A snapshot of the life of an ‘applied’ economist

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A selection of ‘applied’/commercial research pieces I have worked on in 2013

1. The costs and motives behind central bank FX interventions

2. Israel: Inflationary pressures on the horizon.

3. Evaluating the risks associated with the EM credit boom.

4. The anatomy of the EM rates sell-off (May-June 2013).
The costs and motives behind FX interventions: the case of Bank of Israel
The Shekel has appreciated by around 11-12% over the past year on a trade-weighted basis.

Source: Bank of Israel
This has been a significant concern for the Bank of Israel as the strong Shekel has an adverse impact on exports.

Two policy tools to weaken the currency:

A) Monetary policy (cutting the policy rate).

B) Outright FX interventions (accumulating FX reserves).

Policy mix has important implications for asset prices.
Bank of Israel has reintroduced FX interventions... but the pace is likely to be more moderate. Why?

Source: Bank of Israel, Goldman Sachs Global Investment Research
A build-up in FX reserves is likely to be driven by three motives:

*Flow motives:*

**To boost competitiveness:** FX interventions designed to weaken the currency may be used to stimulate economic growth via higher net exports. This motive is particularly strong in current account surplus economies, which naturally experience large capital inflows.

**Reduce FX volatility:** FX interventions can also be used to reduce exchange rate volatility that arises as a result of speculative behaviour or ‘overshooting’ effects (in both directions).

*Stock motive:*

**Precautionary reserves:** Large FX reserves reduce the likelihood of a ‘sudden-stop’ in capital inflows. Given the substantial economic costs associated with such ‘sudden-stops’, countries may seek to hold substantial foreign currency reserves and this could have been an important driver of the acceleration in FX accumulation from the mid-1990s.
There are ‘fiscal’ costs associated with FX reserves...

The costs have risen as the Bol has accumulated larger FX reserves
Costs of FX reserves, per year, for different spreads

Source: Goldman Sachs Global Investment Research
...and the ‘precautionary’ benefits arguably diminish after a certain point.

Source: Goldman Sachs Global Investment Research
The ‘optimal’ FX reserves level (which balances the ‘costs’ and the precautionary benefits) depends on different factors.

The optimal level of FX reserves is inversely related to the ‘opportunity cost’ spread…

Optimal FX reserves as a function of the opportunity costs.

…but depends positively on the degree of risk aversion.

Optimal FX reserves as a function of the risk aversion.

Notes: The optimal FX reserves are based on the baseline calibration in Olivier and Ranciere (2006). In particular, the risk aversion is 2.

Source: Goldman Sachs Global Investment Research, Jeanne and Ranciere (2006)
The cost-benefit trade-off of FX interventions is less appealing today than it was back in 2008.

The Bol's FX reserves are above the optimal precautionary savings level.

BoI's FX reserves vs. optimal level

Source: Goldman Sachs Global Investment Research
FX interventions have remained relatively modest in 2013... and the BoI has introduced a ‘low-cost’ FX intervention gas program

Source: Bank of Israel, Goldman Sachs Global Investment Research
Empirical approach: Quantifying the ‘benefits’ of precautionary FX reserves

Marginal effect on 'sudden-stop' probability* (following a 1pp increase in factor)

- CA surplus (% of GDP)
- FX reserves (% of short-term external debt)
- Currency overvaluation (in %)
- GDP growth (in %)

Source: Goldman Sachs Global Investment Research
Ukraine could benefit from higher FX reserves

'Sudden-stop' probability

CEEMEA avg. (ex Ukraine)

Q4-2008: Ukraine devaluation

Ukraine

Source: Goldman Sachs Global Investment Research
Optimal level of CB FX reserves across EMs (note that the Czech National Bank recently introduced a ‘peg’ against the Euro)

Source: Goldman Sachs Global Investment Research, IMF
Central bank FX reserves has increased over the past 20 years

Source: Goldman Sachs Global Investment Research
... thereby neutralizing the impact of a deterioration in the current account

Exhibit 1: Disentangling the 'growth' and 'yield' impact from the US 'normalisation' process
Stylised Illustration of Model Dynamics

Source: Haver Analytics
Israel: Inflationary pressures on the horizon
Inflation surprised on the downside in 2013

Source: Bloomberg, Goldman Sachs Global Investment Research
... but this trend is likely to change in 2014-15

a) There is little ‘slack’ in the Israeli economy

b) The housing boom is likely to lead to higher rental prices

c) The disinflationary impact from FX is likely to be more muted in 2014
A. There is little ‘slack’ in the Israeli economy compared with the US, Euro area and other developed economies.

**Exhibit 1:** The output gap in Israel is marginally positive... Output gap in Israel vs DM and EM

**Exhibit 2:** ... and unemployment is much lower than in the Euro area or the US. International comparison of unemployment rates

*Source: Goldman Sachs Global Investment Research*

*Source: Haver Analytics*
The decline in the unemployment rate partially reflects structural factors but the unemployment gap remains negative ...
a) The cyclical unemployment rate is an important driver of inflation: We find that a -1pp cyclical unemployment rate (i.e., if unemployment is 1pp below the NAIRU level) tends to increase core inflation by around 0.3%-0.8% on a quarterly (qoq ann.) basis, depending on the approach. This is an important observation, as it suggests that inflation is likely to pick up as exports increase and boost economic activity in 2014.

b) Supply shock also matters: We also find that Israel ‘imports’ a non-trivial part of its inflation from abroad. More specifically, we find that a 1pp rise in import prices tends to increase core inflation by around 10bp on a quarterly (qoq ann.) basis. This also suggests that the strong appreciation trend of the Shekel since mid-2012 can explain a major part of the soft inflation environment in 2012H2 and 2013.
Poor labour market data? There is a close relationship between the output gap (based on GDP data) and the unemployment gap.

Exhibit 5: There is a close relationship between the output gap and the unemployment gap...
Output gap vs Unemployment gap

Exhibit 6: ... and an ‘Okun’s law’ specification suggests that a 1pp drop in the structural unemployment rate increases the output gap by 1.6%
Okun’s law regression

Source: Goldman Sachs Global Investment Research
B) There was a close empirical relationship between house and rental prices... until 2009

Exhibit 7: House price and rent inflation have decoupled in 2009, potentially driven by the low interest rate environment

Source: Goldman Sachs Global Investment Research, Haver Analytics
The housing boom may translate into higher rental prices (especially as interest rates rise)

Exhibit 8: The actual vs equilibrium price-to-rent ratio over time
Price-to-rent ratio: actual vs equilibrium

Exhibit 9: Rental prices need to pick up by 12% to close the ‘gap’
Decomposition of the rise in house prices since Jan 2009

Source: Goldman Sachs Global Investment Research, Haver Analytics
C) Disinflationary impact from FX is likely to be more muted in 2014

- Year-on-year CPI inflation is currently running at 1.3% yoy, well below the mid-point of the BoI’s inflation target (2%).

- But disinflationary effects during the last 12 months may have hidden some of the underlying inflationary pressures. For example, since September 2012, the Shekel has appreciated by around 11% on a trade-weighted basis.

- Given a ‘pass-through’ of around 10%-15%, this could have reduced inflation by around 1.1% to 1.7%, such that headline inflation would have been close to the upper bound of the BoI’s inflation target (3%).
Therefore, we expect inflation to rise gradually in 2014, and ultimately this is likely to trigger a hiking cycle...
... although “well-anchored” inflation expectations could buy the Bol some time
Evaluating the risks associated with the EM credit boom
Sharp divergence in credit growth between developed and emerging markets since 2009

Exhibit 1: Credit growth has outpaced GDP growth in several emerging economies
Real credit and GDP growth across emerging and developed economies

Source: World Bank (BIS/National Authorities when 2012 data was not available), Goldman Sachs Global Investment Research.
An historical overview of systemic banking crises

Exhibit 6: The banking crisis in 2008 was the largest since the ‘great depression’
Historical overview of (systemic) banking crises in EM and DM

Countries with systemic banking crisis*

- DM
- CEEMEA
- AEJ
- LATAM

The great depression
The great recession
Asian Financial Crisis
Tequila crisis
Latin American Debt Crisis
Russia 1998
Turkey 2000

At a first glance, credit booms tend to be a leading indicator of bank crises.

Exhibit 2: Strong credit growth in DM up to the global financial crisis in 2007-08
Credit-to-GDP Average in DM

Exhibit 3: Credit growth has been modest in CEEMEA following the pick-up prior to the great recession.
Credit-to-GDP Average in CEEMEA

Exhibit 4: There was a sharp acceleration in credit growth up to the Asian financial crisis in 1997
Credit-to-GDP Average in AEJ

Exhibit 5: Credit growth has been relatively strong in LATAM over the past couple of years.
Credit-to-GDP Average in LATAM

Source: World Bank, Goldman Sachs Global Investment Research
Overview of (formal) empirical analysis

• Here, we analyse formally whether there is a statistical relationship between credit growth and (systemic) banking crises.

• More specifically, based on a panel binary response model, we assess whether the likelihood of a banking crisis depends on excessive credit growth and domestic monetary policy.

• The main rationale here is that a rapid credit boom may weaken asset quality, and increase susceptibility to financial shocks.

• Intuitively, a high likelihood would imply that only a minor shock to the banking sector can trigger a crisis, while a much larger (more unlikely) shock is required if the likelihood is low.
Summary of key empirical results

1) **Strong credit growth increases the likelihood of a banking crisis.**
   We find a statistically significant relationship between the credit gap (or the 3-year change in the credit-to-GDP ratio) and the likelihood of a banking crisis in the following year.

2) **A sharp tightening in monetary policy also increases the risks.**
   Empirically, we find that a tightening in domestic monetary conditions amplifies the risks associated with excess credit growth. We find that a 1pp tightening in monetary policy increases the risk by approximately the same amount as a 1pp increase in the (excessive) credit growth gap.
Conditional banking crises probabilities across time (2002, 2005, 2008... and 2014)

Exhibit 7: Financial stability risks have generally declined since 2008 within CEEMEA

Source: Goldman Sachs Global Investment Research.
Hungary experienced a banking crisis in 2008 following a period with a positive credit ‘gap’

Source: Goldman Sachs Global Investment Research, Haver Analytics
Similarly, Ukraine had a banking crisis in 2008...

Source: Goldman Sachs Global Investment Research, Haver Analytics
... as did Russia

Source: Goldman Sachs Global Investment Research, Haver Analytics
Nigeria also experienced a banking crisis in 2009 following a credit boom

Source: Goldman Sachs Global Investment Research, Haver Analytics
Turkey: Credit growth has been very strong since 2009 (although the base is low)

Source: Goldman Sachs Global Investment Research, Haver Analytics
NPL ratio is currently at 2.5% in Turkey, significantly below the 10% pre-crisis level, but it tends to be a lagging indicator.
Foreign funding and FX-denominated corporate loans also increase the risks to the Turkish banking sector.

Exhibit 10: The Turkish banking sector’s net foreign asset position has deteriorated while FX denominated loans has increased NIIP (banks) and FX denominated loans in Turkey.

Source: Haver Analytics, Goldman Sachs Global Investment Research.

Exhibit 11: We expect a monetary tightening in Turkey in 2014

Average change in credit-to-GDP ratio (2009-2012) and monetary tightening in 2014 (GS forecast).

The anatomy of the EM rates (May-June) sell-off
EM fixed income: What happens when US growth and Treasury yields go up?

Exhibit 1: Disentangling the ‘growth’ and ‘yield’ impact from the US ‘normalisation’ process
Stylised Illustration of Model Dynamics

1. Growth Impact
- US Growth ↑
- External Demand ↑
- Domestic Growth Dynamics ↑
- Global Risk Aversion ↓
- VIX ↓

2. Yield Impact
- US 10yr Yields ↑
- Rising US yields tend to increase CEEMEA yields, particularly in leveraged economies with large external imbalances

Note: Red arrows indicated a positive impact on CEEMEA yields while grey arrows indicate a negative impact. The empirical analysis suggests that the ‘yield’ effect dominates the ‘growth’ effect.

Source: Goldman Sachs Global Investment Research
Sensitivity to higher US Treasuries varies significantly across countries...

Source: Goldman Sachs Global Investment Research
... based on leverage levels and current account deficits

Source: Goldman Sachs Global Investment Research
A rapid sell-off in UST could lead to a larger impact on EM yields

Source: Goldman Sachs Global Investment Research
Estimated model explains a large share of the variation in the EM rates sell-off

\[ y = 0.6549x + 45.734 \]

\[ R^2 = 0.5591 \]

Source: Goldman Sachs Global Investment Research
The EM sell-off was generally more in line with the non-linear model.
Macro fundamentals have been a key differentiation theme during the EM sell-off.

Model Estimates (published March 2013) vs. Realized EM sell-off (May to August 2013)

- CA Deficit
- External debt

Source: Goldman Sachs Global Investment Research
I, Kasper Lund-Jensen, hereby certify that all of the views expressed in this report accurately reflect my personal views, which have not been influenced by considerations of the firm’s business or client relationships.

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