Fig 1. Equilibrium in the Modified Mundell-Fleming Model

Panel 1.a: IS* and LM* curves intersect at point (y0, e0) for exchange rate and output.

Panel 1.b: Price level (p0) and aggregate demand intersect at (y0) with aggregate supply.

Panel 1.c: KI (Capital inflow) and D (Demand) intersect at (d0) for current account deficit.
Fig. 2. Macroeconomic Equilibrium With and Without Rationing

Exchange rate

Panel 2.a

Panel 2.b

Panel 2.c

Price

Aggregate demand

Aggregate supply

Output, income

Y

Y

Y

IS*
LM*
E
e_e
y
Y

P

p

P

P

E
E

d
D

Current account deficit
Capital inflow

d_e

Output, income
Fig. 3. Saving, Investment and the Monetary Overhang

Panel 3.a

IS*  LM*

E  E

e_0  e_0

Y  Y

Output, income

Panel 3.b

Money

Nominal money supply

Nominal money demand

M^D  M^S

Y  Y

Output, income

Panel 3.c

Exchange rate

i(Y)  i(y_0)

s(Y)  s(y_0)

S=Y  S=Y

Investment, saving

s_0 = i_0
Fig. 4. Effects of Monetary Expansion With and Without Rationing
Fig. 5. Effects of Fiscal Expansion With and Without Rationing

Panel 5.a

Panel 5.b

Panel 5.c
Fig. 6. Effects of an Increase in Remittances
Annex 1. A Modified Mundell-Fleming Model

1. The model with market clearing

\[ s_p = s_p(y-t) \]  
\[ s_g = t - g \]  
\[ s_f = d = d(e) \]  
\[ i = i(y, r) \]  
\[ KI = 2(r - r^*) + f \]

Where \( y \) is output; \( d \) is the current account deficit; \( e \) is the exchange rate, \( i \) is domestic investment, and \( r \) is the interest rate at which the Cuban government can borrow from international markets. Government expenditure \( (g) \), taxes \( (t) \) the foreign interest rate \( r^* \), and the autonomous component of capital inflows \( (f) \), are exogenous variables. In situations where the government controls the level of external borrowing, the last equation is deleted and the inflow of capital becomes fully exogenous \( (K_I = f) \).

Using the preceding equations, the national income identities\(^1\) and the definition of total saving as the sum of personal, government and foreign saving, yields the equation:

\[ s = s_p(y-t) + (t-g) + d(e) = i(y, r) \]  

The market-clearing condition in the money market is:

\[ m/p_c = 8 y \]  

Where \( m \) is the exogenous nominal stock of money; \( 8 \) is a parameter; \( p_c = \alpha p + (1-\alpha) (e p_f) \) is the consumer price or expenditure deflator; \( (1-\alpha) \) is the share of import prices, and \( p_f \) is the exogenous foreign price. Combining the IS* and LM* schedules yields the aggregate demand function:

\[ Y^D = Y^D(p, g, t, m, r^*) \]  

Aggregate supply is positively related to the domestic price level because of the assumed rigidity of nominal wages, and to the price of imports which affects the supply of labor.

\[ Y^S(p, p_c) = Y^D(p) \]  

---

\(^1\) The equality between total expenditure and total income implies \( c + i + g - d = c + s_f + t \) which, after some manipulation, yields \( i = s_f + s_g + s_f \)
If markets clear, aggregate demand $Y^D$ is equal to the supply of output $Y^S$.

The market clearing condition in the foreign exchange market—the equality of the current account deficit and the net capital inflow—is given by the equation:

$$d(e) = 2(r-r^*) + f$$

balance of payments

2. The model with fixed exchange rate and controlled prices

We replace the clearing conditions in the markets for saving, money, foreign exchange and output by the minimum conditions:

$$S = \min[I(y, r), S_d(y) + d(e)] = I$$

$$M = \min(M^S, 8Y) = M^S$$

$$d = \min[KI, d(e)] = KI$$

$$Y = \min[Y^S(p, p_c), Y^D(p)] = Y^S$$

and we add the exchange rate fixing equation $e=E$, where $E$ is the exogenous, controlled exchange rate.
Table 1. Effects of Policy Changes on Key Variables under Alternative Regimes

<table>
<thead>
<tr>
<th></th>
<th>Fiscal expansion(^a)</th>
<th>Monetary expansion(^b)</th>
<th>Increase in remittances</th>
<th>Exchange rate &amp; price liberalization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Market clearing</td>
<td>Market clearing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rationing(^b)</td>
<td>Rationing(^b)</td>
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<td></td>
</tr>
<tr>
<td>Output</td>
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<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Domestic price</td>
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<td>+</td>
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<tr>
<td>Exchange rate ($/peso)</td>
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<td>–</td>
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<tr>
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<td>Foreign exchange rationing</td>
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<td>eliminated</td>
</tr>
</tbody>
</table>

\(^a\) Financed by external borrowing  
\(^b\) Fixed exchange rate and price controls
References


Hernandez-Cata, Ernesto (2007). "Price Liberalization and the End of the Rationing System in Cuba. All we have to Fear is Fear Itself.". Cuba in Transition, Association for the Study of the Cuban Economy.

