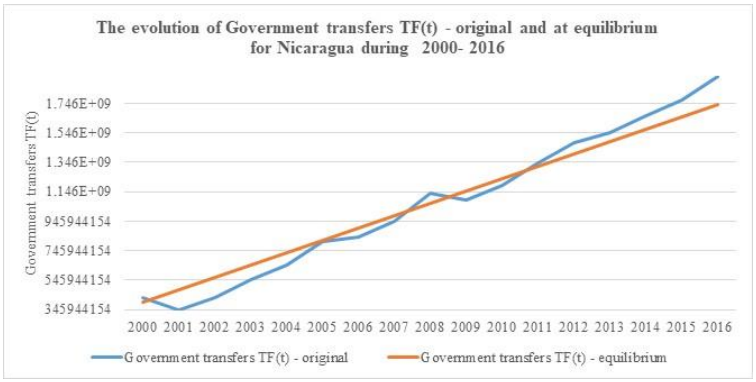


Figure 3.10.5

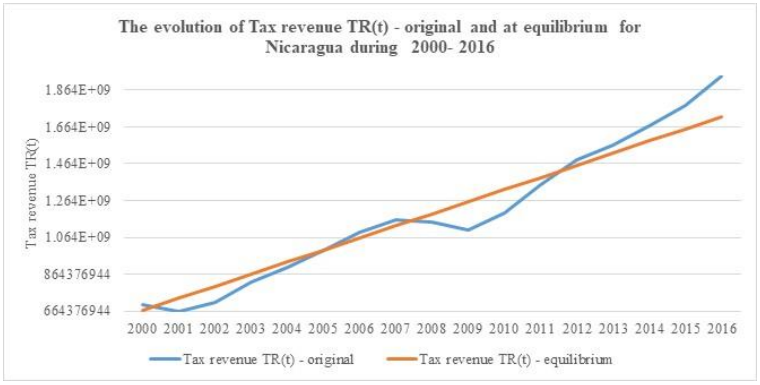


Figure 3.10.6

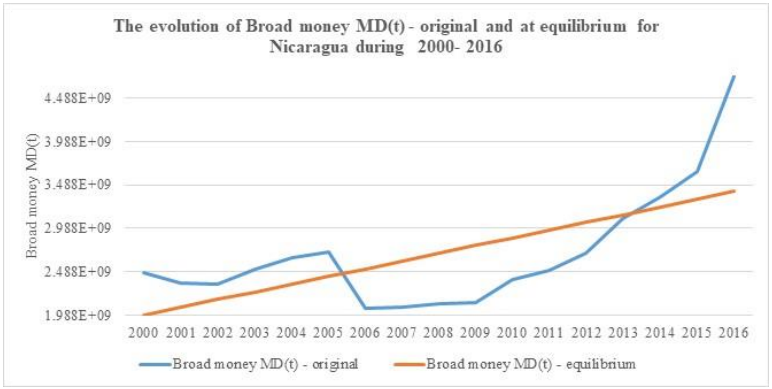


Figure 3.10.7

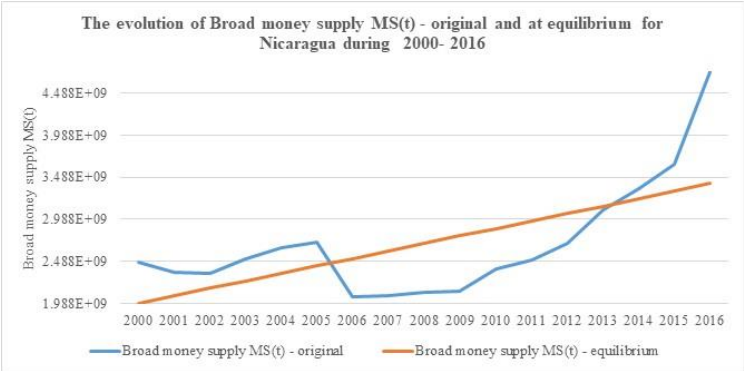
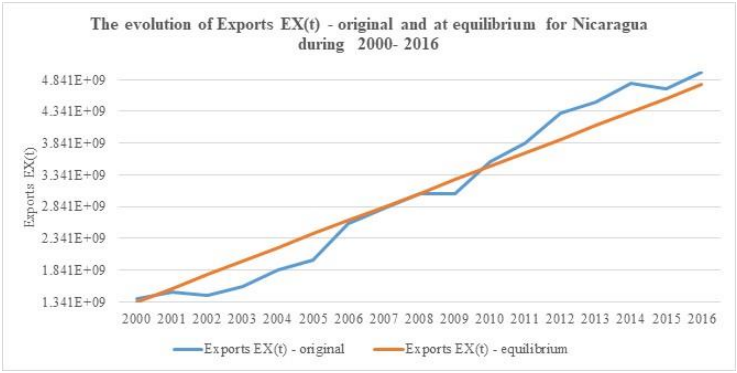


Figure 3.10.8



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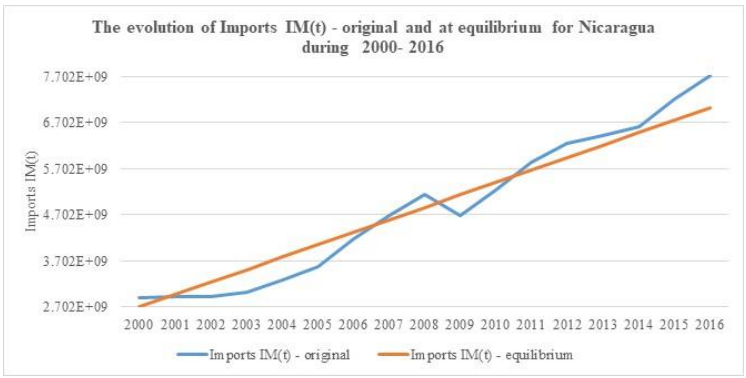

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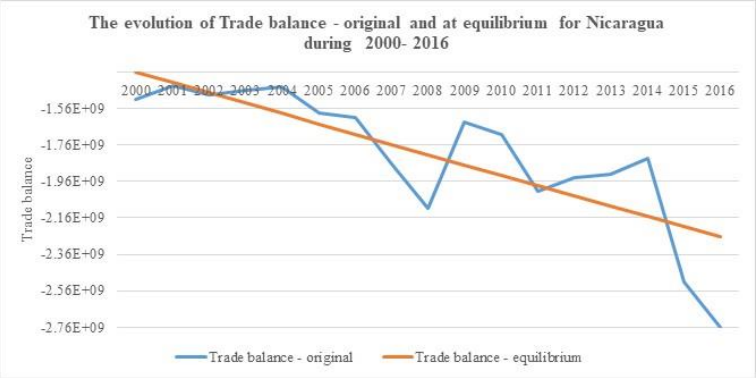

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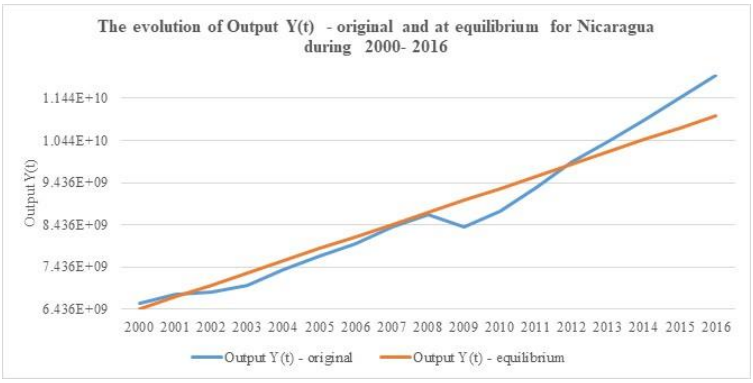


Figure 3.10.12

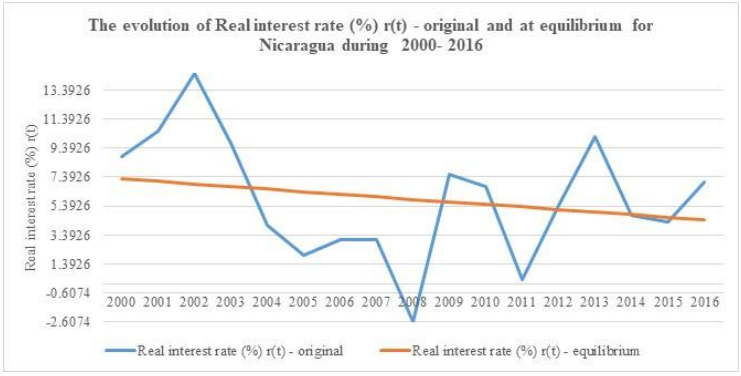


Figure 3.10.13

3.11. Peru

After the analysis during 2000-2016 the model equations are:

(320) D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)
(321) C(t)=0.6617DI(t)-615882143
(322) G(t)=0.5198TI(t)+905111868
(323) TI(t)=TR(t)+OR(t)
(324) OR(t)=0.0560Y(t)-1261876348
(325) I(t)=0.3824Y(t)+265642964r(t)-27763316706
(326) DI(t)=Y(t)+TF(t)-TR(t)
(327) TF(t)=0.0457Y(t)+5738548239
(328) TR(t)=0.1912Y(t)-5104061651
(329) IM(t)=0.3251Y(t)-13947892348
(330) EX(t)=0.2051Y(t)+9409474912
(331) D(t)=Y(t)
(332) MD(t)=0.5519Y(t)+283500862r(t)-31746677561
(333) MS(t)=3828929396t-7641219812338
(334) MD(t)=MS(t)

Solving the equations (1)-(15) we find that at equilibrium ("t" being the year):

(335) Y(t)=6396972602.79t-12713555916563.80
(336) r(t)=1.0528t-2091.4257
(337) TI(t)=1580855092.59t-3148209879448.25
(338) G(t)=821746083.79t-1635569446419.53
(339) DI(t)=5466761036.72t-10853979930161.70
(340) C(t)=3617243400.48t-7182471281997.26
(341) OR(t)=358004136.11t-712771192618.74
(342) TR(t)=1222850956.48t-2435438686829.50
(343) TF(t)=292639390.42t-575862700427.31
(344) I(t)=2725835006.46t-5444926912526.31
(345) IM(t)=2079651429.50t-4147116248332.08
(346) EX(t)=1311799541.57t-2597704523952.83
(347) MD(t)=MS(t)=3828929395.82t-7641219812338.12

From the relationships (16)-(28) we can draw the following conclusions:

The analysis of "Actual final consumption of households" emphasizes that in 2000, 2001, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Actual final consumption of households" emphasizes that in 2010, 2011, 2012 is above the equilibrium value and in 2008, 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of households" was registered

in 2013 (111.31%) and the minimum in 2005 (91.70%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 61.73-65.28%.

The analysis of "Actual final consumption of the government" emphasizes that in 2000, 2001, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2012 is above the equilibrium value and in 2008, 2009, 2010, 2011 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of the government" was registered in 2015 (117.44%) and the minimum in 2004 (91.79%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 10.54-12.77%.

The analysis of "Other revenues" emphasizes that in 2000, 2001, 2008, 2010, 2011, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2002, 2003, 2004, 2005, 2006, 2007, 2009 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2010, 2011, 2012 is above the equilibrium value and in 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Other revenues" was registered in 2000 (141.49%) and the minimum in 2004 (75.47%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 4.33-5.34%.

The analysis of "Investment" emphasizes that in 2000, 2001, 2002, 2008, 2010, 2011, 2012, 2013, 2014 is above the equilibrium value and in 2003, 2004, 2005, 2006, 2007, 2009, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Investment" emphasizes that in 2008, 2010, 2011, 2012 is above the equilibrium value and in 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Investment" was registered in 2000 (195.19%) and the minimum in 2005 (69.77%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 13.98-26.52%.

The analysis of "Government transfers" emphasizes that in 2001, 2008, 2011, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2000, 2002, 2003, 2004, 2005, 2006, 2007, 2009, 2010, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Government transfers" emphasizes that in 2008, 2011, 2012 is above the equilibrium value and in 2009, 2010 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Government transfers" was registered in 2014 (167.66%) and the minimum in 2016 (-54.04%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 8.23-12.56%.

The analysis of "Tax revenue" emphasizes that in 2000, 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2005, 2009, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Tax revenue" emphasizes that in 2008, 2010, 2011, 2012 is above the equilibrium value and in 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Tax revenue" was registered in 2008 (110.96%) and the minimum in 2002 (89.45%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 12.61-16.70%.

The analysis of "Broad money" emphasizes that in 2000, 2001, 2002, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Broad money" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Broad money" was registered in 2000 (167.48%) and the minimum in 2006 (79.26%).

The analysis of "Exports" emphasizes that in 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Exports" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Exports" was registered in 2008 (112.99%) and the minimum in 2000 (85.13%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 25.19-33.34%.

The analysis of "Imports" emphasizes that in 2000, 2001, 2008, 2010, 2011, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2002, 2003, 2004, 2005, 2006, 2007, 2009, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Imports" emphasizes that in 2008, 2010, 2011, 2012 is above the equilibrium value and in 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Imports" was registered in 2000 (118.68%) and the minimum in 2004 (84.00%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 16.86-26.37%.

The analysis of "Trade balance" emphasizes that in 2004, 2005, 2006, 2007, 2008, 2009, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2010, 2011, 2012, 2013, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Trade balance" emphasizes that in 2008, 2009 is above the equilibrium value and in 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Trade balance" was registered in 2016 (316.12%) and the minimum in 2014 (-69.64%).

The analysis of "Output" emphasizes that in 2000, 2008, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2009 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Output" emphasizes that in 2008, 2010, 2011, 2012 is above the equilibrium value and in 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Output" was registered in 2013 (107.76%) and the minimum in 2004 (93.92%).

The analysis of "Real interest rate (%)" emphasizes that in 2000, 2001, 2002, 2003, 2005 is above the equilibrium value and in 2004, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Real interest rate (%)" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Real interest rate (%)" was registered in 2000 (180.36%) and the minimum in 2016 (39.89%).

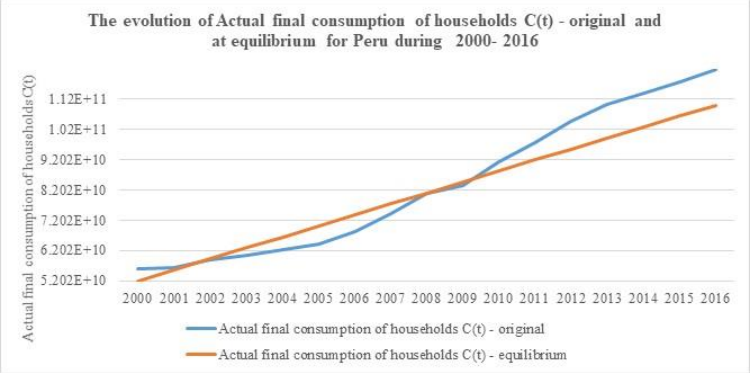


Figure 3.11.1

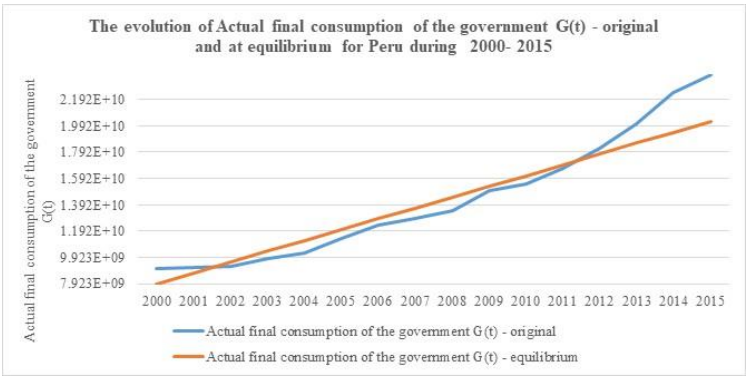


Figure 3.11.2

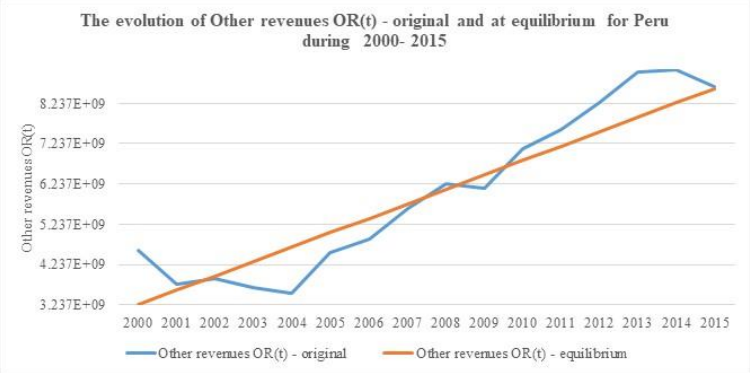


Figure 3.11.3

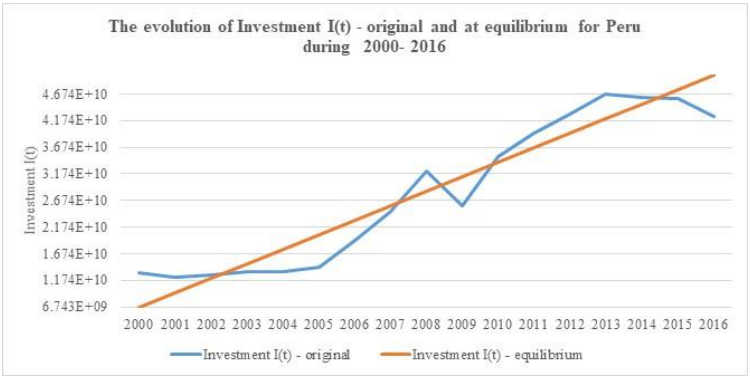


Figure 3.11.4

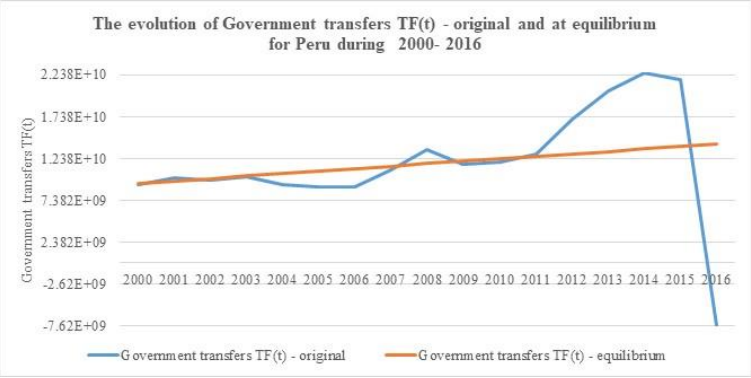


Figure 3.11.5

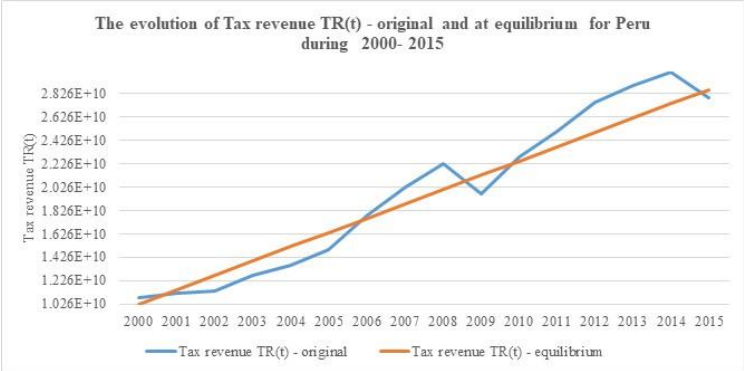


Figure 3.11.6

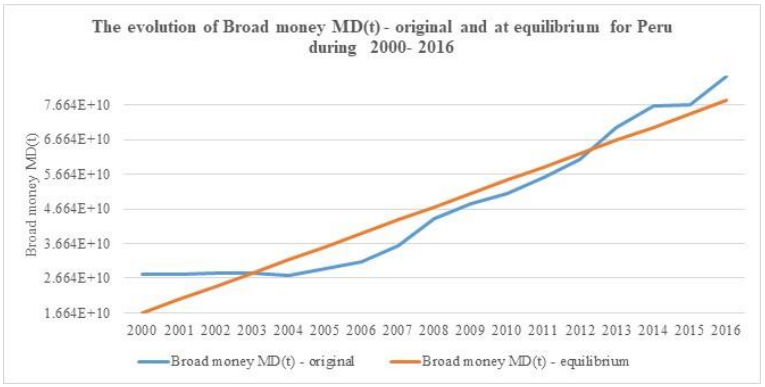


Figure 3.11.7

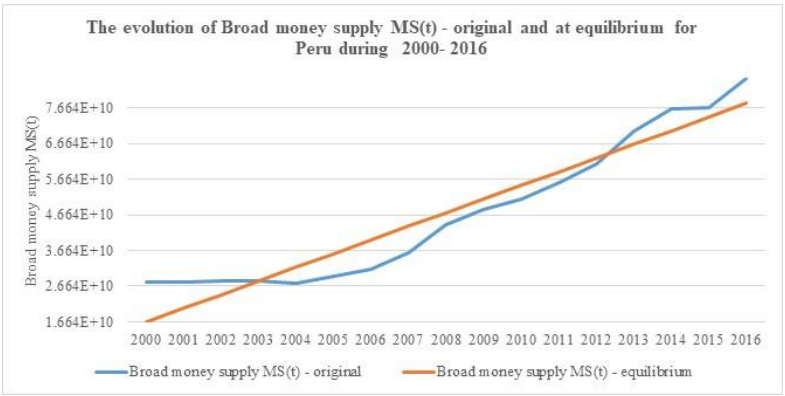


Figure 3.11.8

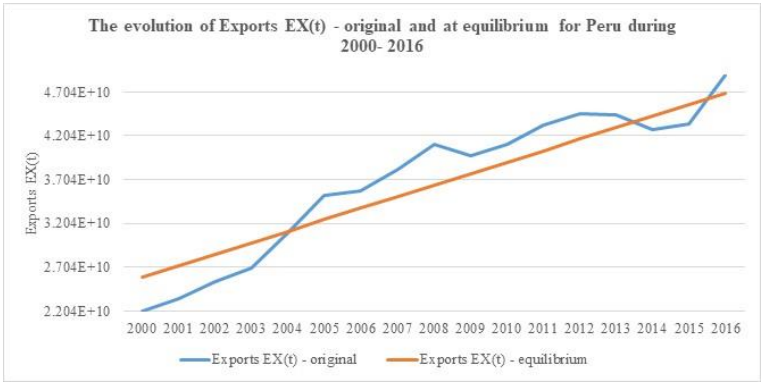


Figure 3.11.9

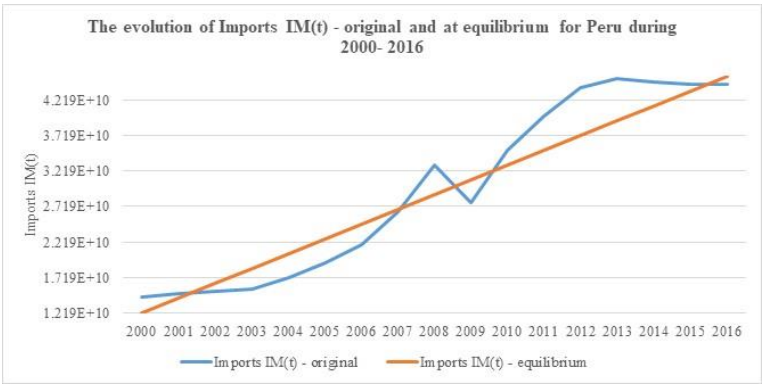


Figure 3.11.10

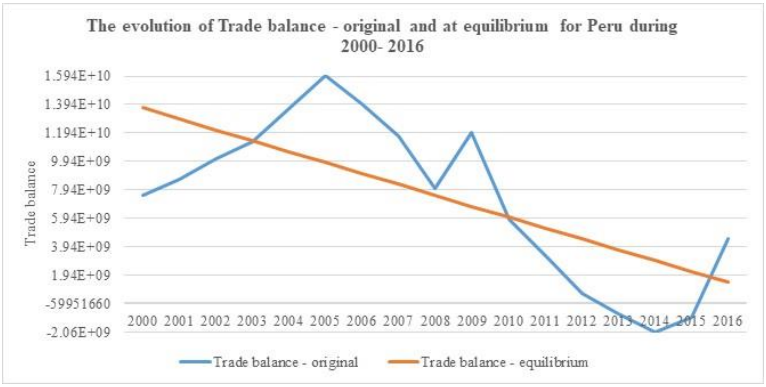


Figure 3.11.11

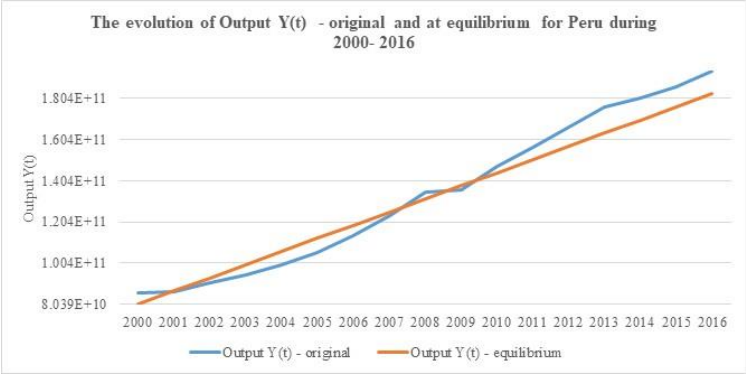


Figure 3.11.12

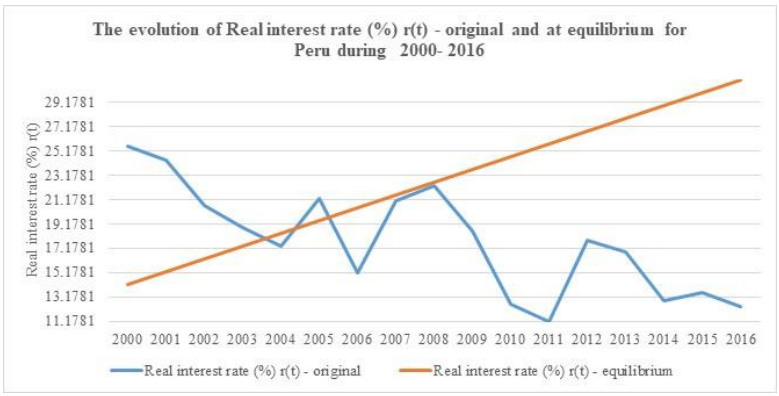


Figure 3.11.13

3.12. Paraguay

After the analysis during 2000-2016 the model equations are:

(348) D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)
(349) C(t)=0.6183DI(t)+2046589034
(350) G(t)=0.5390TI(t)-5081200
(351) TI(t)=TR(t)+OR(t)
(352) OR(t)=0.1289Y(t)-847978735
(353) I(t)=0.1947Y(t)+9282772r(t)-856085649
(354) DI(t)=Y(t)+TF(t)-TR(t)
(355) TF(t)=0.2618Y(t)-5033017321
(356) TR(t)=0.1723Y(t)-1087613421
(357) IM(t)=0.5928Y(t)-2325627482
(358) EX(t)=0.5912Y(t)-1156792770

(359) D(t)=Y(t)
(360) MD(t)=0.9307Y(t)-5008281r(t)-10949314422
(361) MS(t)=728710906t-1456777453501
(362) MD(t)=MS(t)

Solving the equations (1)-(15) we find that at equilibrium ("t" being the year):

(363) Y(t)=769993251.91t-1527092683990.34
(364) r(t)=-2.4102t+4901.5460
(365) TI(t)=231876482.75t-461805700789.72
(366) G(t)=124991094.00t-248937612313.92
(367) DI(t)=838934405.98t-1667765951072.85
(368) C(t)=518704433.46t-1029115783899.68
(369) OR(t)=99241036.93t-197668224978.83
(370) TR(t)=132635445.82t-264137475810.90
(371) TF(t)=201576599.89t-404810742893.40
(372) I(t)=127506499.08t-252605430391.52
(373) IM(t)=456428396.94t-907539360209.94
(374) EX(t)=455219622.30t-903973217595.16
(375) MD(t)=MS(t)=728710906.06t-1456777453501.00

From the relationships (16)-(28) we can draw the following conclusions:

The analysis of "Actual final consumption of households" emphasizes that in 2000, 2001, 2004, 2008, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2002, 2003, 2005, 2006, 2007, 2009 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Actual final consumption of households" emphasizes that in 2008, 2010, 2011, 2012 is above the equilibrium value and in 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of households" was registered in 2000 (108.28%) and the minimum in 2009 (94.06%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 62.90-72.42%.

The analysis of "Actual final consumption of the government" emphasizes that in 2012, 2013, 2014, 2015 is above the equilibrium value and in 2005, 2006, 2007, 2008, 2009, 2010, 2011 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2013, 2014, 2015 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of the government" was registered in 2013 (106.90%) and the minimum in 2008 (79.22%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 15.25-16.45%.

The analysis of "Other revenues" emphasizes that in 2012, 2014, 2015 is above the equilibrium value and in 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2013 is below

the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2014, 2015 is above the equilibrium value and in 2013 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Other revenues" was registered in 2015 (115.87%) and the minimum in 2010 (87.35%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 11.65-13.32%.

The analysis of "Investment" emphasizes that in 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Investment" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Investment" was registered in 2016 (101.08%) and the minimum in 2005 (72.55%).

The analysis of "Government transfers" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2006, 2007, 2008, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Government transfers" emphasizes that in 2009, 2010, 2011, 2012 is above the equilibrium value and in 2008 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Government transfers" was registered in 2009 (457.40%) and the minimum in 2008 (-1942.69%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between -18.97-7.85%.

The analysis of "Tax revenue" emphasizes that in 2011, 2014, 2015 is above the equilibrium value and in 2005, 2006, 2007, 2008, 2009, 2010, 2012, 2013 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Tax revenue" emphasizes that in 2014, 2015 is above the equilibrium value and in 2013 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Tax revenue" was registered in 2014 (105.04%) and the minimum in 2007 (85.32%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 16.01-17.73%.

The analysis of "Broad money" emphasizes that in 2000, 2001, 2002, 2003, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Broad money" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Broad money" was registered in 2000 (537.55%) and the minimum in 2007 (60.88%).

The analysis of "Exports" emphasizes that in 2000, 2005, 2007, 2010, 2011, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2006, 2008, 2009, 2012 is below the equilibrium value. During the financial crisis

(2008-2012), the behavior of "Exports" emphasizes that in 2010, 2011 is above the equilibrium value and in 2008, 2009, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Exports" was registered in 2000 (108.40%) and the minimum in 2009 (86.94%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 49.09-57.46%.

The analysis of "Imports" emphasizes that in 2008, 2010, 2011, 2012, 2013, 2014 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2009, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Imports" emphasizes that in 2008, 2010, 2011, 2012 is above the equilibrium value and in 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Imports" was registered in 2011 (110.18%) and the minimum in 2002 (83.31%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 49.08-54.50%.

The analysis of "Trade balance" emphasizes that in 2000, 2001, 2002, 2005, 2006, 2007, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2003, 2004, 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Trade balance" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Trade balance" was registered in 2016 (171.16%) and the minimum in 2012 (-4.28%).

The analysis of "Output" emphasizes that in 2000, 2001, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Output" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Output" was registered in 2000 (110.73%) and the minimum in 2009 (89.35%).

The analysis of "Real interest rate (%)" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Real interest rate (%)" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Real interest rate (%)" was registered in 2003 (45.51%) and the minimum in 2000 (16.57%).

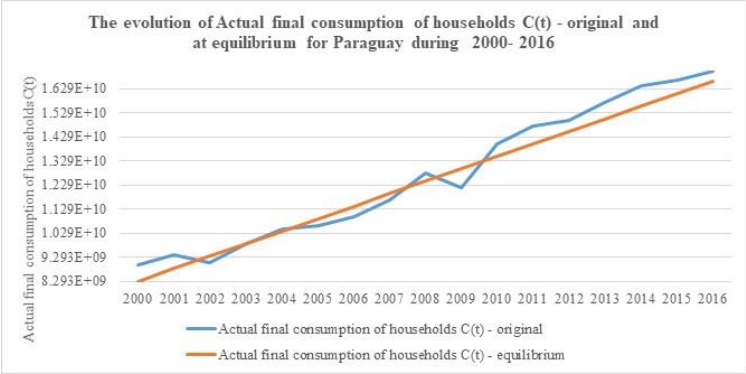


Figure 3.12.1

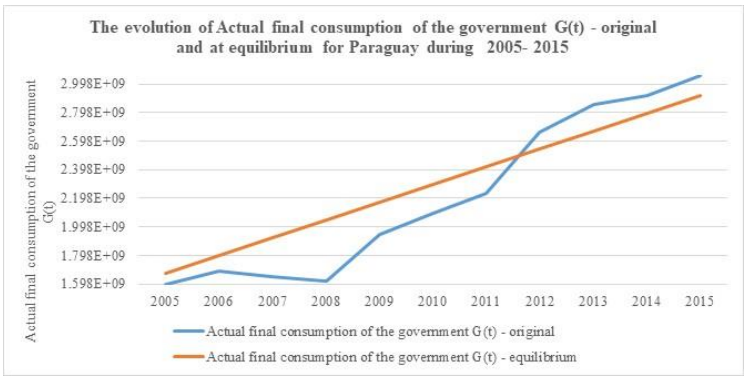


Figure 3.12.2

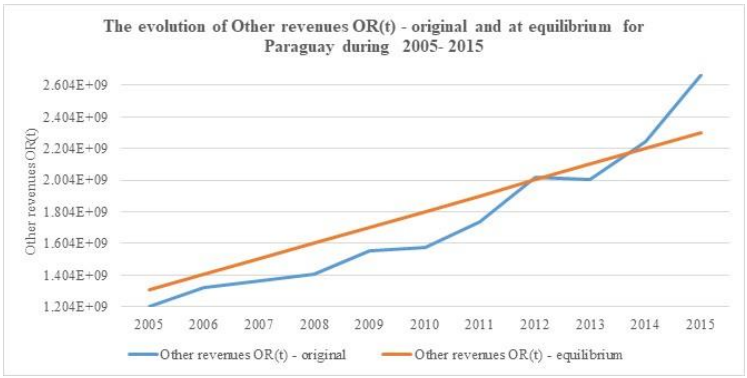


Figure 3.12.3

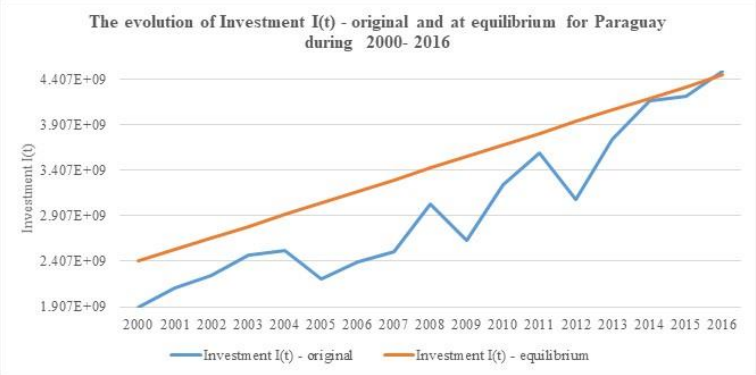


Figure 3.12.4

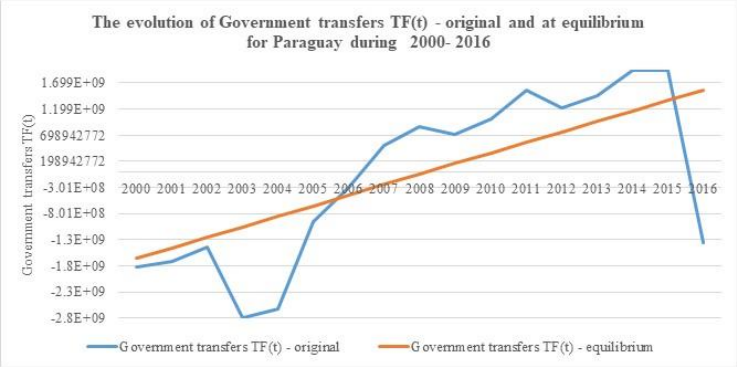


Figure 3.12.5

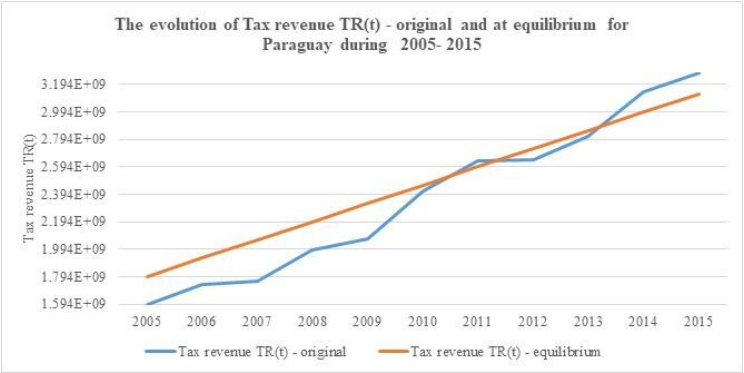


Figure 3.12.6

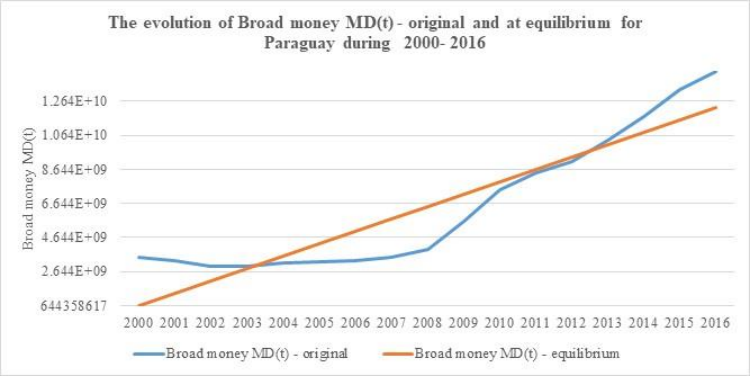


Figure 3.12.7

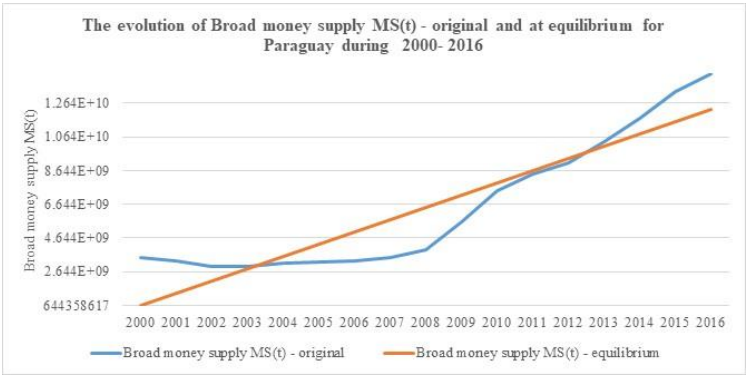


Figure 3.12.8

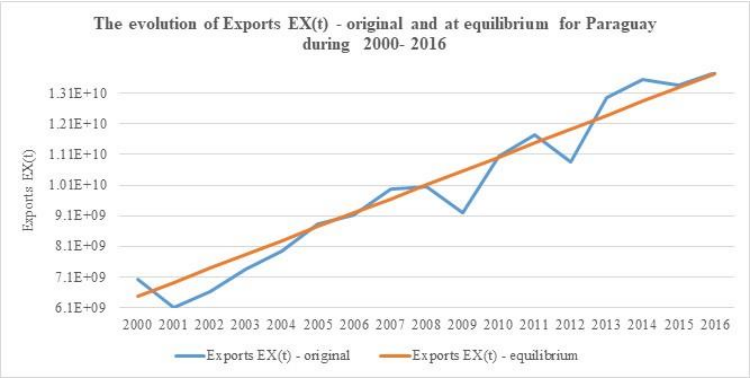


Figure 3.12.9

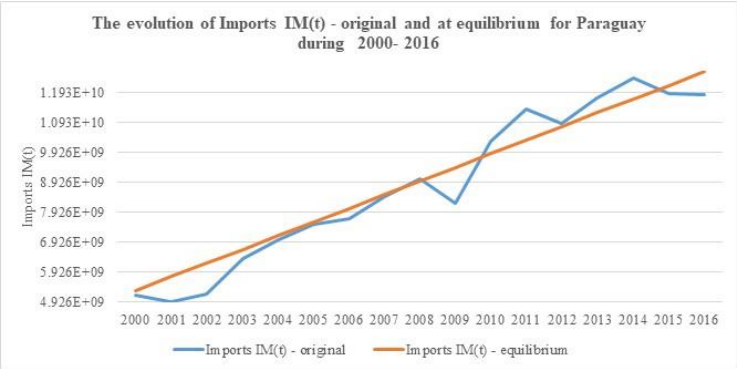


Figure 3.12.10

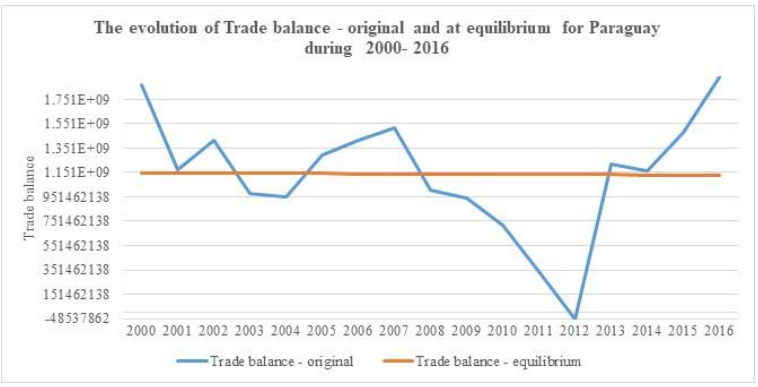


Figure 3.12.11

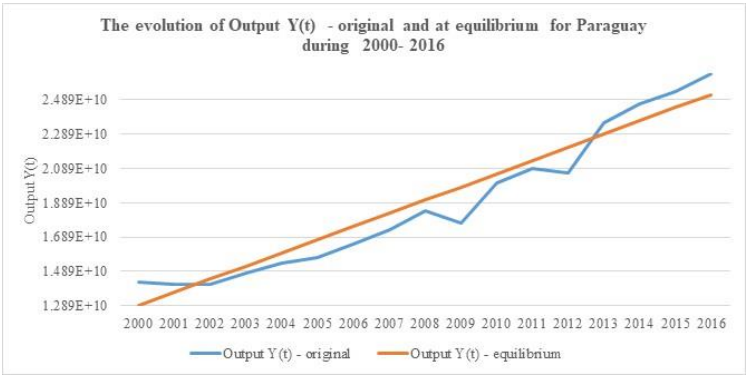


Figure 3.12.12

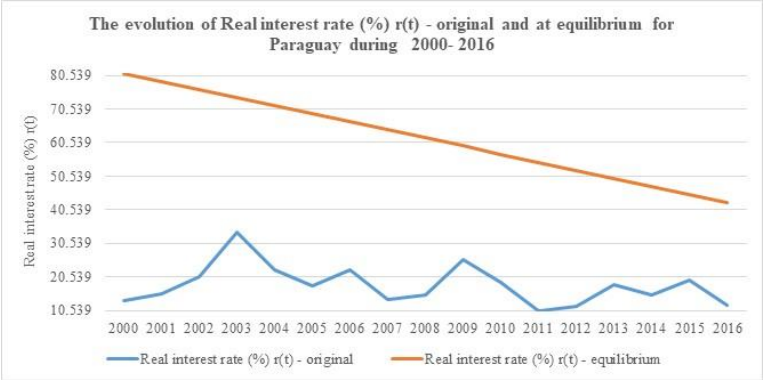


Figure 3.12.13

3.13. Trinidad and Tobago

After the analysis during 2000-2016 the model equations are:

(376) D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)
(377) C(t)=0.3137DI(t)+5047197459
(378) G(t)=0.0347TI(t)+2601586844
(379) TI(t)=TR(t)+OR(t)
(380) OR(t)=0.0473Y(t)+19045198
(381) I(t)=0.2211Y(t)-5521541r(t)-911945805
(382) DI(t)=Y(t)+TF(t)-TR(t)
(383) TF(t)=-0.1211Y(t)+3626208706
(384) TR(t)=0.2493Y(t)-232823606
(385) IM(t)=0.4788Y(t)-1037611469
(386) EX(t)=0.8883Y(t)-6348527148
(387) D(t)=Y(t)
(388) MD(t)=0.7047Y(t)+78067070r(t)-3991213832
(389) MS(t)=635859252t-1266342746547
(390) MD(t)=MS(t)

Solving the equations (1)-(15) we find that at equilibrium ("t" being the year):

(391) Y(t)=-402432800.97t+822463163403.48
(392) r(t)=11.7777t-23594.3409
(393) TI(t)=-119366618.03t+243739115172.39
(394) G(t)=-4139768.09t+11054732518.47
(395) DI(t)=-253341262.53t+521619651485.17
(396) C(t)=-79473519.25t+168680034041.30
(397) OR(t)=-19024357.05t+38899655435.87

(398) TR(t)=-100342260.98t+204839459736.52
(399) TF(t)=48749277.46t-96004052181.79
(400) I(t)=-153997897.69t+311188769233.39
(401) IM(t)=-192671574.91t+392730671383.85
(402) EX(t)=-357493190.85t+724270298994.17
(403) MD(t)=MS(t)=635859252.43t-1266342746546.53

From the relationships (16)-(28) we can draw the following conclusions:

The analysis of "Actual final consumption of households" emphasizes that in 2002, 2003, 2004, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2000, 2001, 2005 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Actual final consumption of households" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of households" was registered in 2007 (142.44%) and the minimum in 2001 (84.88%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 46.77-73.92%.

The analysis of "Actual final consumption of the government" emphasizes that in 2005, 2006, 2007, 2009, 2010, 2011, 2012, 2013, 2014 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2008 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2009, 2010, 2011, 2012, 2013 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of the government" was registered in 2006 (133.35%) and the minimum in 2008 (78.45%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 12.76-20.05%.

The analysis of "Other revenues" emphasizes that in 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2014 is above the equilibrium value and in 2001, 2002, 2003, 2004 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Other revenues" was registered in 2014 (342.62%) and the minimum in 2001 (77.90%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 3.04-8.72%.

The analysis of "Investment" emphasizes that in 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2000, 2001, 2002 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Investment" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Investment" was registered in 2014 (554.68%) and the

minimum in 2000 (46.16%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 12.06-25.18%.

The analysis of "Government transfers" emphasizes that in 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2014 is above the equilibrium value and in 2000, 2013, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Government transfers" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Government transfers" was registered in 2008 (297.64%) and the minimum in 2016 (-975.73%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 12.15-25.01%.

The analysis of "Tax revenue" emphasizes that in 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2014 is above the equilibrium value and in 2001, 2002, 2003 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Tax revenue" emphasizes that in 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Tax revenue" was registered in 2014 (234.09%) and the minimum in 2001 (70.47%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 23.78-34.25%.

The analysis of "Broad money" emphasizes that in 2000, 2001, 2002, 2009, 2010, 2013, 2015, 2016 is above the equilibrium value and in 2003, 2004, 2005, 2006, 2007, 2008, 2011, 2012, 2014 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Broad money" emphasizes that in 2009, 2010 is above the equilibrium value and in 2008, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Broad money" was registered in 2009 (119.68%) and the minimum in 2008 (78.23%).

The analysis of "Exports" emphasizes that in 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Exports" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Exports" was registered in 2015 (413.22%) and the minimum in 2002 (58.46%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 54.46-71.36%.

The analysis of "Imports" emphasizes that in 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2000, 2001, 2002, 2003 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Imports" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Imports" was registered in 2015 (272.15%) and the minimum in 2000

(67.70%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 31.10-53.90%.

The analysis of "Trade balance" emphasizes that in 2005, 2006, 2007, 2008, 2009, 2010, 2011 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2012, 2013, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Trade balance" emphasizes that in 2008, 2009, 2010, 2011 is above the equilibrium value and in 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Trade balance" was registered in 2011 (4151.49%) and the minimum in 2012 (-2766.81%).

The analysis of "Output" emphasizes that in 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 is above the equilibrium value and in 2000, 2001, 2002, 2003 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Output" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Output" was registered in 2015 (196.42%) and the minimum in 2000 (70.47%).

The analysis of "Real interest rate (%)" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Real interest rate (%)" emphasizes that in 2008, 2009, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Real interest rate (%)" was registered in 2009 (81.45%) and the minimum in 2002 (-121.76%).

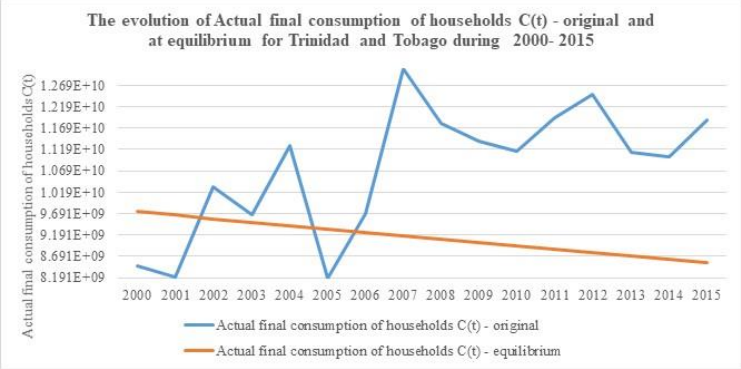
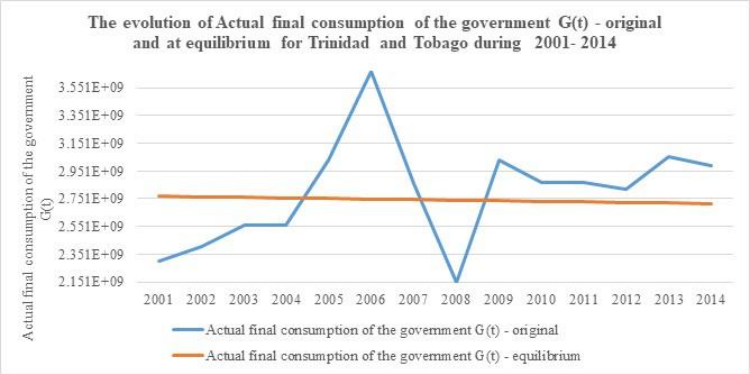


Figure 3.13.1



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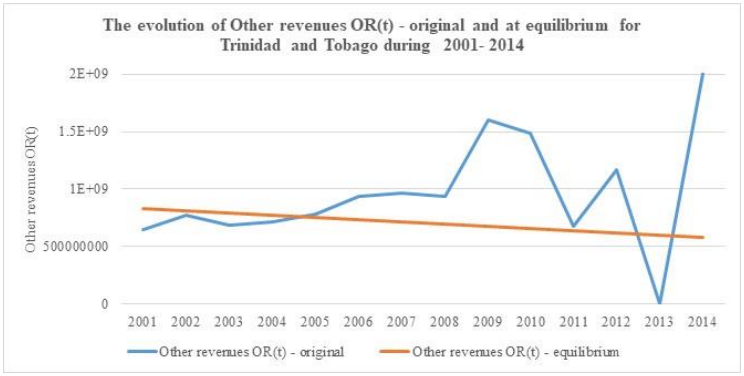
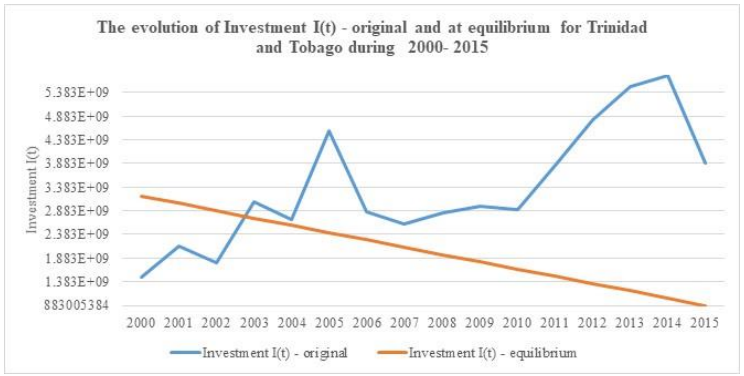


Figure 3.13.3



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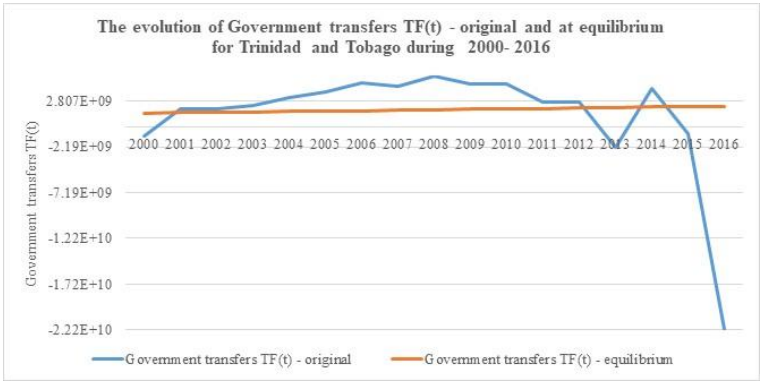
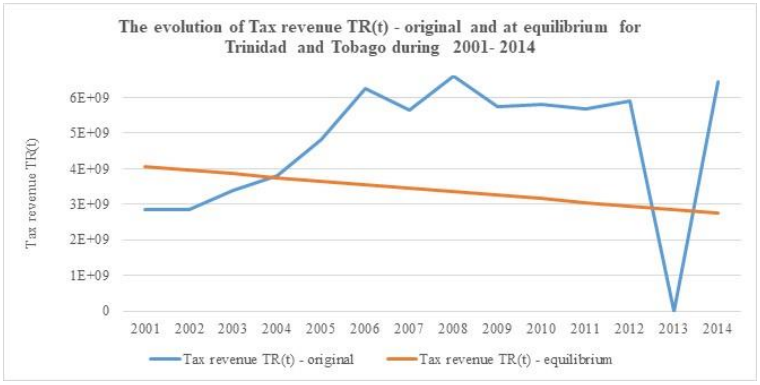


Figure 3.13.5



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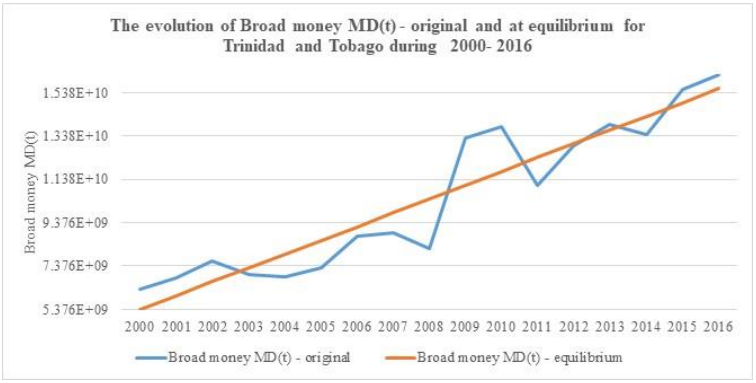

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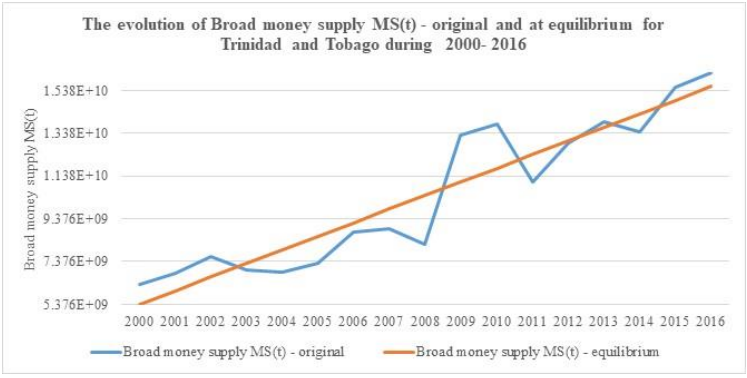

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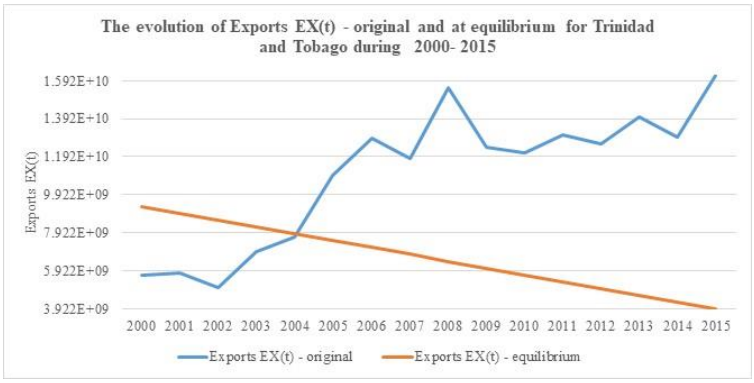

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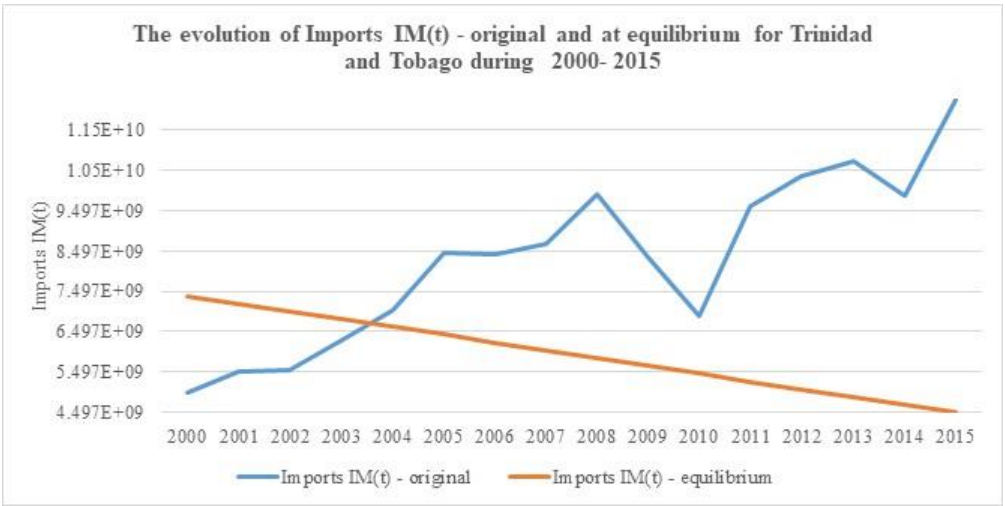
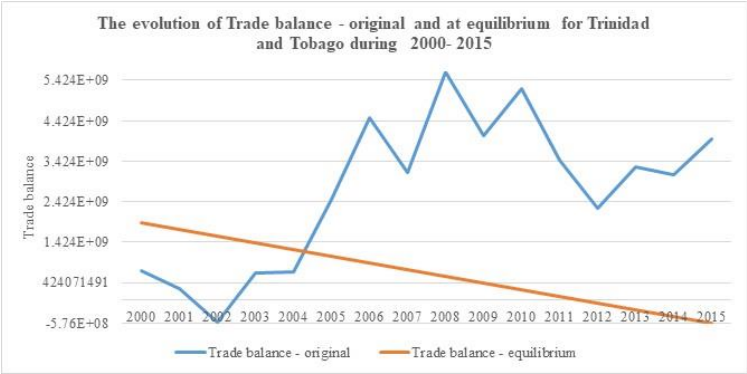


Figure 3.13.10



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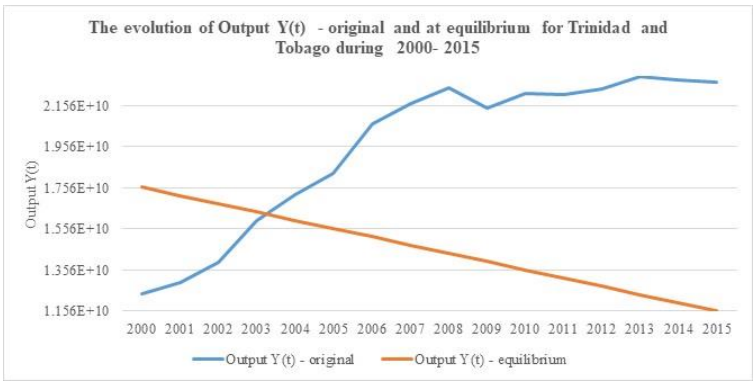

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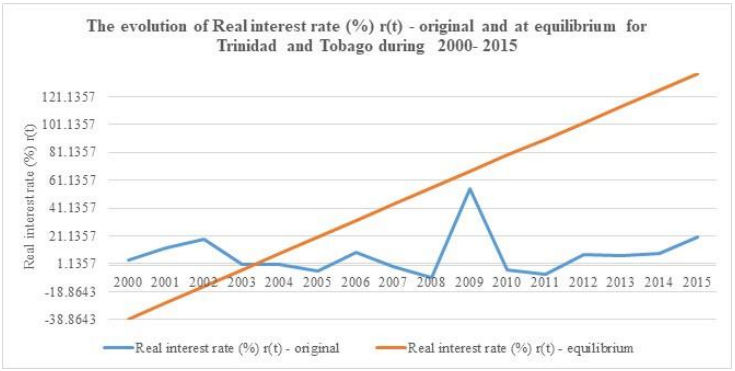


Figure 3.13.13

3.14. United States

After the analysis during 2000-2016 the model equations are:

(404) D(t)=C(t)+G(t)+I(t)+EX(t)-IM(t)
(405) C(t)=0.6792DI(t)-17563073379
(406) G(t)=0.2739TI(t)+1548806961751
(407) TI(t)=TR(t)+OR(t)
(408) OR(t)=0.0924Y(t)-245059171773
(409) I(t)=0.1791Y(t)+67848103497r(t)+193672525233
(410) DI(t)=Y(t)+TF(t)-TR(t)
(411) TF(t)=0.1419Y(t)-465969568587
(412) TR(t)=0.1019Y(t)+28954859356
(413) IM(t)=0.2637Y(t)-1562197110558
(414) EX(t)=0.2796Y(t)-2414614328501
(415) D(t)=Y(t)
(416) MD(t)=1.3801Y(t)+147236495387r(t)-10527223664471
(417) MS(t)=318697324437t-629662301608246
(418) MD(t)=MS(t)

Solving the equations (1)-(15) we find that at equilibrium ("t" being the year):

(419) Y(t)=215551382063.88t-418052533209240.00
(420) r(t)=0.1442t-286.6172
(421) TI(t)=41869658028.65t-81420485541077.10
(422) G(t)=11467428841.01t-20750960175209.70
(423) DI(t)=224190986755.54t-435303595281447.00
(424) C(t)=152271287437.81t-295677258581536.00
(425) OR(t)=19913837523.15t-38867081182289.70
(426) TR(t)=21955820505.50t-42553404358787.30
(427) TF(t)=30595425197.16t-59804466430994.60
(428) I(t)=48383765221.09t-94121693681396.50
(429) IM(t)=56847536255.50t-111815521913054.00
(430) EX(t)=60276436819.47t-119318142684152.00
(431) MD(t)=MS(t)=318697324436.57t-629662301608246.00

From the relationships (16)-(28) we can draw the following conclusions:

The analysis of "Actual final consumption of households" emphasizes that in 2004, 2005, 2006, 2007, 2008, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2009, 2010, 2011, 2012, 2013 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Actual final consumption of households" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of households" was

registered in 2016 (103.96%) and the minimum in 2000 (96.44%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 67.90-69.44%.

The analysis of "Actual final consumption of the government" emphasizes that in 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2004, 2005 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2009, 2010, 2011, 2012 is above the equilibrium value. The maximum ratio between real and equilibrium value of "Actual final consumption of the government" was registered in 2010 (109.73%) and the minimum in 2000 (83.24%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 14.40-17.05%.

The analysis of "Other revenues" emphasizes that in 2000, 2007, 2008, 2010, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2005, 2006, 2009, 2011, 2012 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Other revenues" emphasizes that in 2008, 2010 is above the equilibrium value and in 2009, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Other revenues" was registered in 2013 (108.80%) and the minimum in 2012 (91.01%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 7.36-8.40%.

The analysis of "Investment" emphasizes that in 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2015 is above the equilibrium value and in 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Investment" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Investment" was registered in 2006 (113.29%) and the minimum in 2009 (81.53%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 20.60-22.58%.

The analysis of "Government transfers" emphasizes that in 2000, 2001, 2005, 2006, 2007, 2008, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2002, 2003, 2004, 2009, 2010, 2011, 2012 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Government transfers" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Government transfers" was registered in 2000 (118.88%) and the minimum in 2009 (76.05%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 11.02-12.96%.

The analysis of "Tax revenue" emphasizes that in 2000, 2001, 2005, 2006, 2007, 2008, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2002, 2003,

2004, 2009, 2010, 2011, 2012 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Tax revenue" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Tax revenue" was registered in 2000 (121.01%) and the minimum in 2009 (74.44%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 10.31-12.93%.

The analysis of "Broad money" emphasizes that in 2000, 2001, 2006, 2007, 2008, 2009, 2016 is above the equilibrium value and in 2002, 2003, 2004, 2005, 2010, 2011, 2012, 2013, 2014, 2015 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Broad money" emphasizes that in 2008, 2009 is above the equilibrium value and in 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Broad money" was registered in 2016 (119.05%) and the minimum in 2011 (92.62%).

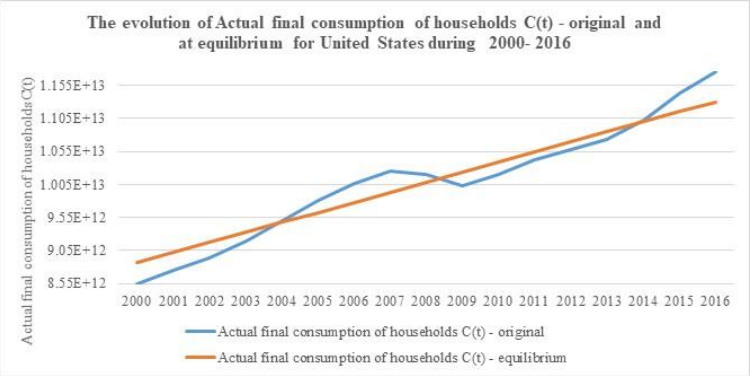
The analysis of "Exports" emphasizes that in 2000, 2007, 2008, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is above the equilibrium value and in 2001, 2002, 2003, 2004, 2005, 2006, 2009 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Exports" emphasizes that in 2008, 2010, 2011, 2012 is above the equilibrium value and in 2009 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Exports" was registered in 2000 (106.31%) and the minimum in 2003 (87.25%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 10.33-13.63%.

The analysis of "Imports" emphasizes that in 2004, 2005, 2006, 2007, 2008, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2009, 2010, 2011, 2012, 2013 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Imports" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Imports" was registered in 2006 (109.71%) and the minimum in 2009 (87.72%). The excess of equilibrium values is due, in the corresponding periods, to the large share of GDP, between 15.45-16.96%.

The analysis of "Trade balance" emphasizes that in 2003, 2004, 2005, 2006, 2007, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2008, 2009, 2010, 2011, 2012, 2013, 2014 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Trade balance" emphasizes that in 2008, 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Trade balance" was registered in 2006 (138.42%) and the minimum in 2009 (72.10%).

The analysis of "Output" emphasizes that in 2004, 2005, 2006, 2007, 2008, 2014, 2015, 2016 is above the equilibrium value and in 2000, 2001, 2002, 2003, 2009, 2010, 2011, 2012, 2013 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Output" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Output" was registered in 2007 (103.41%) and the minimum in 2001 (96.77%).

The analysis of "Real interest rate (%)" emphasizes that in 2000, 2001, 2002, 2005, 2006, 2007, 2008 is above the equilibrium value and in 2003, 2004, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 is below the equilibrium value. During the financial crisis (2008-2012), the behavior of "Real interest rate (%)" emphasizes that in 2008 is above the equilibrium value and in 2009, 2010, 2011, 2012 is below the equilibrium value. The maximum ratio between real and equilibrium value of "Real interest rate (%)" was registered in 2000 (401.36%) and the minimum in 2011 (35.40%).



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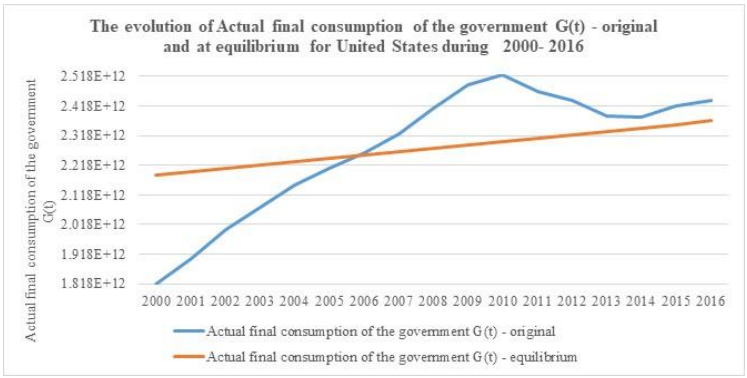

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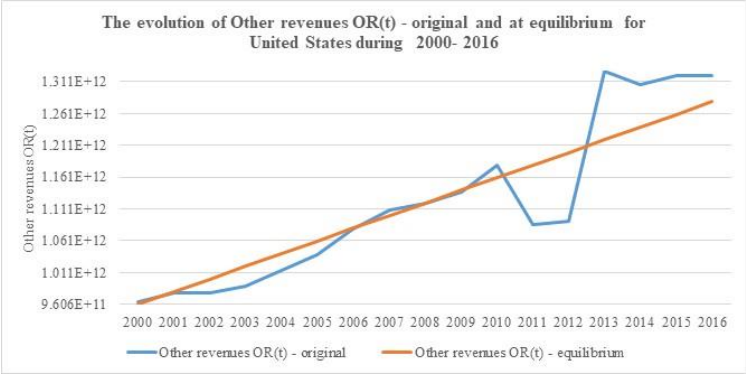

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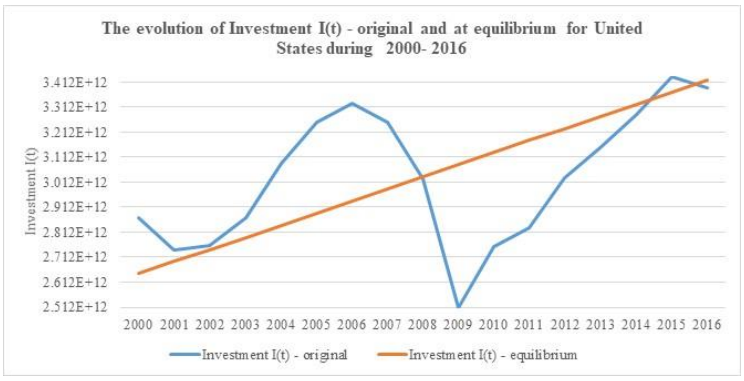

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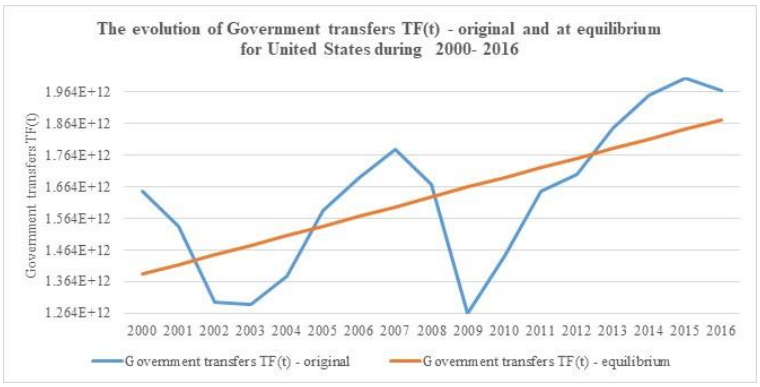

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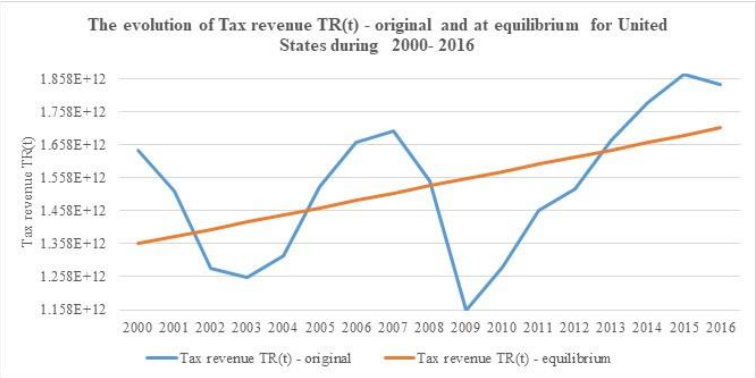

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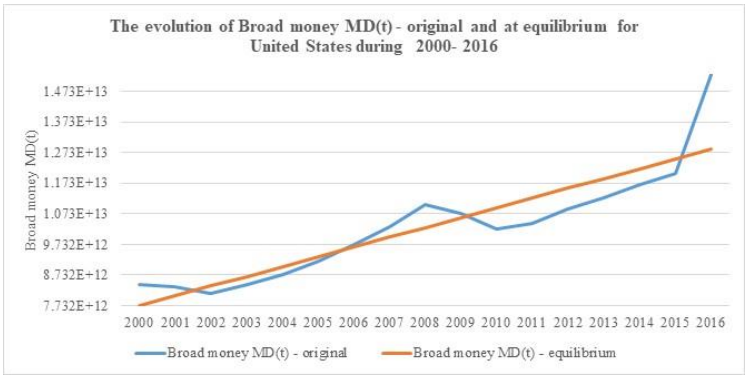

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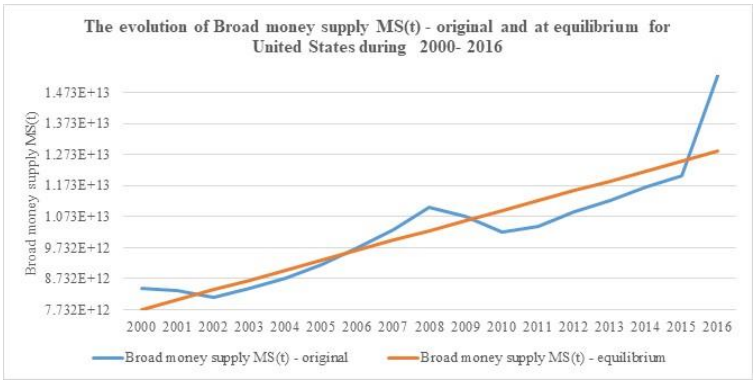

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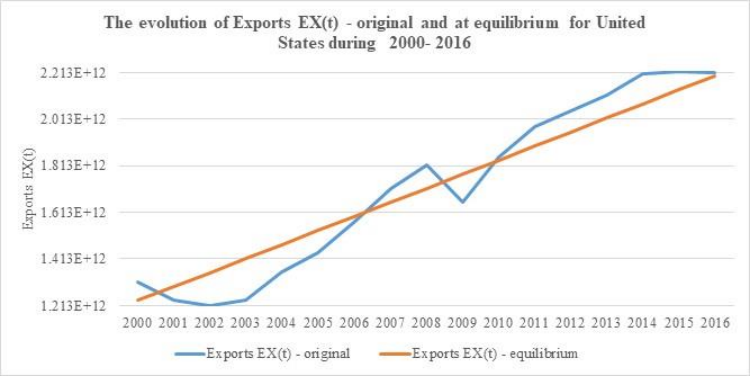

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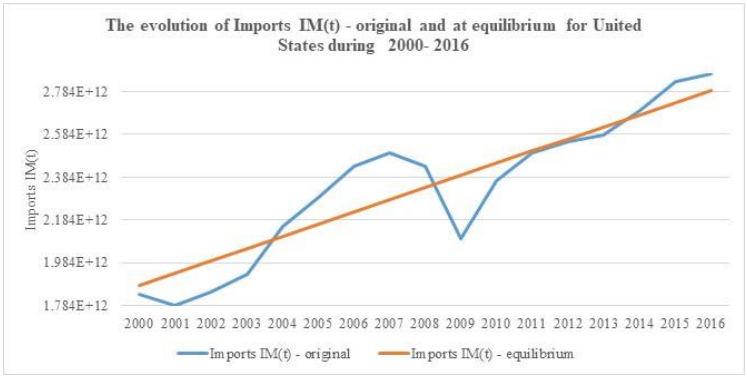

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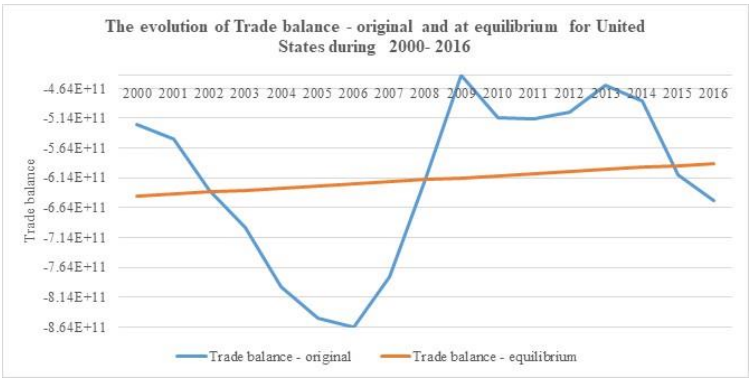

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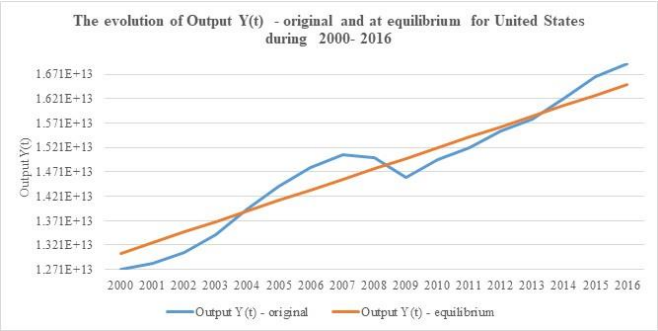

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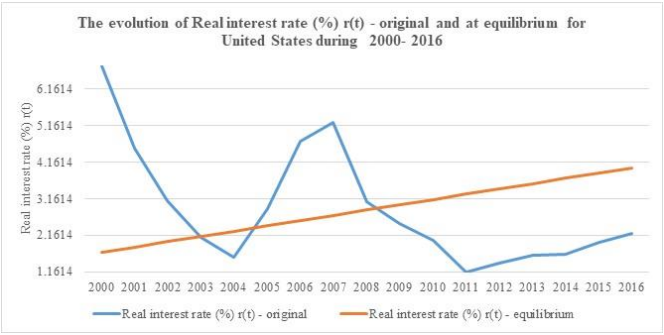

Figure 3.14.13

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