Macroeconomic policies and vulnerabilities: a model based approach

Presentation at Johns Hopkins University/Carey School of Business

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Required materials:

Review of Model – Closed Economy

https://www.youtube.com/watch?v=bi6N1azsEYE

Required

Extending Model – Open Economy

https://www.youtube.com/watch?v=LicsCrmyqbg&feature=youtu.be

Required

A recent example of macroeconomic policy – similar to one discussed in class.

http://www.economist.com/news/finance-and-economics/21677232-are-dire-public-finances-hindering-central-bank-tackling-inflation-broken

Required

Additional Materials

Exchange rate determination / Monetary policy

Chapter 14, PP 21-31 in the textbook:

http://testmodel2014.yolasite.com/

Model Algebra

Tanner, Evan (2015) “The Algebraic Galaxy of *Simple* Macroeconomic Models: A Hitchhiker’s Guide.” Manuscript that will be distributed.

Recent press articles.

China-Brazil link is top threat to global economy
http://www.ft.com/intl/cms/s/0/920b2708-6d9d-11e5-8171-ba1968cf791a.html#axzz3p0hvDtcR

Political risk drives Brazil’s markets
http://www.ft.com/intl/cms/s/0/2f810894-76c8-11e5-8564-b4bb9a521c63.html#axzz3p0hvDtcR

Brazil's economy

Broken lever

Are dire public finances hindering the central bank from tackling inflation?

Oct 31st 2015 | From the print edition

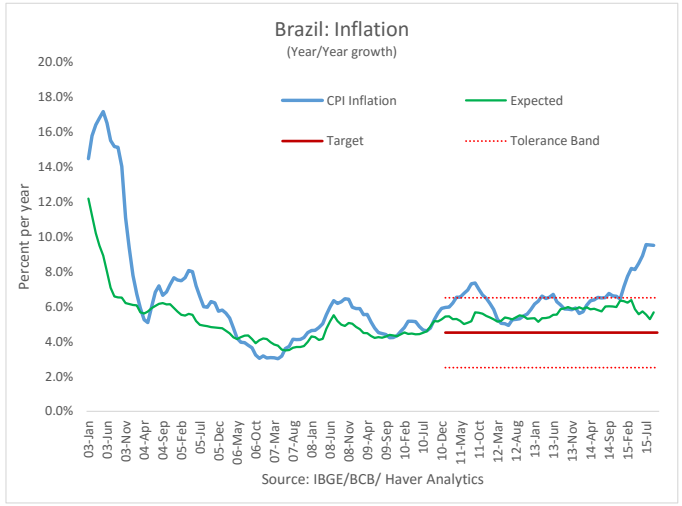
BRAZIL does not look like an economy on the verge of overheating. The IMF expects it to shrink by 3% this year, and 1% next. (The country has not suffered two straight years of contraction since 1930-31.) Fully 1.2m jobs vanished in the year to September; unemployment has reached 7.6%, up from 4.9% a year ago. Those still in work are finding it harder to make ends meet: real (ie, adjusted for inflation) wages are down 4.3% year-on-year. Despite the weak economy, inflation is nudging double digits. The central bank recently conceded that it will miss its 4.5% inflation target next year. Markets don't expect it to be met before 2019.

A country case that is related to the in class exercise.

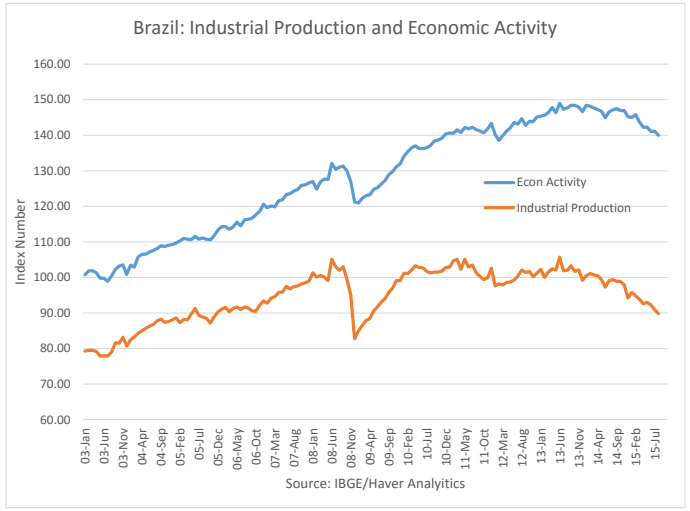
This presentation should not be reported as representing the views of the IMF. The views expressed in this presentation are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. **The presentation is not to be construed as reflecting any policy recommendations for any specific country**.

http://www.economist.com/news/finance-and-economics/21677232-are-dire-public-finances-hindering-central-bank-tackling-inflation-broken

Country example: Brazil



Inflation – rearing its ugly head again…
Expected inflation above the target of 3.5%, actual nearing 8%....



…even though output is coming down.

Brazil is suffering “stagflation” – economic stagnation coupled with inflation.

Factors to consider:

Internal:

- Growing government budget deficits.
- Drought in Southern Brazil (São Paulo – the country’s industrial base); Interruptions of electricity.
- Political scandal – corruption in Petrobras (“*Lava Jato*” – Operation Car Wash – money laundering.)

External:

- Lower demand from global markets – including China.
- Investor jitters – downgrading by rating agencies.

Questions:

1. Can a simple macroeconomic model, much like the one you learned in your textbook, explain the “stagflationary” situation in a country like Brazil?

    - Which assumptions or “shocks” are required?

2. Can such a model help understand the policy choices that Brazil faces in trying to bring down its inflation rate?

    - Monetary policy?
    - Fiscal Policy?

3. Can such a model help motivate a discussion about the external vulnerabilities that Brazil faces?

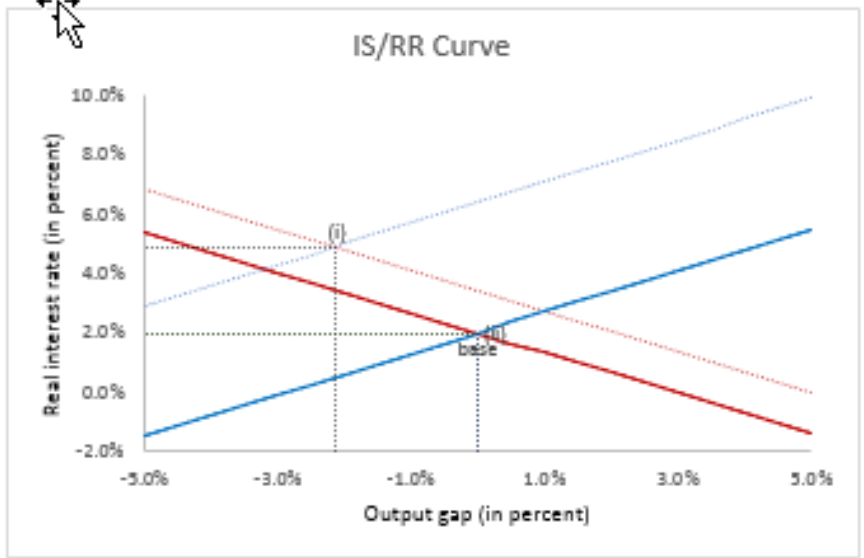
    - Loss of investor confidence – higher external interest rates?
    - Reduced demand for its export goods – terms of trade?

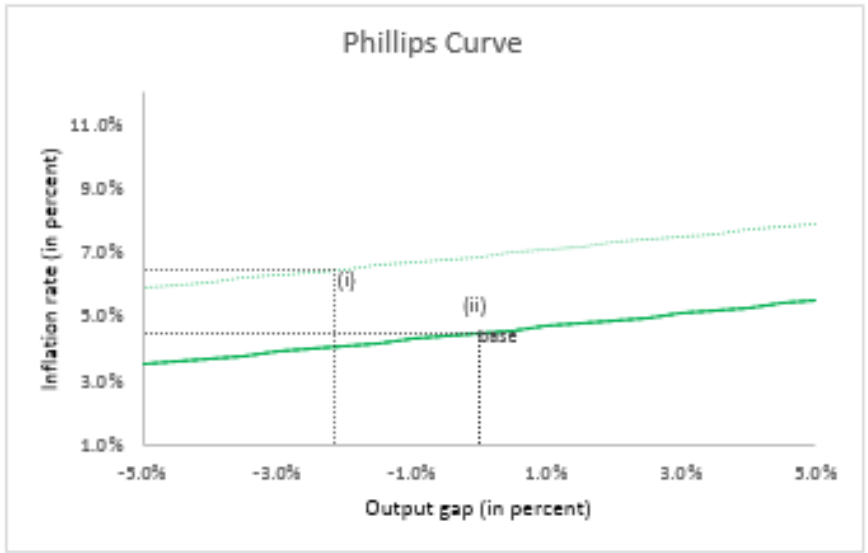
Answers: We will certainly try!!

1. Can a simple macroeconomic model, much like the one you learned in your textbook, explain the “stagflationary” situation in a country like Brazil?

In percent of potential output	base	alt(i)	alt(ii)
Shocks -- Expenditure			
Gov't Spending	0.0%	2.0%	0.0%
Tax Measures (one-off)	0.0%	0.0%	0.0%
In percent			
Shocks - Supply / Expected inflation			
Supply shock (% of Y^P)	0.0%	-2.0%	0.0%
Inflation expectations (gap w.r.t. target)	0.0%	2.0%	0.0%

More government spending, inflation above the target, adverse supply shock drought → electricity.





Interpret the charts – Shift of IS, RR and Phillips Curve.

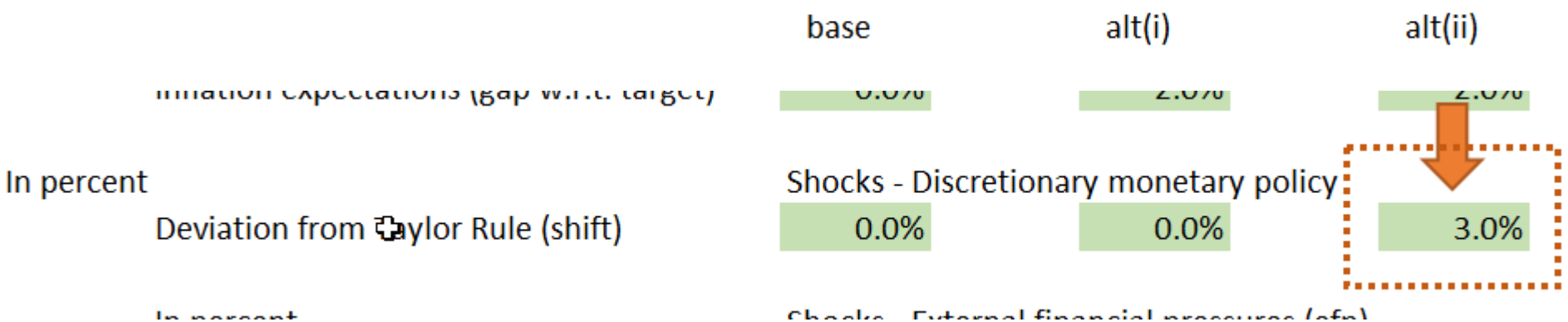
Where did these curves shift (solid to dotted) – and why?

What was the consequence?

Interpret the numbers – output gap, real interest rate, inflation rate, nominal interest rate.

Results – Core Domestic Variables	base	alt(i)	alt(ii)
Output gap (% of Potential)	0.0%	-2.2%	0.0%
		Recession	
Real Interest Rate (in percent)	2.0%	4.9%	2.0%
		Above neutral	
Inflation Rate (in percent)	4.5%	6.5%	4.5%
		Above target	
Nominal Interest Rate (in percent)	6.5%	11.4%	6.5%

2. Can such a model help understand the policy choices that Brazil faces in trying to bring down its inflation rate??



	base	alt(i)	alt(ii)
Inflation expectations (gap w.r.t. target)	0.0%	2.0%	2.0%
In percent	Shocks - Discretionary monetary policy		
Deviation from Taylor Rule (shift)	0.0%	0.0%	3.0%
In percent	Shocks - External financial pressures (efp)		

Monetary policy: central bank “goes it alone” (fiscal policy not cooperative).

Central bank “goes off its Taylor Rule” – tightens even more.

2. Can such a model help understand the policy choices that Brazil faces in trying to bring down its inflation rate??

	base	alt(i)	alt(ii)
Results - Core Domestic Variables			
Output gap (% of Potential)	0.0%	-2.2%	-4.3%
		Recession	Recession
Real Interest Rate (in percent)	2.0%	4.9%	6.4%
		Above neutral	Above neutral
Inflation Rate (in percent)	4.5%	6.5%	6.0%
		Above target	Above target
Nominal Interest Rate (in percent)	6.5%	11.4%	12.4%

Question: Would there be any reason to believe in this scenario that expected inflation might go down? Why?

2. Can such a model help understand the policy choices that Brazil faces in trying to bring down its inflation rate??

	base	alt(i)	alt(ii)
Demand side decomposition of output gap (percent of potential)			
Output gap	0.0%	-2.2%	-4.3%
Consumption	0.0%	-0.5%	-1.1%
Investment	0.0%	-1.7%	-2.6%
Governerment Spending	0.0%	-2.0%	-2.0%
Net Exports	0.0%	-1.9%	-2.6%
Exports	0.0%	-1.2%	-1.7%
Imports	0.0%	0.7%	0.9%

Question: Using this strategy, investment “takes a big hit.” Why? Why do we care?

2. Can such a model help understand the policy choices that Brazil faces in trying to bring down its inflation rate??

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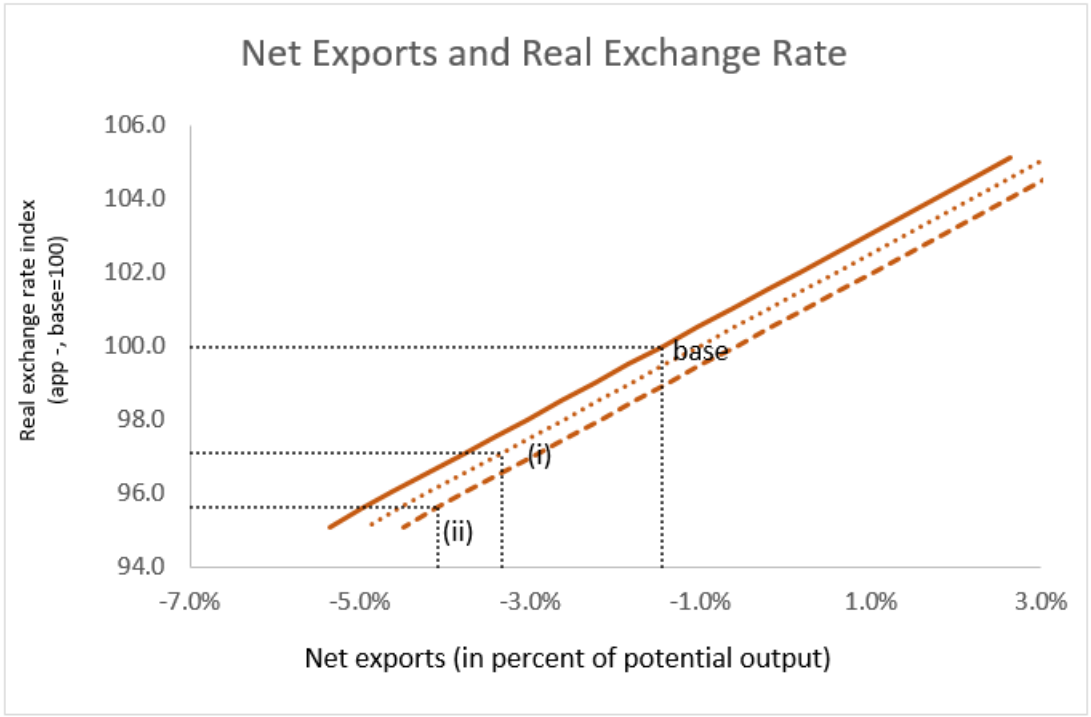
Question: Using this strategy, net exports – exports minus imports also “take a big hit.” Why? Why do we care?

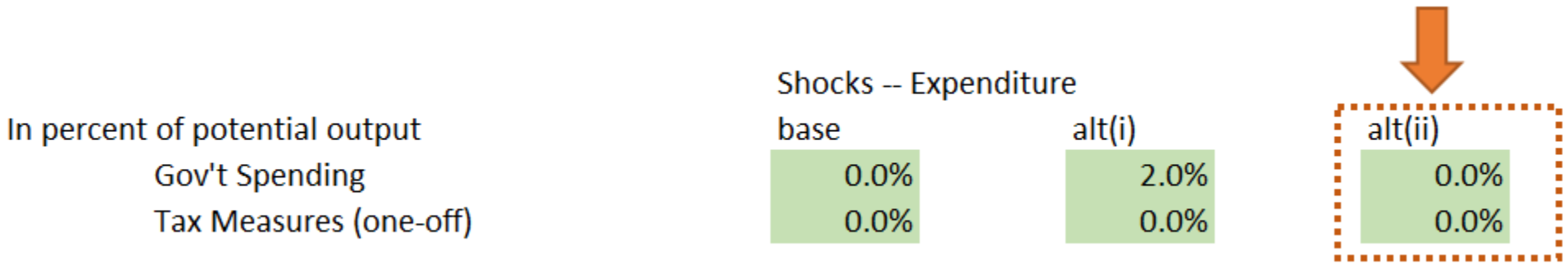
2. Can such a model help understand the policy choices that Brazil faces in trying to bring down its inflation rate??



Question: Using this strategy, net exports – exports minus imports also “take a big hit.” Why? Why do we care?

2. Can such a model help understand the policy choices that Brazil faces in trying to bring down its inflation rate??

Show what happens when you cut government spending – discuss why this is an important option to consider (investment, trade balance effects).



In percent of potential output	Shocks -- Expenditure base	alt(i)	alt(ii)
Gov't Spending	0.0%	2.0%	0.0%
Tax Measures (one-off)	0.0%	0.0%	0.0%

3. Can such a model help motivate a discussion about the external vulnerabilities that Brazil faces?

- Loss of investor confidence – higher external interest rates?
- Reduced demand for its export goods – terms of trade?

How might this strategy erode foreign investor confidence?

Hint: Why might foreign investors care about (a) net exports and even (b) domestic investment?

3. Can such a model help motivate a discussion about the external vulnerabilities that Brazil faces?

- Loss of investor confidence – higher external interest rates?
- Reduced demand for its export goods – terms of trade?

In percent	base	alt(i)	alt(ii)
	Shocks - External financial pressures (efp)		
Total external financial pressures	0.0%	0.0%	1.0%
Real interest rate -- dev.from baseline	0.0%	0.0%	0.0%
Risk premium -- dev.from baseline	0.0%	0.0%	1.0%

Risk premium: investors need to be compensated more because country is shakier – lost their “investment grade” rating….

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- Loss of investor confidence – higher external interest rates?
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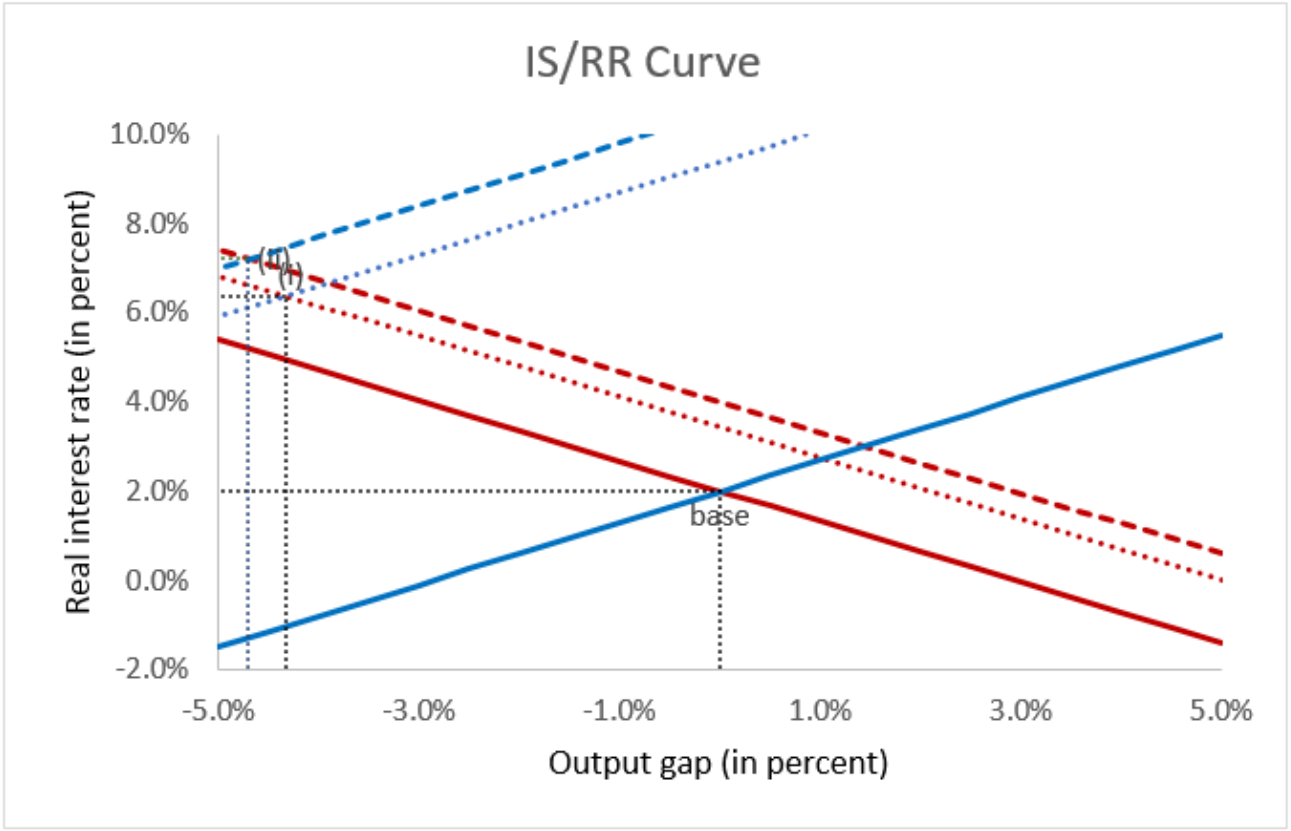

Higher interest rates abroad are transmitted to domestic interest rates (leftward shift of RR) but also mean a cheaper currency (Rightward shift of IS).

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	base	alt(i)	alt(ii)
Demand side decomposition of output gap (percent of potential)			
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Investment	0.0%	-2.6%	-3.1%
Governerment Spending	0.0%	2.0%	2.0%
Net Exports	0.0%	-2.6%	-2.4%
Exports	0.0%	-1.7%	-1.7%
Imports	0.0%	0.9%	0.7%

Even lower output… why??

3. Can such a model help motivate a discussion about the external vulnerabilities that Brazil faces?

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Net Exports	0.0%	-2.6%	-2.4%
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Imports	0.0%	0.9%	0.7%

Better net exports … but is this a 'happy scenario'? Why or why not?

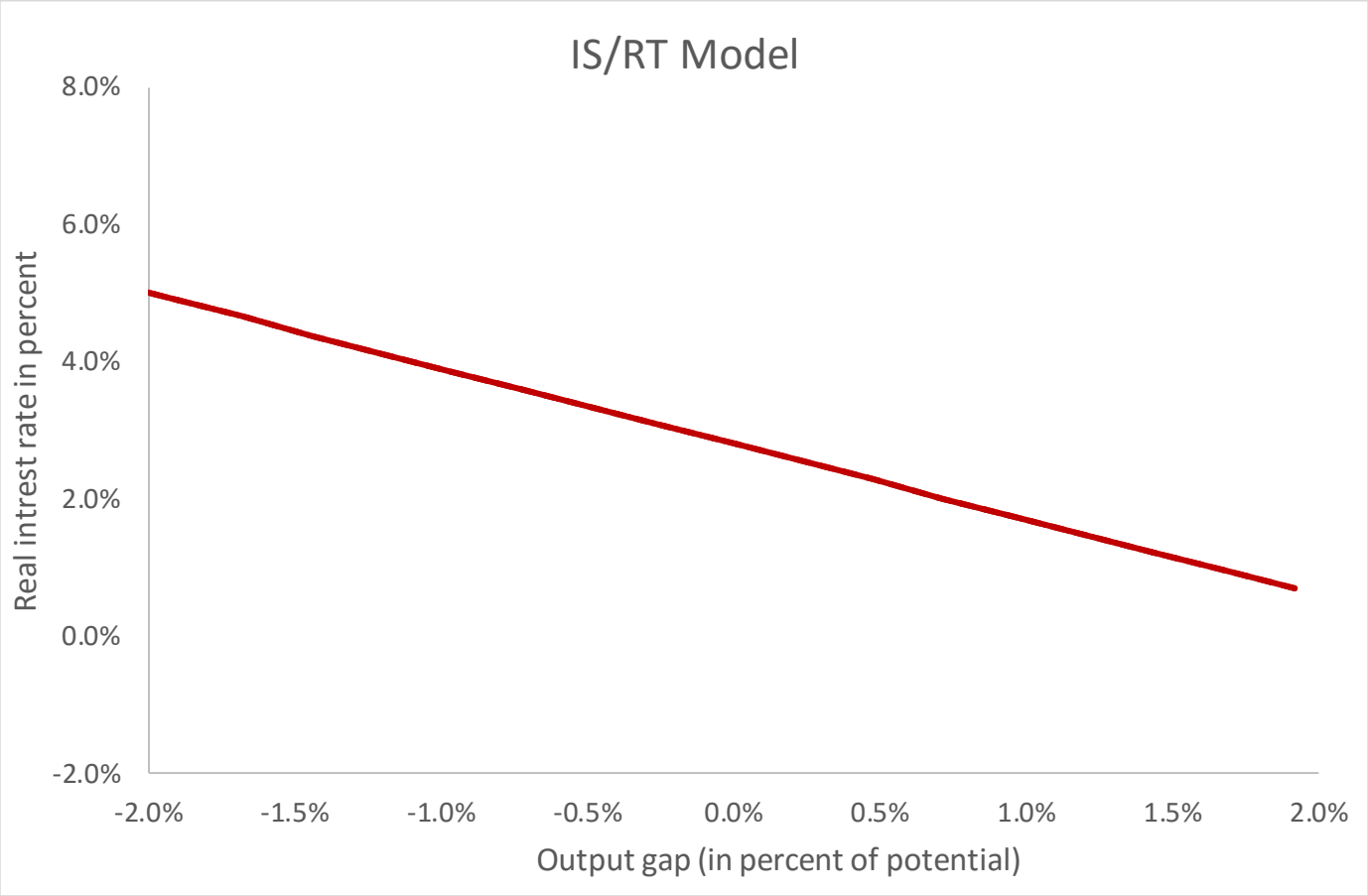
Conclusion – the country is in a “pick your poison” position – some options ‘less bad’ than others.

Raise interest rates
Cut spending

How will these policies affect risk premium? Market expectations of inflation?

Supplementary material.

The IS (investment-savings) curve.



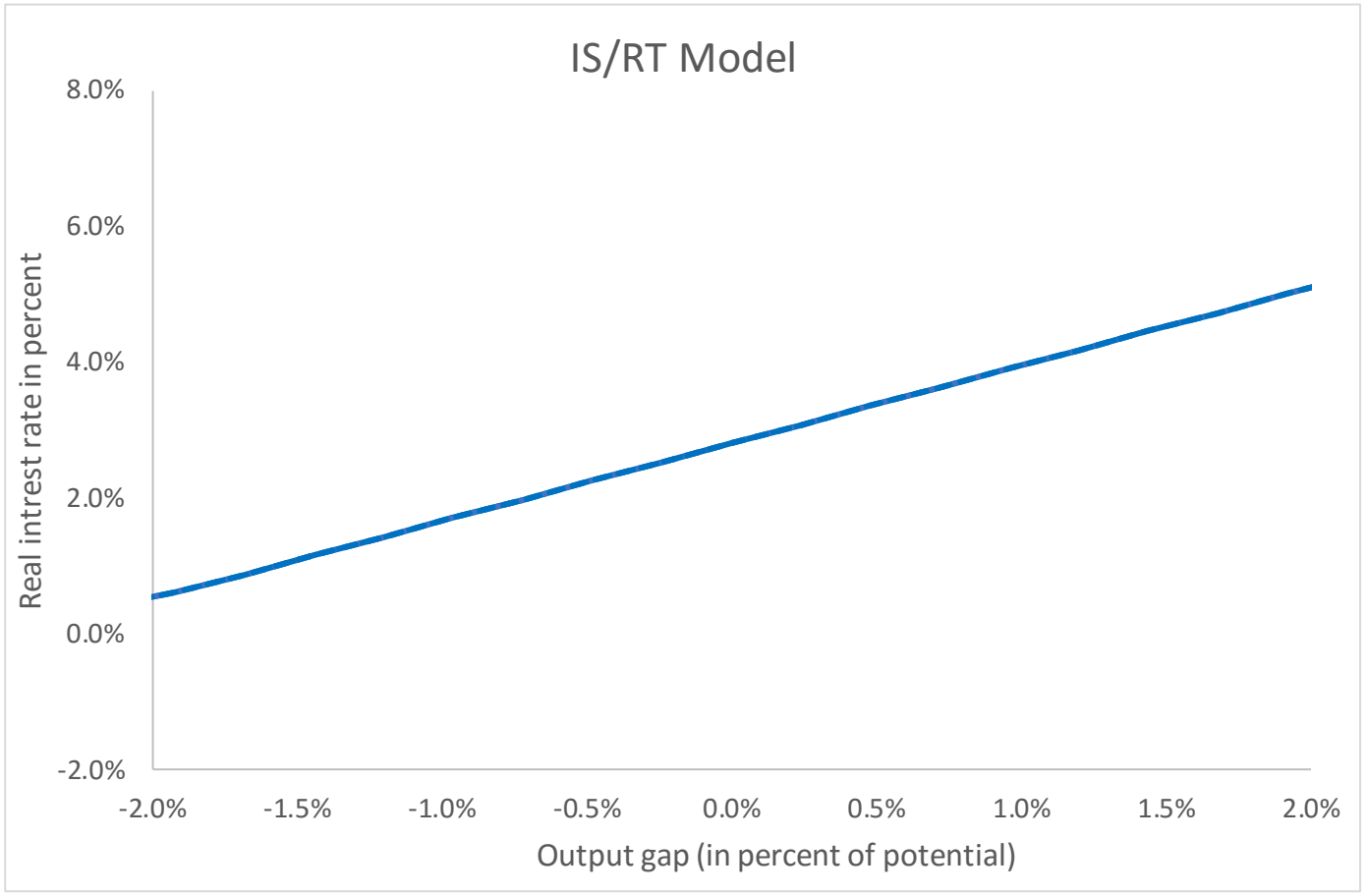
The IS curve shows how the interest rate affects the output gap through aggregate demand:

When the interest rate falls, households and firms spend more – an increase in the output gap.

When the interest rate rises, households and firms spend less – a decrease in the output gap.

Hence, the IS curve slopes down.

The RT (Real Taylor) curve.



The RT curve reflects the central bank's dual goals of output and price stabilization.

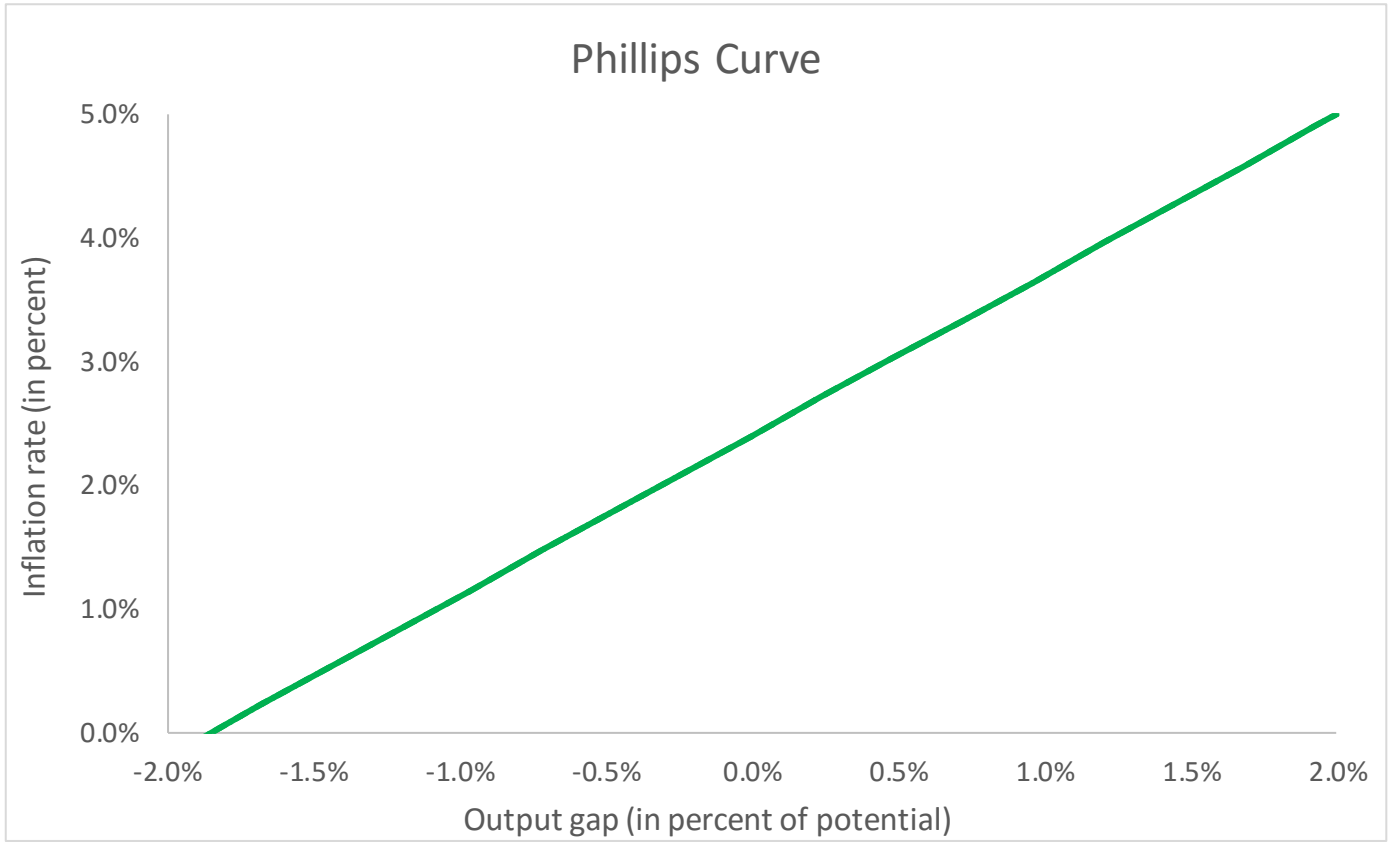
The curve shows us the central bank's policy rule – a Taylor Rule.

If an increase in demand raises the output gap, the central bank must raise interest rates to restrain inflation and output – consistent with its policy goals.

If a decrease in demand reduces the output gap, the central bank must lower interest rates to keep inflation and output from falling too much– also consistent with its policy goals.

Hence, the RT curve slopes up.

The Phillips Curve (PC).



The Phillips Curve (PC) shows the relationship between the output gap and the inflation rate.

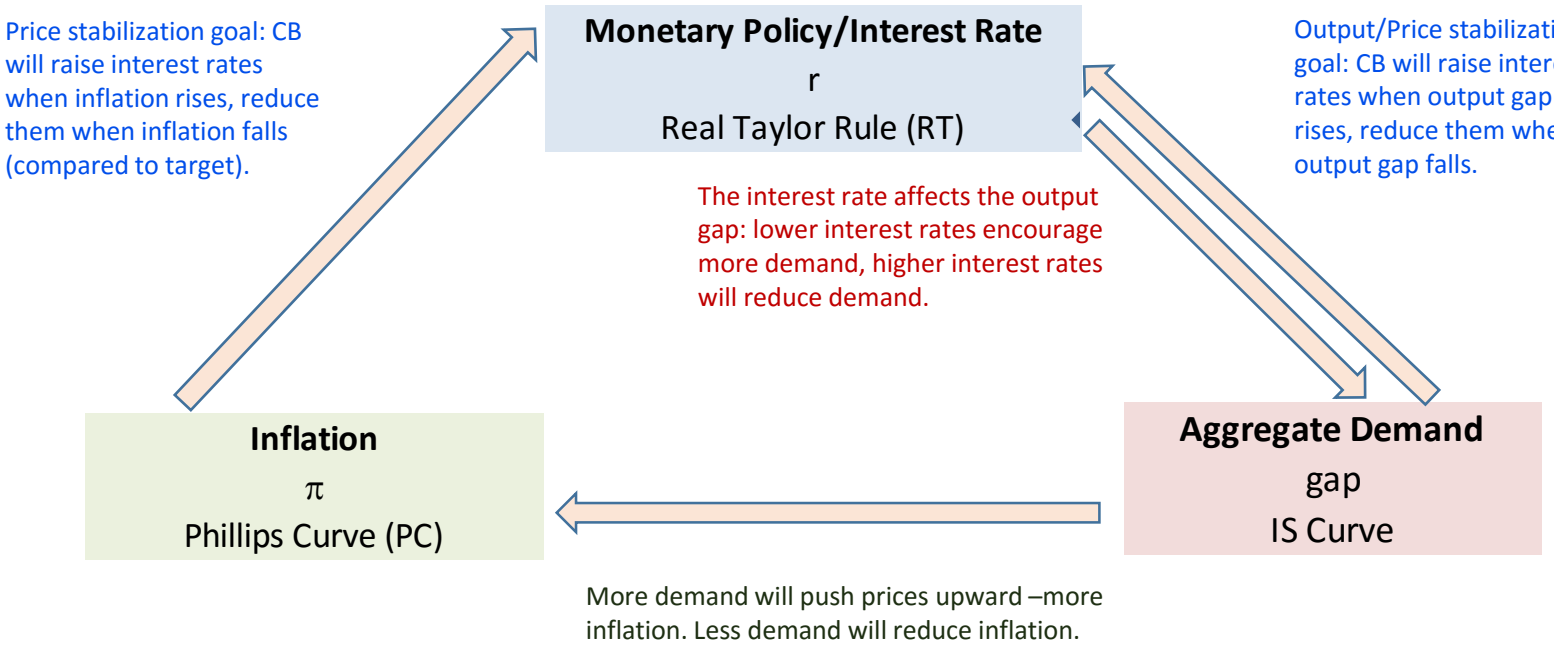
If demand increases and the output gap rises, firms will face higher costs – wages will rise. These higher costs are passed on to buyers – more inflation.

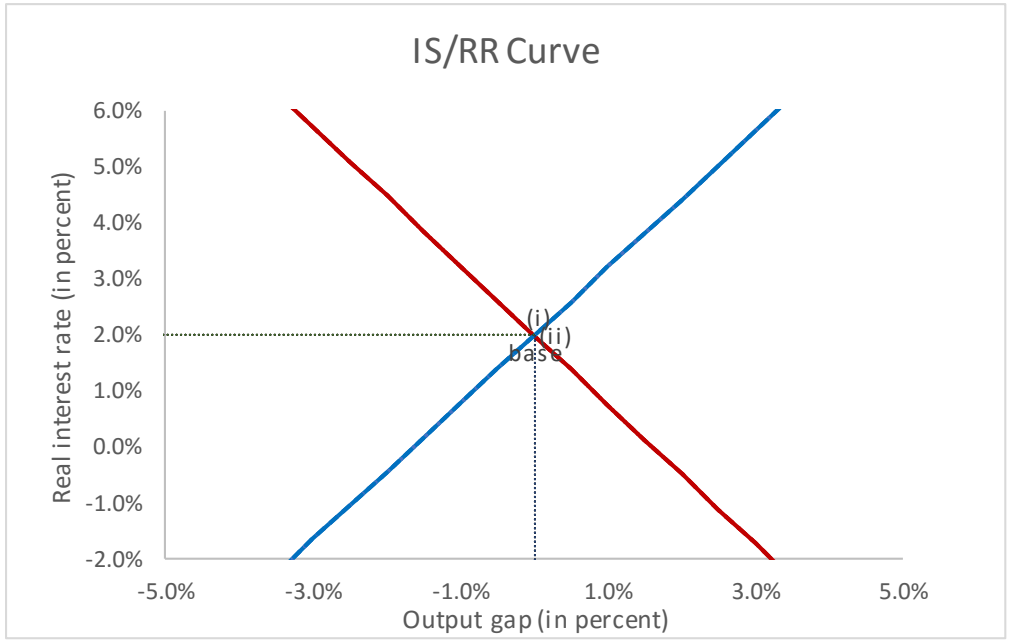
If demand decreases and the output gap falls, firms will face lower costs – wages will fall. These lower costs are passed on to buyers – less inflation.

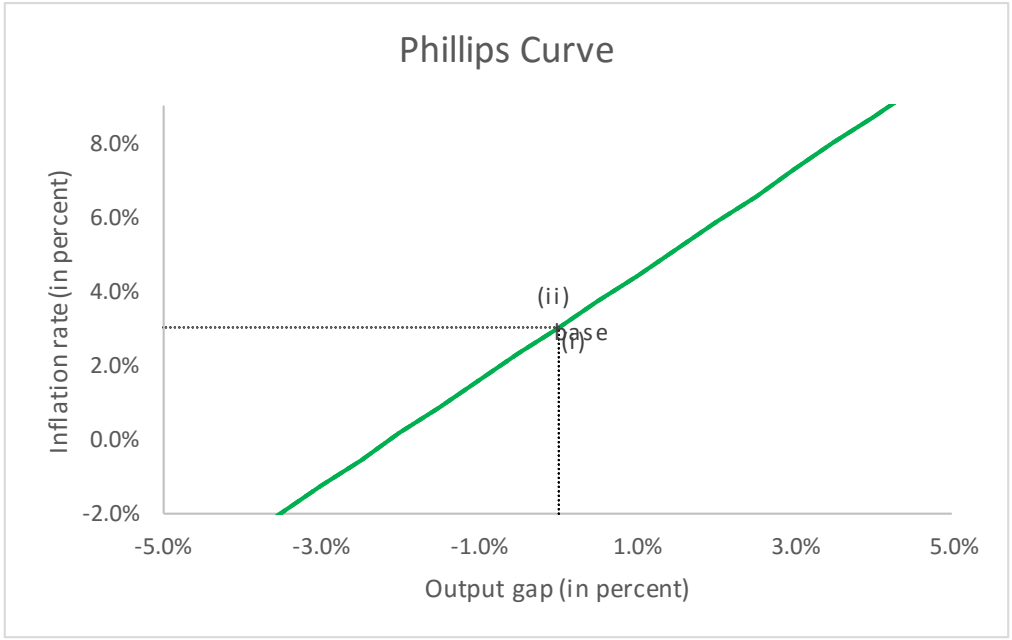
For this reason, the PC slopes up.

An economy contains many **simultaneous relationship**s among key variables: relationships that happen all at once – and can sometimes be in more than one direction.

Some examples:




IS/RR Curve
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
-1.0%
-2.0%
Real interest rate (in percent)
(i)
(ii)
base
-5.0%
-3.0%
-1.0%
1.0%
3.0%
5.0%
Output gap (in percent)


Phillips Curve
8.0%
6.0%
4.0%
2.0%
0.0%
-2.0%
Inflation rate (in percent)
(ii)
base
(i)
-5.0%
-3.0%
-1.0%
1.0%
3.0%
5.0%
Output gap (in percent)

Plan

1. Brief review of short macro model – closed economy
2. Extending the model to an open economy.
3. Application: The Impact of Fiscal and Monetary Policy in An Open Economy
4. Application: Economic Stabilization in an Open Economy
5. Application: Vulnerabilities of an Emerging Market Open Economy.

You've already learned about short run macroeconimc equilibrium through the use of a model.

That model had three main relationships:

Goods market equilibrium (the IS curve)

A monetary policy rule or "reaction function" – the RT (or RR) curve.

Determination of the inflation rate on the supply side – the Phillips Curve (PC).

Until now we've focused on the closed economy.

We'll now extend this model to the open economy.

You will learn:

How relative prices and output determine the net export balance (exports minus imports)

How changes in interest rates (i.e. monetary policy) now effect economic activity through two channels: domestic expenditures and external sector (exchange rate) impacts.

The IS Curve –closed economy

$$Y = C + I + G$$

The IS Curve – open economy

$$Y = C + I + G + X - IM$$

Export supply – determined by the relative price of exports (rpx)

$$X_t = a_{0X} + \underset{POSITIVE}{a_{1X}} * rpx_t$$

Import demand – determined by output and the relative price of imports (rpim)

$$IM_t = a_{0IM} + \underset{POSITIVE}{a_{1IM}} Y_t + \underset{NEGATIVE}{a_{2IM}} * rpim_t$$

The exchange rate (in spot markets), S – a key price in any open economy:

$$S_t = \frac{\text{Domestic Currency Units}}{\text{Foreign Currency}}$$

Example: Brazil:

$$S_t = \frac{\text{Brazilian Real}}{\text{US Dollar}}$$

A more valuable currency means a lower value of S – fewer Reais per Dollar

"Appreciation minus"

The real price of exports.

$$RPX_t = \frac{S_t P_t^x}{P_t} = \frac{\text{Exchange Rate * World Price}}{\text{Domestic Price Level}}$$

$rpx_t = \%$ deviation from long run norm

When RPX rises, exporters are encouraged to produce more exports.

Example: Iron Ore In Brazil

	World Price of Iron Ore US Dollars / Dry Metric Ton	Spot Exchange Rate Reais/Dollar	Domestic Price Level index, base = 1	Real Price of Exports (RPX) -Reais/DMT	Deviation from Norm *rpx*	
	60	2.86	1	171.4	-4.8%	Appreciated currency
Long run norm →	60	3.00	1	180.0	0.0%	
	60	3.15	1	189.0	5.0%	Depreciated currency

NB> Brazil assumed to be a price taker -- has no effect on world price

Bottom Line – all else equal, when the currency is more depreciated, exporters receive more for each unit of the export good sold on world markets; quantity in volume terms (i.e. tons of iron ore) of exports supplied will increase.

The real price of imports.

$$RPIM_t = \frac{S_t P_t^{IM}}{P_t} = \frac{\text{Exchange Rate * World Price}}{\text{Domestic Price Level}}$$

$$rpim_t = \%\ \text{deviation from long run norm}$$

When RPIM rises, importers are discouraged from to purchasing imports.

Example: Imported French Wine

	World Price French Pinot Noir US Dollars / Bottle	Spot Exchange Rate Reais/Dollar	Domestic Price Level index, base = 1	Real Price of Imports (RPX) -Reais/Bottle	Deviation from Norm *rpim*	
	100	2.86	1	285.7	-4.8%	Appreciated currency
Long run norm →	100	3.00	1	300.0	0.0%	
	100	3.15	1	315.0	5.0%	Depreciated currency

NB. Brazil assumed to be a price taker -- has no effect on world price

Bottom Line – all else equal, when the currency is more depreciated, domestic purchasers tend to substitute away from imported goods and toward domestic substitutes (i.e. less French wine, more Brazilian wine).

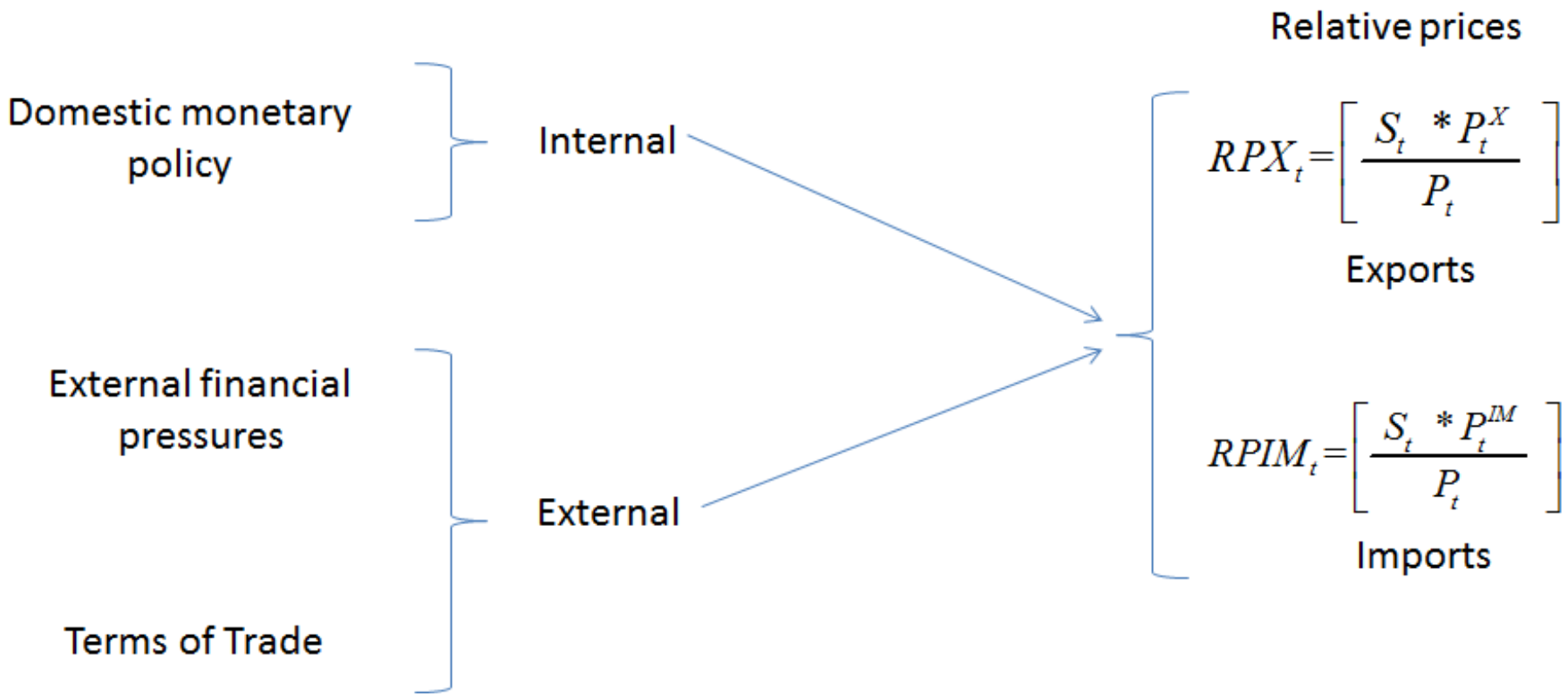
Export supply – determined by the relative price of exports (rpx)

$$X_t = a_{0X} + \underset{POSITIVE}{a_{1X}} * rpx_t$$

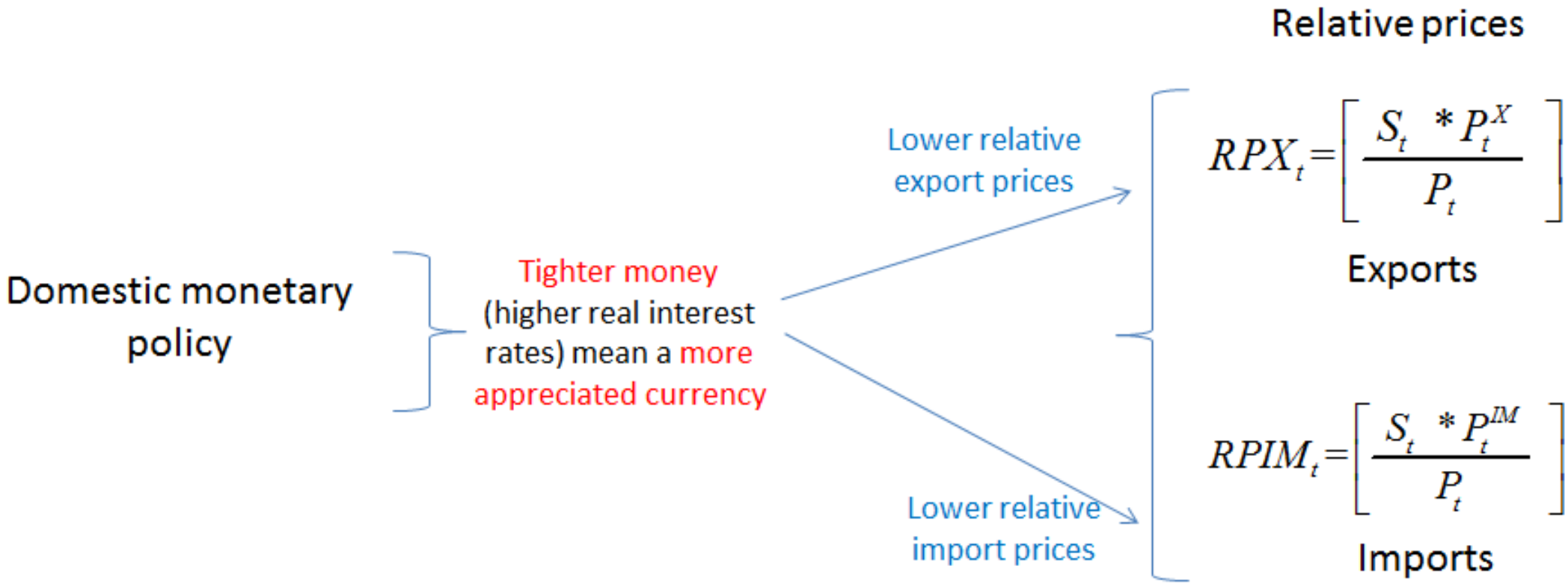
Import demand – determined by output and the relative price of imports (rpim)

$$IM_t = a_{0IM} + \underset{POSITIVE}{a_{1IM}} Y_t + \underset{NEGATIVE}{a_{2IM}} * rpim_t$$

Both internal and external factors can impact the relative prices of exports and imports:



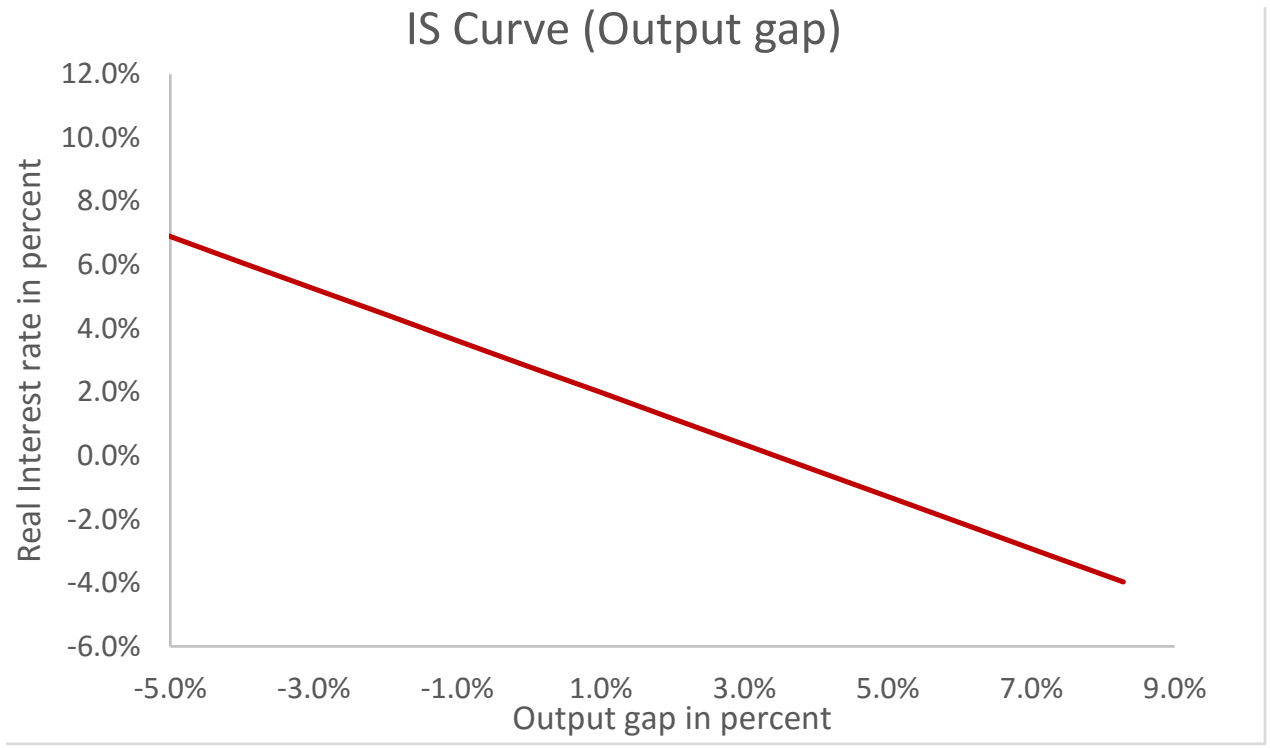
Internal monetary policy impact the
relative prices of exports and imports through the exchange rate
(reflects interest parity condition).



For a deeper economic reasoning about the relationship between real interest rates and exchange rates, see Chapter 14, PP 21-31 in the textbook:

http://testmodel2014.yolasite.com/

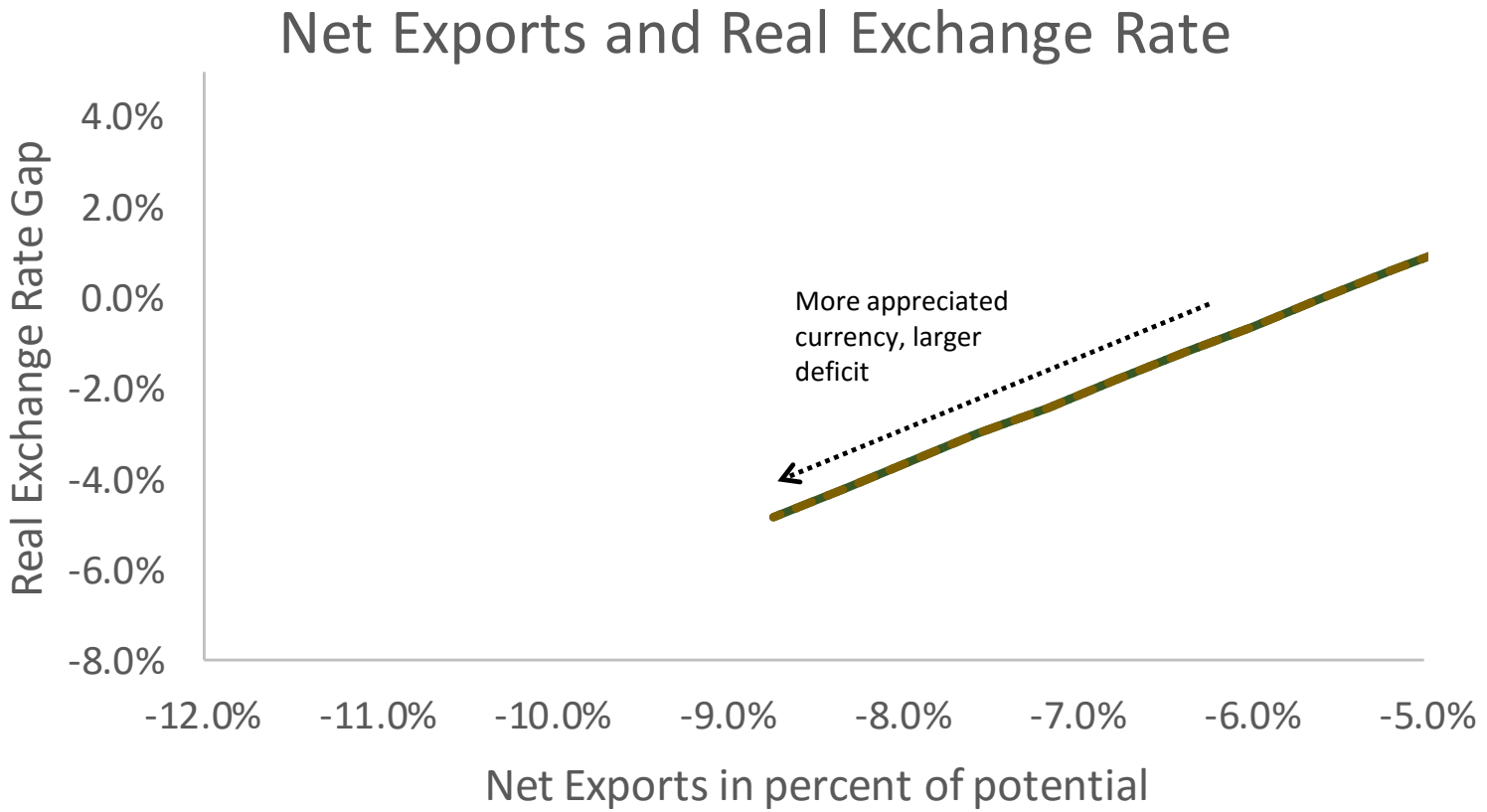
Changes in interest rates work through TWO channels in the open economy.



$$Y = C + I + G + NX$$

All else equal, when interest rates rise:

- Less domestic spending.
- External sector: exports discouraged, imports stimulated.

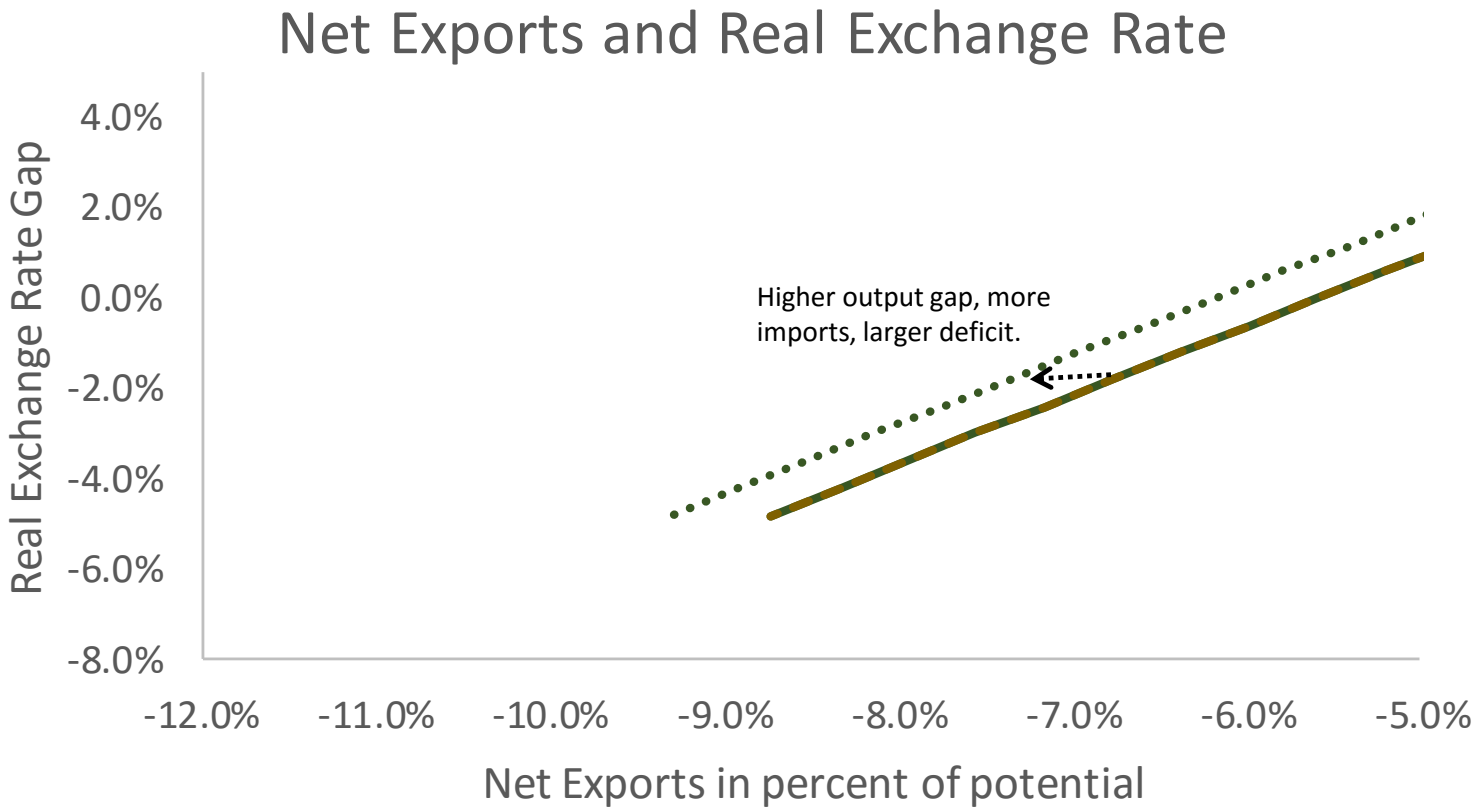


Price Effect:

As the real exchange rate appreciates, net exports fall.

Price effect

$$NX_t - X_t - IM_r = (a_{0X} - a_{0IM}) + (a_{1X} * rpx_t - a_{2IM} * rpim_t) - a_{1IM} Y_t$$

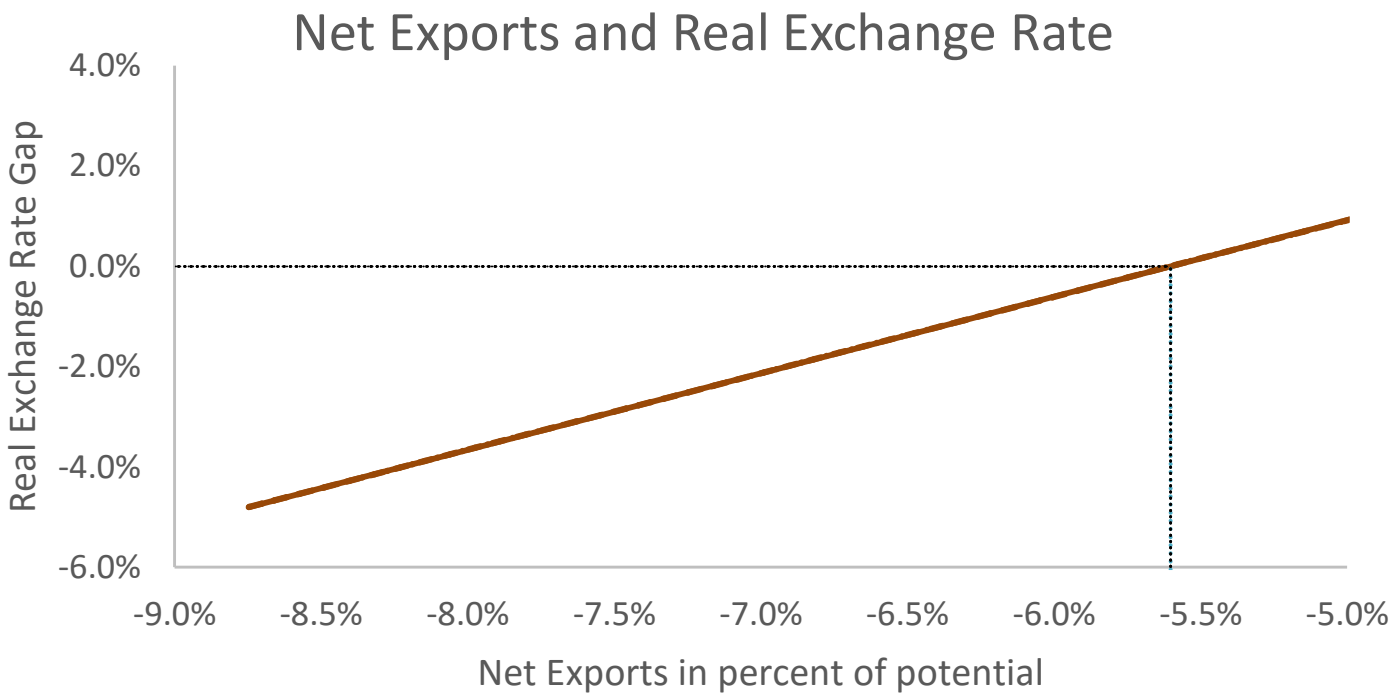


Income Effect:

Higher domestic income means more imports, larger deficit on net exports.

Income effect

$$NX_t - X_t - IM_r = (a_{0X} - a_{0IM}) + (a_{1X} * rpx_t - a_{2IM} * rpim_t) - a_{1IM} Y_t$$



Initial Equilibrium:

With zero output gap with real interest rates at their long-run, real exchange rate at its long run value, net exports are at their long run normal value (ratio to potential output).

$$NX_t - X_t - IM_r = (a_{0X} - a_{0IM}) + (a_{1X} * rpx_t - a_{2IM} * rpim_t) - a_{1IM} Y_t$$

Export and import prices at their long run norm.

Output at potential at potential

External factors can also impact the relative prices of exports and imports. DISCUSSED LATER

External financial pressures

Terms of Trade

External

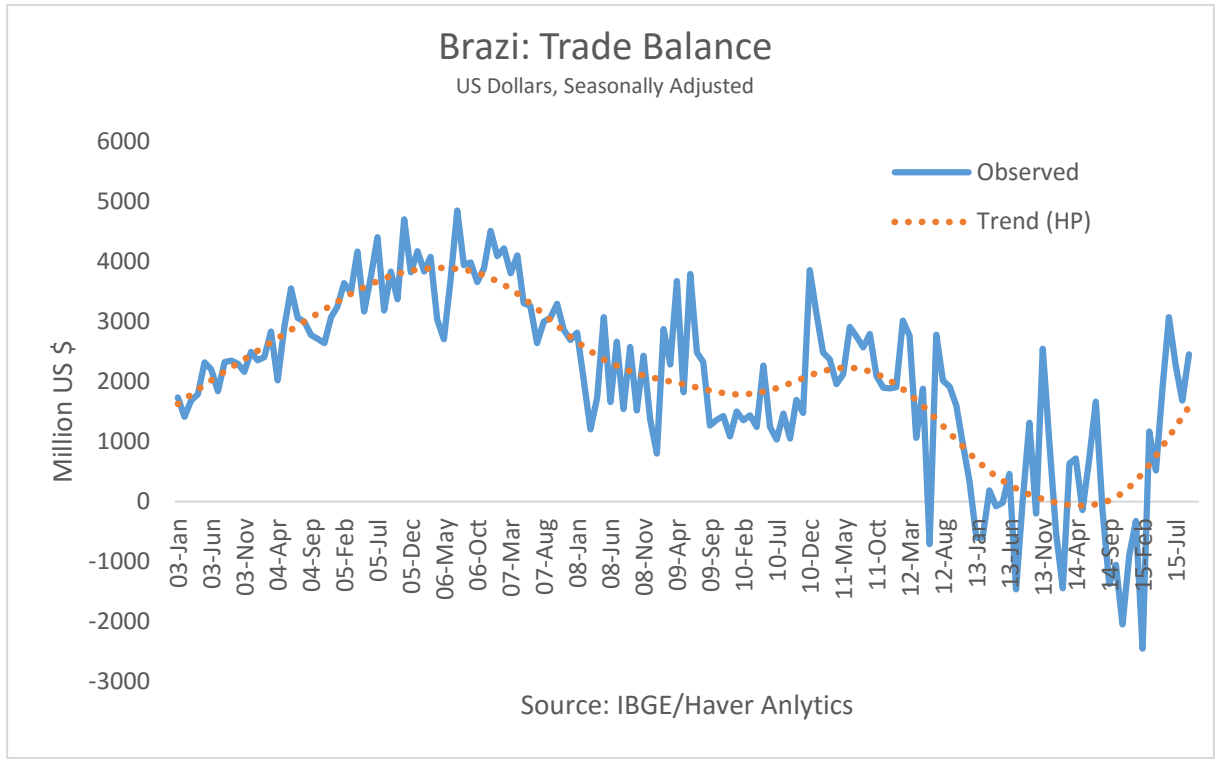
Relative prices

$$RPX_t = \left[\frac{S_t * P_t^X}{P_t} \right]$$

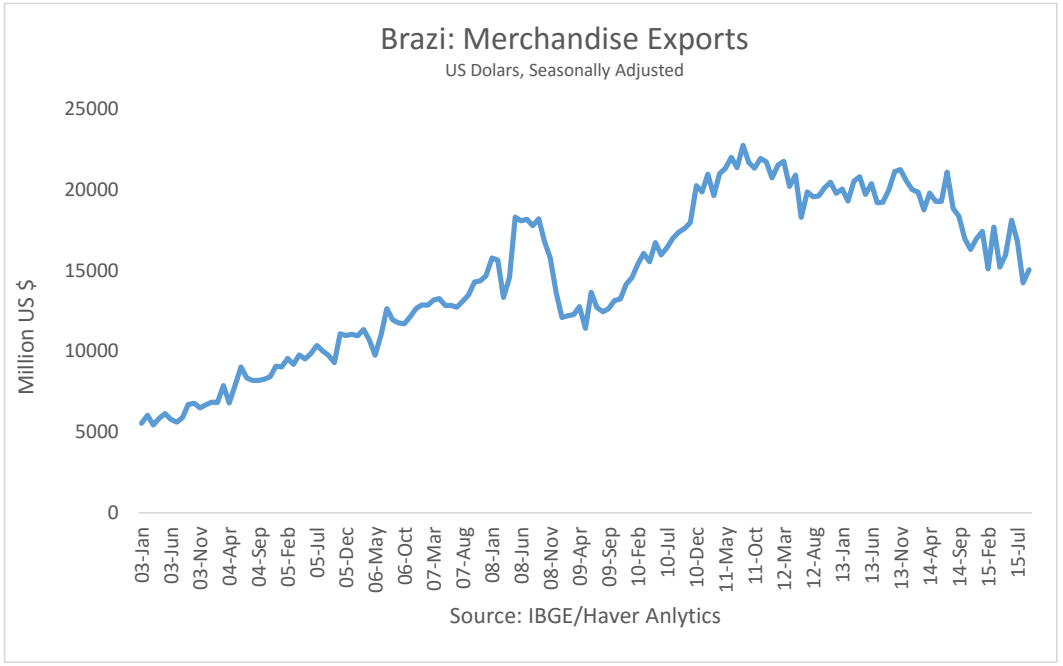
Exports

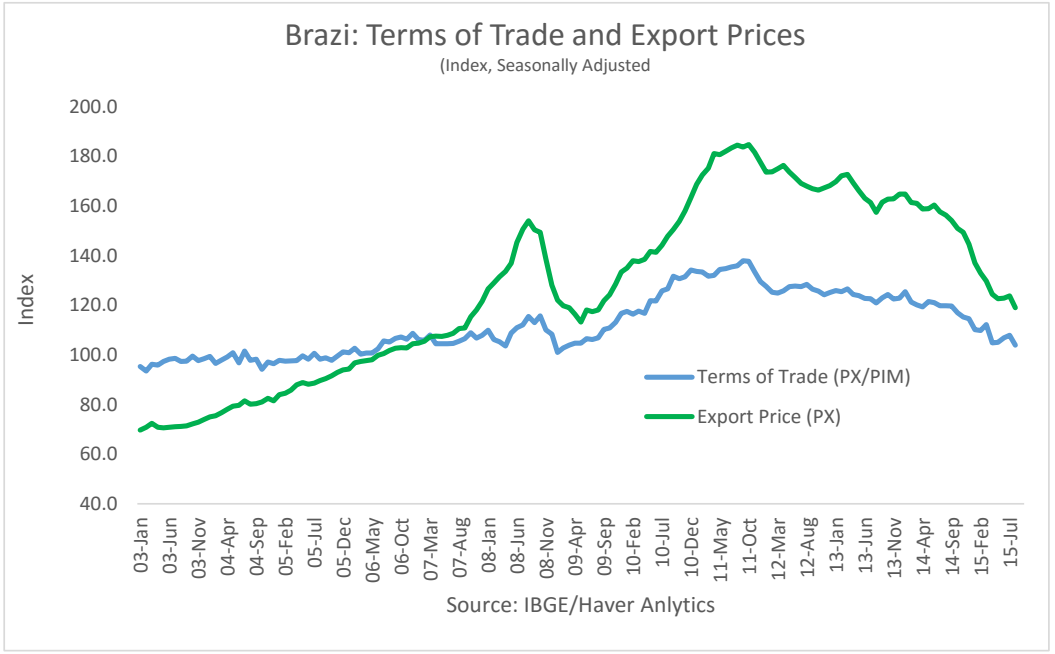
$$RPIM_t = \left[\frac{S_t * P_t^{IM}}{P_t} \right]$$

Imports

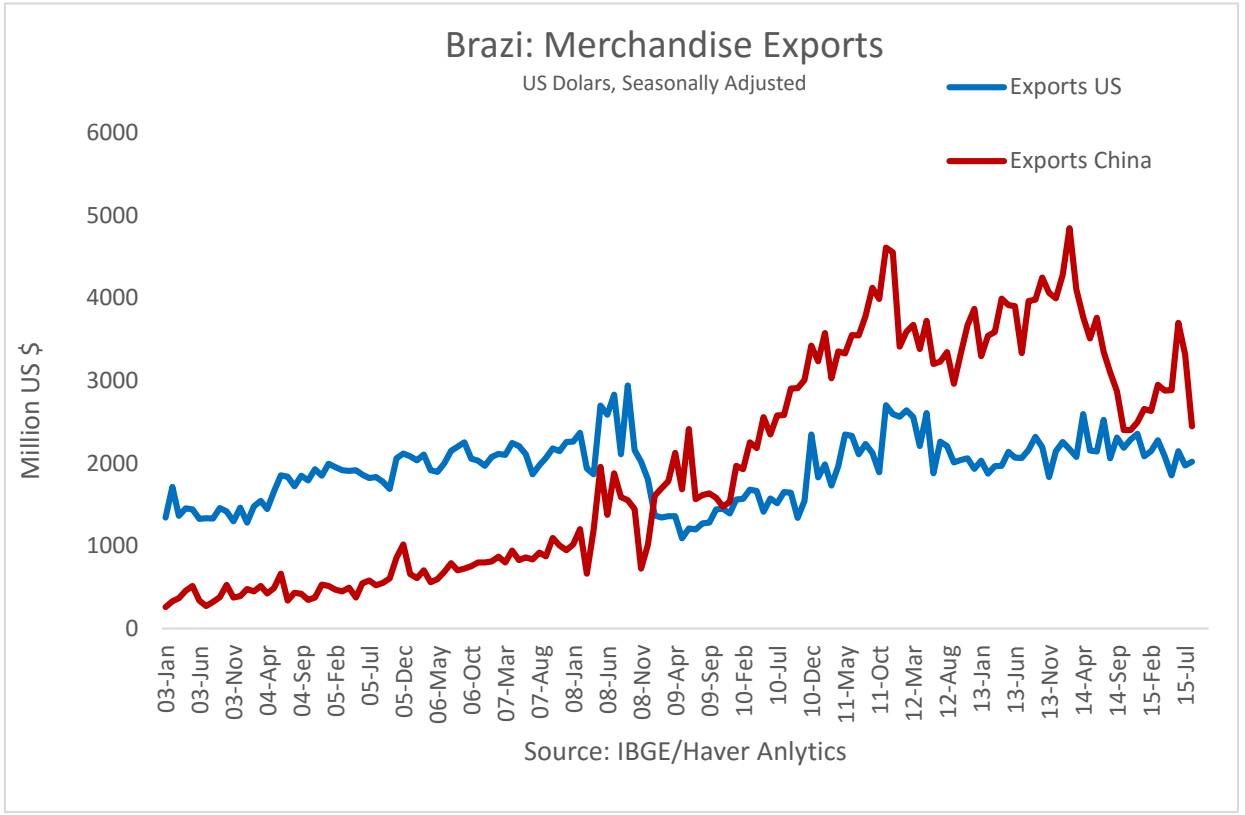


Brazil's net exports (trade balance) has, until mid-2015, been deteriorating.





Brazil's export revenues have been suffering, to a large degree the consequence of declining demand (lower export prices) in world markets.



China-Brazil link is top threat to global economy

Gene Frieda

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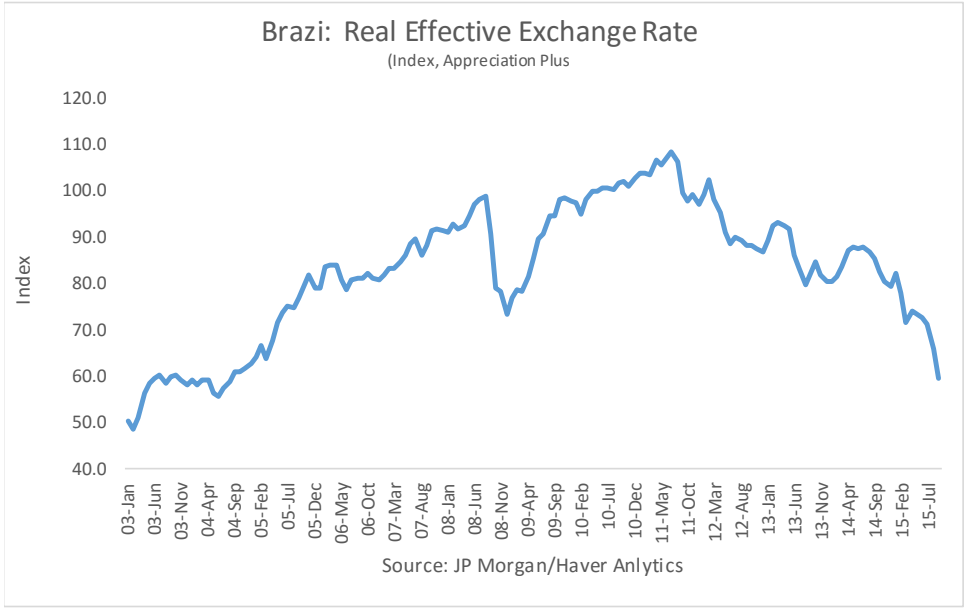
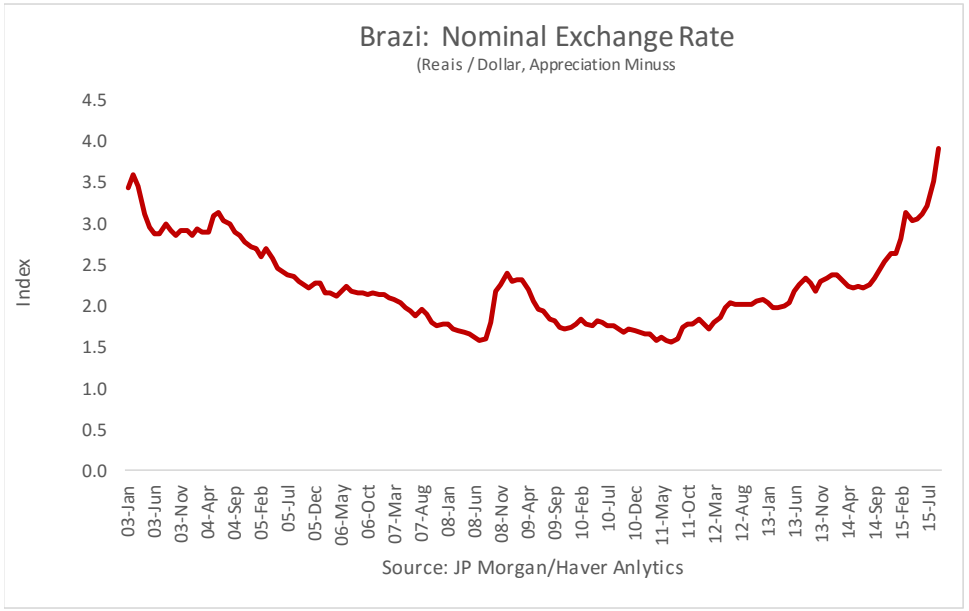
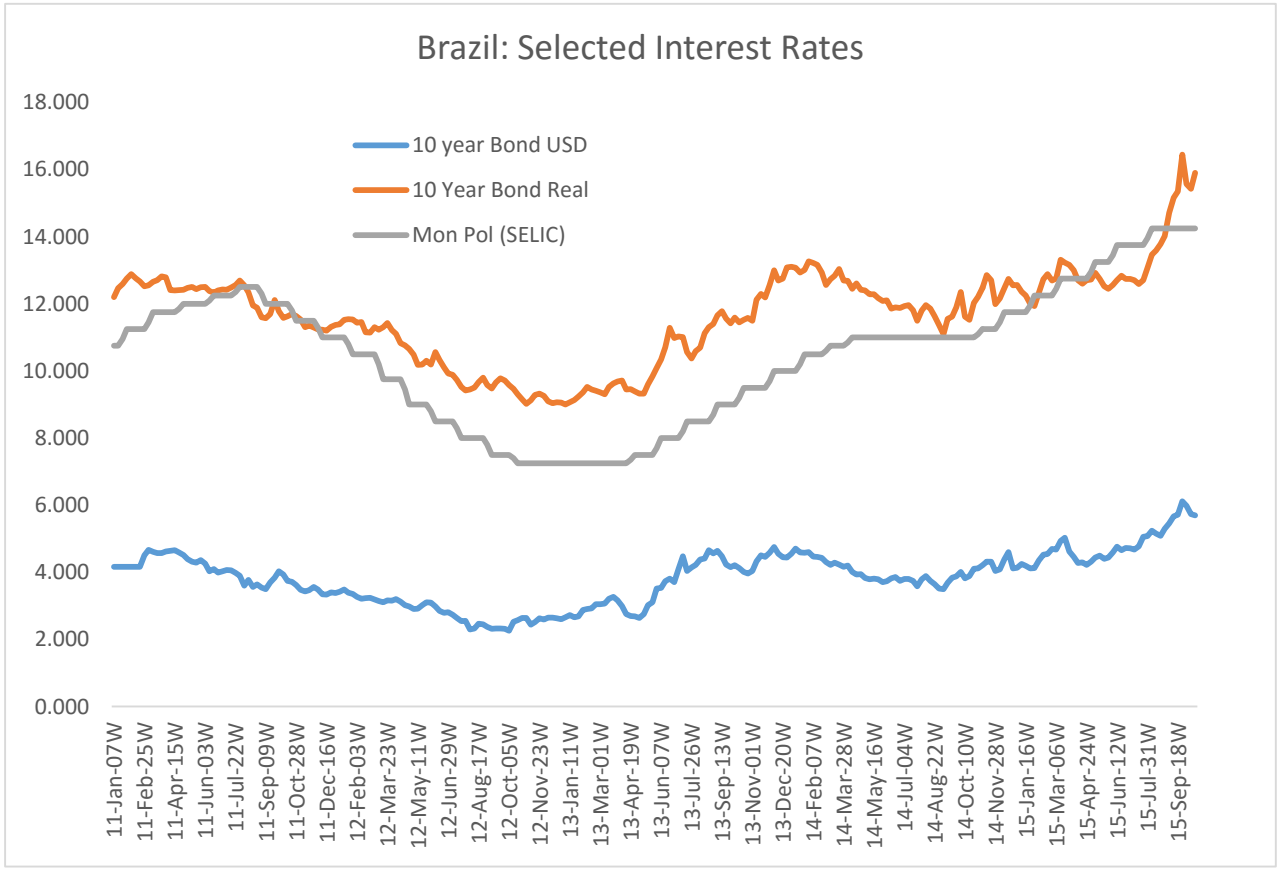
Danger of renminbi depreciation unleashing deflation worldwide

No longer the source of awe that it once was, Chinzila — the nexus between China and Brazil — has become the number one threat to the global economy.



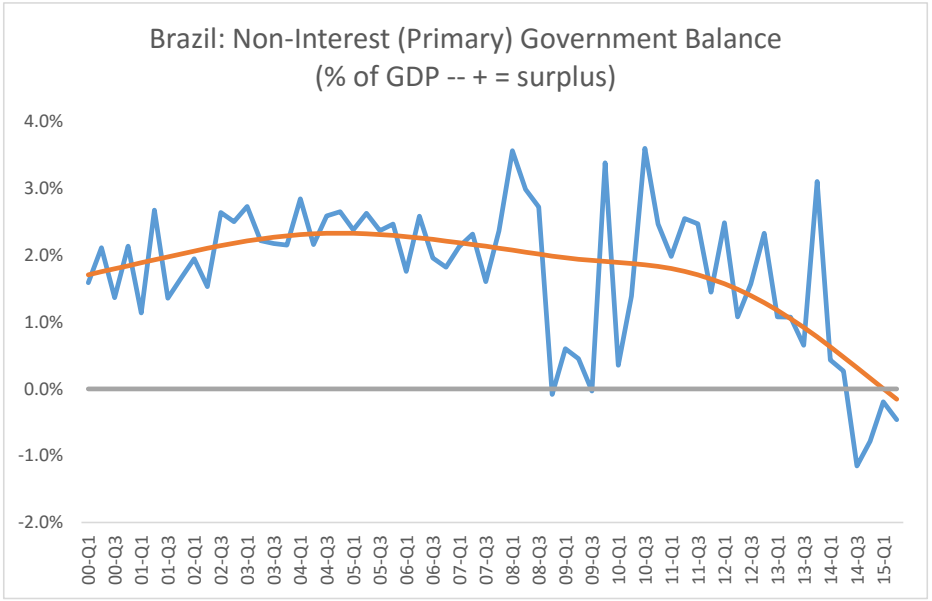


Brazil's exchange rate has depreciated – in both real and nominal terms.

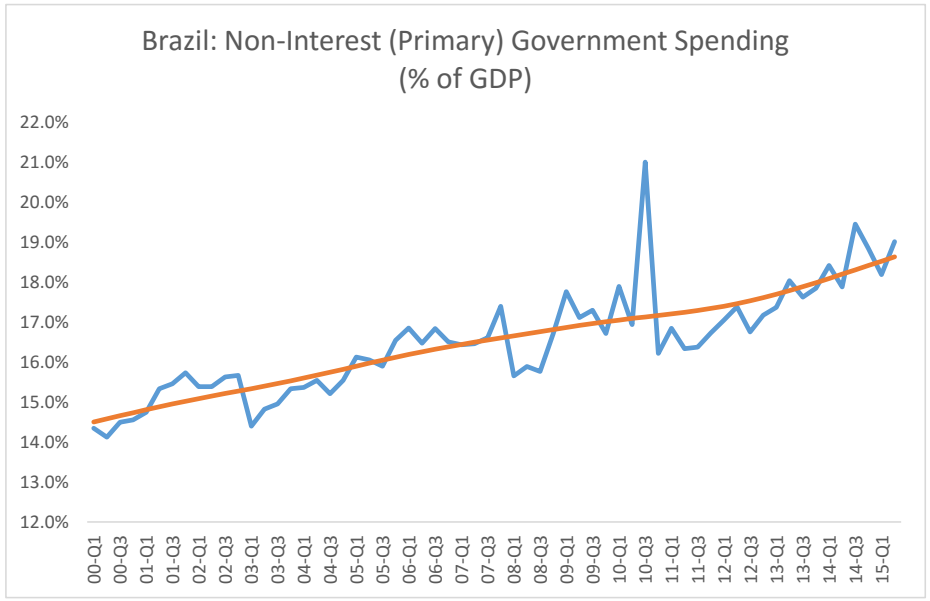


Interest rates continue to rise:
Monetary Policy – tightening by central bank.

Government bond – compensation for more risk, more exchange rate depreciation.



Brazil's fiscal discipline, hard-earned during the early years of the 21st century, has suffered some slippage….



As the share of government expenditures in the economy continue to rise.