

## Global Macro Strategy

### Big Macro 07: The What, Why & So-What of Globalisation – II. Cyclical or structural?

#### Global Macro Strategy

#### Global

Click below for the first note in this series:

[The What, Why & So-What of Globalisation – I. Separating myth from reality](#)

#### The diagnosis: Is the slowdown in trade cyclical or structural?

Demand remains the main driver of global trade over time. But we estimate that as much as 40% of the slowdown in trade post crisis cannot be explained by growth alone. Factors such as the changing texture of Chinese demand, shrinking global value chains, trade liberalisation reversing, and de-materialisation of demand are also compromising trade. Most of these factors appear more structural than cyclical. Our last note addressed the 'what' of the slowdown in globalisation. Today we address the 'why'. The next note in this series will ask 'so-what', and discuss market implications.

#### The prognosis: How fast will trade grow?

We expect trade to grow around 3.75-4.0% per annum in volume terms over the coming 5 years if investment picks up, and nascent protectionism doesn't progress further. If investment doesn't pick up, and if protectionism continues to grow, global trade will likely expand only around 1.25% a year as trend. To put these numbers in context, the median trade volume growth in the last 25 years is around 5.5%.

#### The analysis: Answering the big questions behind trade's slowdown

We organise this note into different sections based on the questions we have been asked most frequently. Please click on the section of interest to go directly to it.

1. [What's holding back trade? Decomposing the drivers of lower trade volumes](#)
2. [Why is investment weak? Isn't that the big question?](#)
3. [How changes within China are changing the world](#)
4. [Is protectionism killing global trade?](#)
5. [From stuff to fluff: De-materialisation makes for a material change in trade](#)
6. [Re-shoring and automation – a gap between anecdote and reality](#)

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## Summary and conclusions

### The 'why' of slowing globalisation – cyclical or structural?

It has been argued that the trade slowdown is only a symptom of a deeper reality – a slowdown in the import sensitive components of expenditure, specifically investment. We disagree – trade elasticity has dropped not just against GDP but also against an import sensitivity adjusted demand aggregate (IAD). Our numbers tell us that less than 60% of the slowdown in trade volume growth between pre and post crisis periods can be explained by weak demand. The slowdown in China investment on re-shoring accounts for 23% of the slowdown, shrinking of value chains explains 11%, while creeping protectionism accounts for another 7%.

### Cyclical influences play an important role – but it may be a very long cycle

We say around 60% of the slowdown can be explained by demand weakness, but can demand weakness today really be described as cyclical? High levels of debt, increased regulation, and reduced competition appear to have slowed investment, which in turn is interacting with weak productivity and trade. Of course, these factors may not be permanent, but they seem unlikely to be resolved in a matter of quarters either. In EM, and China in particular, investment is flattening out at very high levels to GDP. We should expect structurally slower investment growth here.

### From stuff to fluff: The model rejects it, but we can see it's happening

It's not just weakness in investment that has compromised trade; the import propensity of investment is also dropping. We believe part of the reason here is the de-materialisation of the economy, typified by greater investment in (less tradable) services, and lower investment in bricks and mortar. Our model rejects this as an explanation, but we think this is only because data fails to capture this reality fully.

### How seriously has protectionism impacted slowdown in global growth?

Lower tariff and regulatory barriers were a significant contributor to the growth in trade in the 1990s and early 2000s. Tariffs have now stopped declining, while non-tariff barriers are rising. Policy is now harming, not helping trade. But protectionism still explains less than 7% of the trade slowdown. The trajectory is unfriendly, no doubt, but this is far from being the main cause of slow trade.

### Reshoring & automation: A gap between anecdote and evidence... for now

We found little evidence that low value added labour intensive goods are dropping any faster than overall imports in the major economies, suggesting automation is not a big factor driving trade patterns. Nor do we find evidence of major re-shoring, with one notable exception – China. This is not to say that changing technology won't make these forces relevant in time.

### The prognosis: How strongly will trade grow in this new regime?

We expect global trade to grow at 3.75-4.0% in volume terms over the coming 5-7 years if nascent protectionism reverses and investment growth ex China rises to its medium term trend. If investment doesn't pick up, and if protectionism continues to grow, trend growth in global trade will likely be around 1.25%. The median trade volume growth in the last 3 decades is around 5.5%.

# 1: The 'why': Quantifying the factors that have contributed to a slowdown in trade

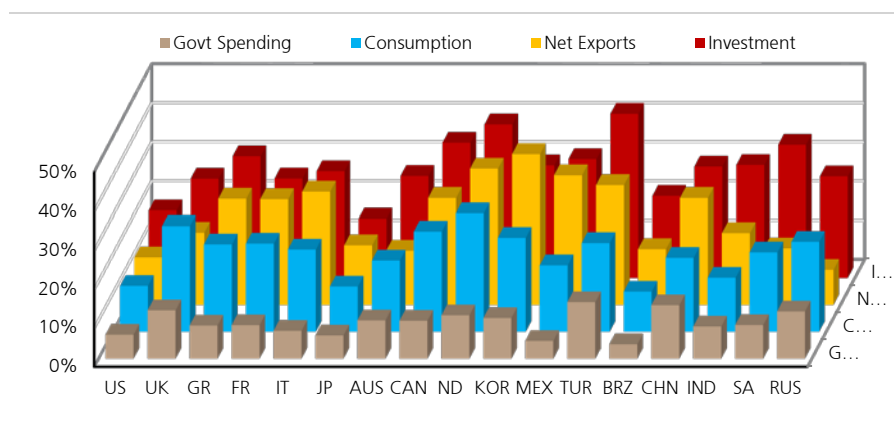
- Trade elasticity has declined even accounting for a bigger drop in the more import sensitive components of expenditure, such as investment.
- Demand factors explain just under 60% of drop in trade volumes between the pre and post crisis years. A simple demand based model has overestimated trade growth significantly in recent years. Something else is also at play.
- The slowdown in China trade volumes accounts for 23% of the slowdown, shrinking of value chains explains 11%, while creeping protectionism accounts for another 7%.

In the previous note of this three-part series we presented evidence that the elasticity of trade relative to GDP is falling - a worrying development if true, because it argues trade may not recover fully even if growth does.

One of the arguments made against this view is that the nature of GDP expenditure is shifting in a manner that undermines trade. Specifically, investment, which is the most import intense form of expenditure, has been weak pretty much across the world. This school of thought argues that a decline in trade is just a symptom of the decline in investment, and that as investment recovers, so will global trade. The relationship of trade with GDP may have broken, but its relationship with the import intense components of expenditure remains intact.

**Is the weakness in global trade just a reflection of weak investment?**

**Figure 1: Import intensity by expenditure component for selected countries**



Source: OECD input-output tables

To test this, we tried to look under the hood of GDP statistics by using input-output tables from the OECD's Structural Analysis database<sup>1</sup>. Using these we calculated the import intensity of each expenditure component of GDP<sup>2</sup>. For each of the largest 16 countries (which account just under 80% of global GDP) we then calculated an import adjusted demand (IAD) measure<sup>3</sup> by weighting each component of expenditure in an economy with its import content.

**We constructed "import adjusted demand" measures across key countries to see how much of the trade slowdown can be explained by sluggish demand**

<sup>1</sup> [https://stats.oecd.org/Index.aspx?DataSetCode=STAN\\_IO\\_TOT\\_DOM\\_IMP#](https://stats.oecd.org/Index.aspx?DataSetCode=STAN_IO_TOT_DOM_IMP#)

<sup>2</sup> The total import content in any item of expenditure A is the sum of the direct imports for that item A and the import content that of others sectors B in the proportion of the output B that is used by this sector A domestically

<sup>3</sup> The methodology was first used by Bussiere et al. See Matthieu Bussiere, Giovanni Callegari, Fabio Chironi, Giulia Sestieri, Norihiko Yamano. 2013. " [Estimating Trade](#)

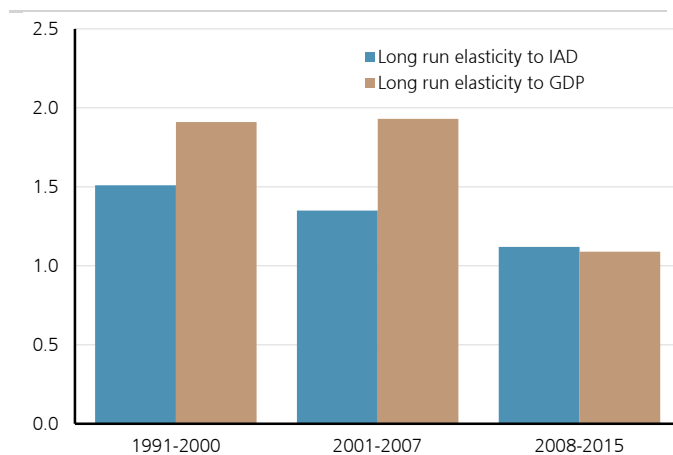
Figure 1 shows this import content of each expenditure item in a country. We normalise these to get the weights for consumption, government spending, private investment and imports, respectively, to arrive at a measure of IAD for each country.

The components of demand that make bigger demands on imports are exports and investment (which therefore are weighted higher). Consumption and government use a much larger proportion of domestic inputs..

**Investment and exports have the highest import content; particularly in EM**

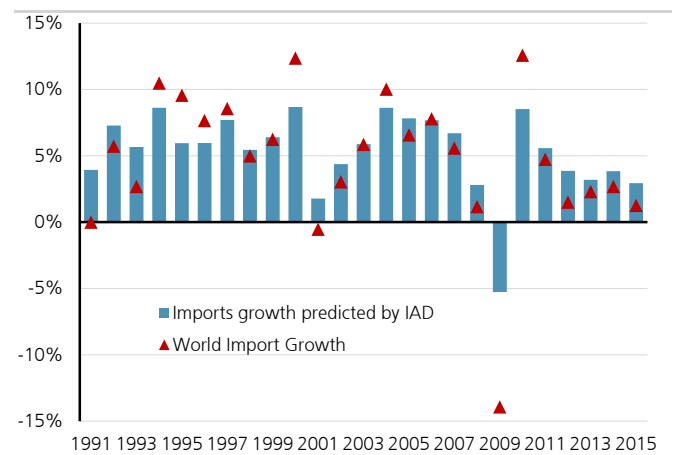
Next, to test whether the decline in trade is only about a particularly sharp drop in import sensitive components such as investment, we calculate the elasticity of trade to IAD, and compare it with the elasticity of trade to GDP.

**Figure 2: Trade elasticity of major trading economies to their gross domestic product (GDP) & Import adjusted demand (IAD) across time**



Source: OECD input-output tables, Haver, UBS. Data shown in real terms.

**Figure 3: Real import growth predicted by IAD vs. actual import growth<sup>4</sup>**



Source: OECD input-output tables, Haver, UBS

Figure 2 shows how these elasticity estimates vary across time. The decline in the elasticity of trade with respect to GDP is much sharper than it is with respect to IAD, but there is a clear and significant decline in trade elasticity with respect to IAD as well. As Figure 3 shows, world trade growth predictions based even on IAD underestimated trade growth in the 1990s, and overestimate trade growth today.

**Even after incorporating weakness in IAD, we find a clear drop in global trade propensities**

The takeaway from both Figure 2 and Figure 3 is the same - the decline in global real import growth is not only about cyclical demand weakness .

[Elasticities Demand Composition and the Trade Collapse of 2008-2009.](#)" American Economic Journal: Macroeconomics, 5(3) : 118-151.

<sup>4</sup>  $\Delta Imports_{it} = c + \beta \Delta IAD_{it} + \gamma Imports_{i,t-1} + \delta IAD_{i,t-1} + \epsilon_{it}$   
 $\Delta Imports_{it} = c + \beta \Delta GDP_{it} + \gamma Imports_{i,t-1} + \delta GDP_{i,t-1} + \epsilon_{it}$ ; ECM based on Panel of 16 countries with Fixed Effects

What is it about then? What are the other variables that we may be missing, and do they qualify as being cyclical or structural? We think the following factors are particularly important:

1. The changing level and texture of growth in China
2. The shrinking of global value chains
3. The shift from trade liberalism to protectionism
4. The 'de-materialisation' of the economy: the move from stuff to fluff
5. A slowdown in the pace of convergence of EM & DM incomes

We run a simple model to quantify the contribution of each of these factors, in addition to that of standard growth factors to the slowdown in global trade volumes.

We regress global real import ( $M_t$ ) growth on the following variables<sup>5</sup>:

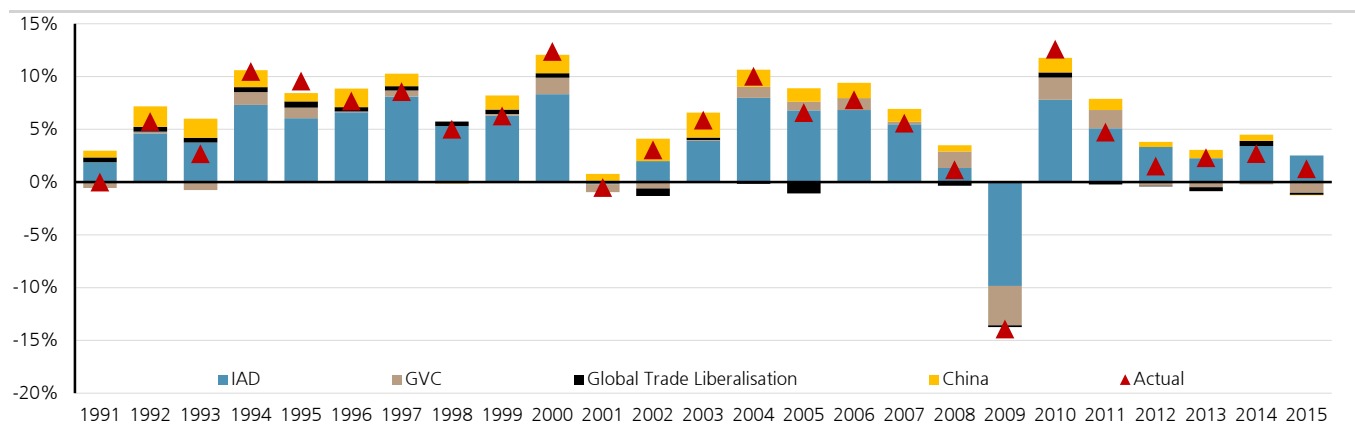
**Import adjusted demand (IAD)** growth rates for the top 15 economies in the world, excluding China. **GVC**, which measures the growth of Global Value Chains or vertical integration in these countries, again, excluding China. **Trade liberalisation**, which we proxy using the Fraser Institute's Freedom to trade index. **China's** volume of trade weighted by its share in world trade volumes as in OECD (2016)<sup>6</sup>.

The independent variables used

The final model specification used is as follows<sup>7</sup>:

$$\Delta \ln M_t = c + \beta_1 \Delta \ln IAD + \beta_2 \Delta GVC + \beta_3 \Delta TradeLiberalisation + \beta_4 \Delta \ln China + \varepsilon_t$$

**Figure 4: Contribution to global import volume growth by explanatory factor**



Source: OECD input-output tables, Haver, Fraser Institute, UBS

<sup>5</sup> We detail the descriptions of the variables and the results of the model in the Appendix of this note.

<sup>6</sup> Haugh, Kopoin, Rusticelli, Turner and Dutu. 2016. "Cardiac Arrest or Dizzy Spell: Why is World Trade So Weak and What can Policy Do About It?." OECD Economic Policy Paper No.18.

<sup>7</sup> We also tried to introduce a) price variables (trade deflators to consumption deflators), b) a measure of the move away goods consumption towards services consumption, and c) a measure of convergence of EM per capita incomes with DM. These variables were either not significant or did not add much new information so were excluded from the final model, but we will have more to say about them later.

**Figure 5: Contribution to trade growth, and to the decline in trade growth**

	Import Adjusted Demand (IAD)	Global Value Chains	Trade Liberalisation	China	Actual	Predicted
<b>Contribution to world import volumes growth</b>						
1990-2007	5.35%	0.31%	0.16%	1.39%	6.27%	6.26%
2011-15	3.32%	-0.06%	-0.07%	0.57%	2.50%	2.81%
<b>Contribution to drop in world import volumes growth (2011-15 relative to 1990-2007)</b>	<b>-2.03%</b>	<b>-0.38%</b>	<b>-0.24%</b>	<b>-0.81%</b>	<b>-3.78%</b>	<b>-3.45%</b>
Explaining the drop in import growth	53.77%	9.94%	6.28%	21.51%		
<b>Share of Total Explained</b>	<b>58.76%</b>	<b>10.86%</b>	<b>6.87%</b>	<b>23.51%</b>		

Source: OECD input-output tables, Haver, Fraser Institute, UBS

Here are the key conclusions of the model.

- 1. IAD, or demand factors, explain the bulk of the variation in trade volume growth over time. They explain around 59% of the drop in global import volume growth between the 1990-2007 and 2011-2015** (see highlighted areas in Figure 5). Similar to the work by OECD<sup>8</sup>, we too find that IAD explained a larger proportion of the drop in global trade in years immediately post the crisis. More recently, IAD has done a poorer job of explaining imports, and the contribution of non-demand, or structural, factors has increased.
- 2. The change in China's trade patterns (which we discuss in more detail in Section 3) explains 23% of the decline** in import volumes between the two periods. China has not contributed negatively to global trade<sup>9</sup>, but having gone from a very large positive contribution to no contribution, it (its absence) explains a significant chunk of the drop in global trade.
- 3. Shrinking of global value chains<sup>10</sup> explains just under 11%** of the drop in trade growth. The vertical fragmentation of production boosted gross (though not value added) trade for some emerging markets in the 1990s and early 2000s. As these value chains are now shrinking, gross trade volumes are coming lower. The real reasons why these value chains are shrinking are not entirely clear. It may have to do with business confidence, in other words, the cycle. But recent research from OECD<sup>11</sup>

See [Section 2: Why has investment slowed?](#)

See [Section 3: How changes in China are changing the world](#)

See [The What, Why & So-What of Globalisation – I. Separating myth from reality](#)

<sup>8</sup> The methodology was first used by Bussiere et al. See Matthieu Bussiere, Giovanni Callegari, Fabio Chironi, Giulia Sestieri, Norihiko Yamano. 2013. "[Estimating Trade Elasticities Demand Composition and the Trade Collapse of 2008-2009](#)." American Economic Journal: Macroeconomics, 5(3) : 118-151.

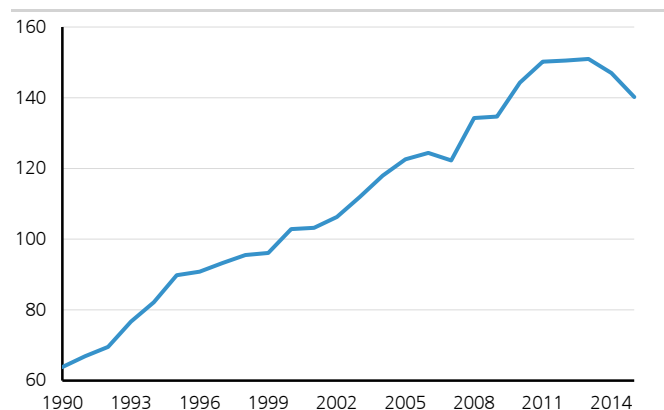
<sup>9</sup> This may sound surprising to some readers given the negative y/y growth in China export and import numbers reported in recent months. Recall, however, that we are dealing with import volumes, not USD values of imports. Volume data has held up better than USD values, the latter being impacted by currency and commodity trends.

<sup>10</sup> There is some correlation (0.4) between the China and the GVC variable, but including them separately does not impact the model much, and helps ease of interpretation.

<sup>11</sup> See Haugh et al (2016) referenced earlier

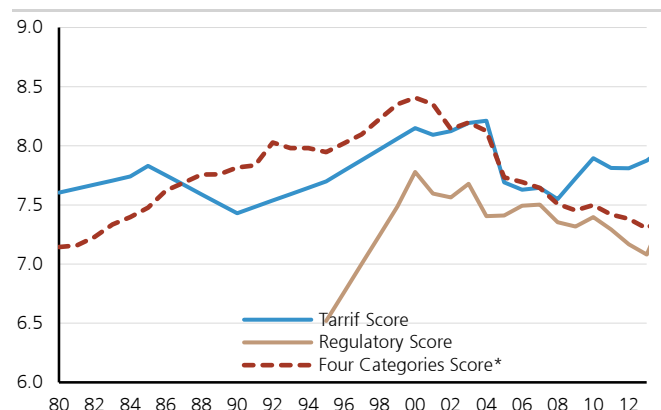
shows that even adjusting for the output gap, a measure of cyclicity, global value chains have shrunk (Figure 6).

**Figure 6: 'Structural' global value chain proxy : OECD data<sup>12</sup>**



Source: OECD, UBS. The data filters out the effect of the cycle using the equation in the footnote below, and works with the errors of this model as an estimate structural of the structural global value chains

**Figure 7: Institutions and policy turn less friendly to trade**



Source: Fraser Institute, UBS. Average score using (i) Tariffs, (ii) Regulatory trade barriers, (iii) Black market exchange rates and (iv) Controls of the movement of capital and people

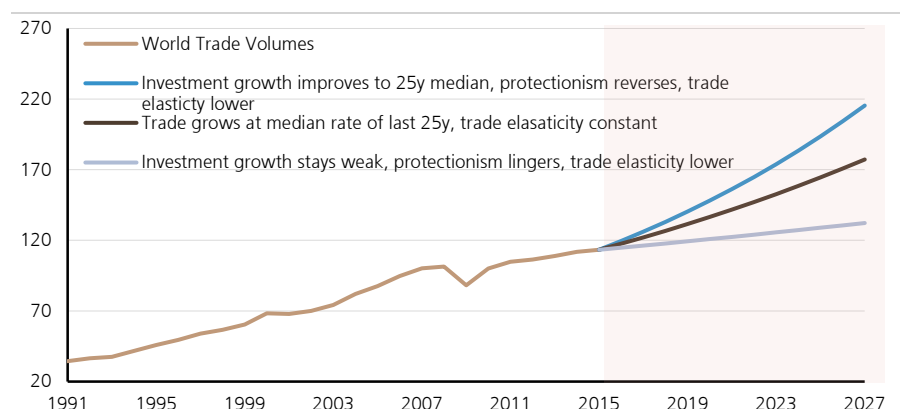
4. Lastly, as policies become less trade friendly, their impact is beginning to be noticed in trade numbers. We proxy the rise and fall of trade friendly institutions with the Fraser Institute's Freedom to trade index (Figure 7). Freer trade contributed positively to trade in 1990s, but its contribution flattened out around the early 2000s, and more recently free trade measures have declined pointing to a rise in protectionism. **A turn towards protectionism explains 6-7% of the drop in global import volumes** between the pre- and post-crisis periods.

See [Section 4: Is protectionism killing global trade](#)

We expect trade to grow at 3.75-4.0% in volume terms over the coming 5-7 years if nascent protectionism reverses and investment growth ex China rises to its medium term trend. If investment doesn't pick up, and if protectionism continues to grow, trend growth in global trade will likely be around 1.25%. The median trade volume growth in the last 25 years is around 5.5%.

**The prognosis: How strongly will trade grow?**

**Figure 8: Projected trajectory of trade volumes: scenario analysis**



Source: Haver, UBS estimates

<sup>12</sup>  $\Delta \ln GVC Volumes_{it} = \alpha + \beta_1 \Delta OutputGap_{it} + \varepsilon_{it}$

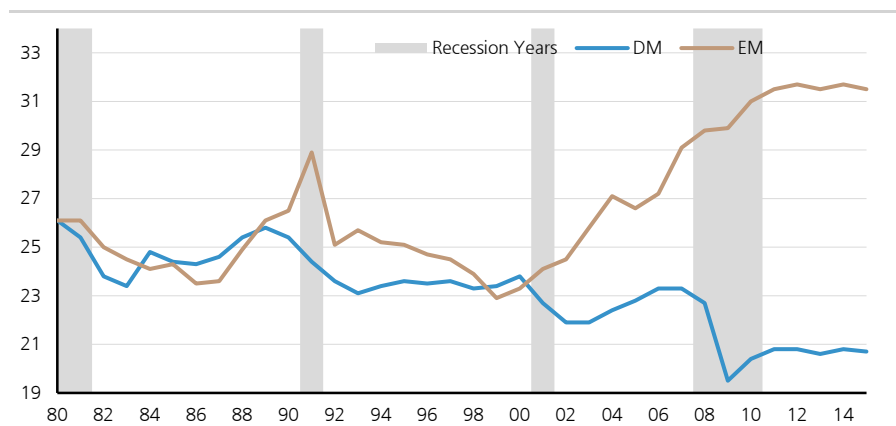
## 2: Why has investment slowed?

- *Weakness in demand explains just under 60% of fall in trade growth. It is the most import sensitive component of demand – investment – that has fallen particularly sharply.*
- *But is it only cyclical factors behind the fall in investment? Not an issue of trade alone; this is perhaps 'the' central question in macroeconomics.*
- *There certainly seem to be some non-cyclical factors at play here. Among these are high debt, policy uncertainty & regulations, rising market concentration, changing technology & lower residential investment.*

Global investment growth relative to output has flattened since 2010. While the big change in trend has come from EM, investment in DM has continued on an old lacklustre trend in place since the pre-crisis years even after slipping off a cliff in 2009 (Figure 9). To the extent that investment is typically the most import-intensive component of GDP (see Figure 1), deepening our understanding of what is influencing global investment trends can provide useful insight into whether the plateauing in global trade volume growth, too, is cyclical or structural.

**For many the question of trade slowdown links back to the question of an investment slowdown. But is the slowdown in investment cyclical?**

**Figure 9: Flattening out: investment share of GDP - EM and DM**



Source: IMF, Haver, UBS

**The weak cycle argument, and why it may not be complete:** Many academicians<sup>13</sup> argue that the growth of global investment has not deviated significantly from what theory would have predicted, given the state of economic and financial conditions. They say weak investment just reflects the tepid nature of the recovery post crisis. Expectations of stronger future growth would go a long way towards rekindling investment demand, according to this view.

**One view is that weak investment just reflects the tepid post crisis recovery**

It would be naïve to suggest investment is not related to demand. Indeed the most rudimentary investment theory, the accelerator model, links investment closely to past and future expected growth<sup>14</sup>.

<sup>13</sup> See "No puzzle about weak business investment: it's the economy!", Aslam, Leigh and Park, IMF Blog, 2015" and "(Why) is investment weak?", Banerjee et al BIS, 2015" instance.

<sup>14</sup> See Explaining the recent slump in investment, The role of expected demand and uncertainty'. M Bussiere et al, Banque de France, September 2015



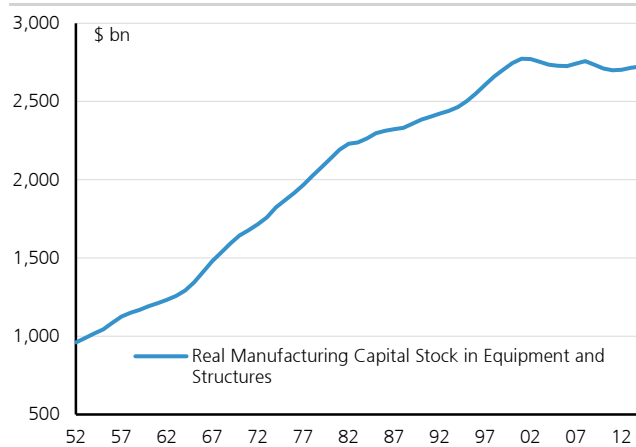
However, investment/GDP in the US and developed world as a whole peaked as far back as 2000, betraying more than cyclical traits. Consider for instance that the real manufacturing capital stock in the US has not grown since 2000 (Figure 10). As manufacturing is one of the most trade intense sectors, this finding doesn't sit easily with the notion that global trade is experiencing purely cyclical headwinds.

**The stock of capital in the US has not grown even as GDP has continued to grow. Facts don't fit the basic accelerator model**

Can we lean on other standard explanations that address the cycle? According to Tobin's Q theory, investment will rise if the ratio of the market value of installed capital (profitability, proxied by the share price) to replacement cost of installed capital is greater than 1. A very closely linked neo-classical model of investment argues that firms will invest if the marginal return on capital for a firm is greater than its marginal cost of capital. However, investment in DM has remained weak normalising for both profitability<sup>15</sup> (Figure 11) and the real returns on capital<sup>16</sup>.

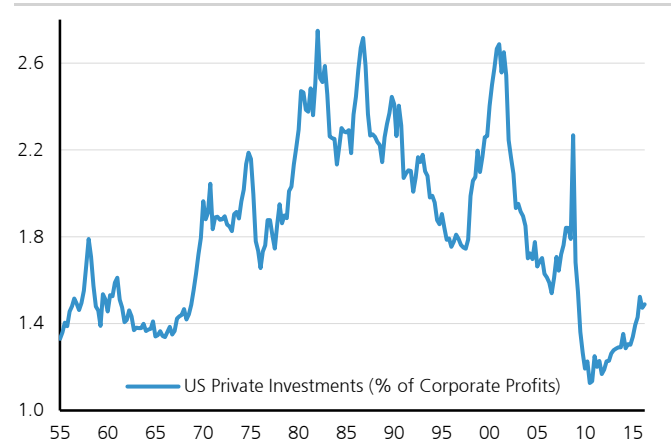
**Neither can Tobin's Q or the neo-classical model explain why investment is weak**

**Figure 10: US real manufacturing capital stock in equipment and structures**



Source: Fed Reserve, UBS

**Figure 11: US private investment as % of corporate profits**



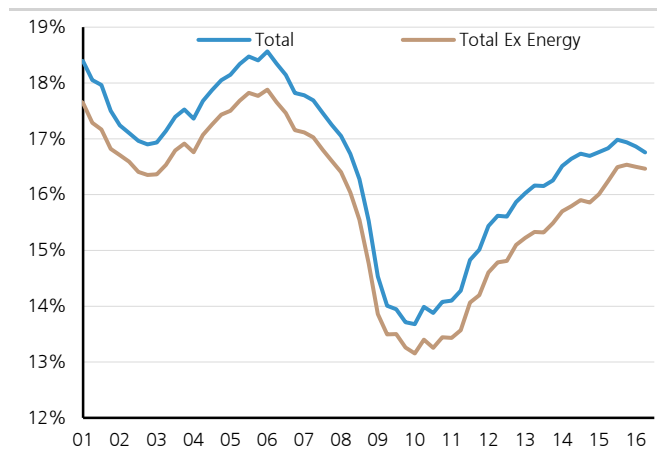
Source: Haver, UBS

What about the ebb and flow of commodity prices- wouldn't lower energy prices be hurting investment, particularly as investment in the US is now driven by oil.

<sup>15</sup> See 'Investment in the EA: Why has it been weak? B Barkbu et al, February 2015

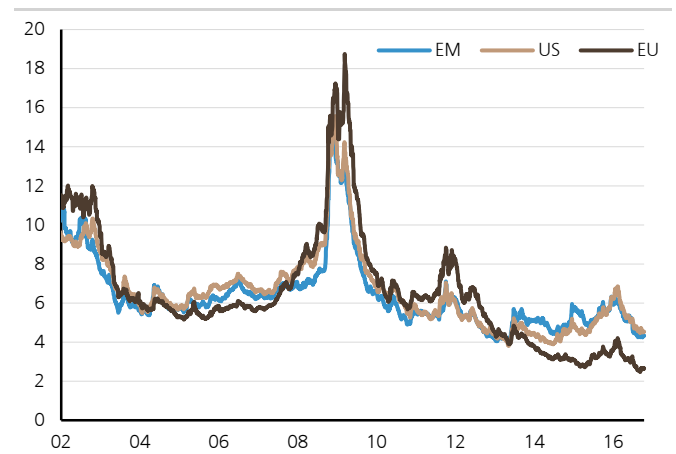
<sup>16</sup> See 'Secular Stagnation and the Returns on Capital', Gomme et al. FRB of St Louis, 2015 and 'Slow credit recovery and excess returns on capital', Liu et al, FRB of San Francisco, 2016

**Figure 12: US investment growth (% y/y)**



Source: Haver, UBS

**Figure 13: Average of IG and HY bond yields : Investment is weak despite lower cost of funds**



Source: Bloomberg, UBS

Again, the facts reject this view. The share of "mining exploration, shafts & wells" in US private fixed investment is now less than 2% (down from 5% in 2013). US investment to GDP flat-lines even if the energy sector is excluded (Figure 12).

We thus believe that cyclical influences only partially explain the tepid pace of investment growth in the developed world. What explains it then? We think several forces are interacting:

**High levels of economic policy uncertainty** may be keeping investment appetites restrained. For instance, the proportion of companies in the NFIB's small business optimism survey pointing to government regulations being the single-most important problem today is presently at 20-year highs (Figure 14). Rogoff and others have pointed to **government regulations** post-2010 having inadvertently suppressed private investment appetites. For instance, by requiring financial institutions to overweight government debt they may have crowded out lending to SMEs. It is hard to describe any of these points as being cyclical in nature.

**High debt stocks** in the developed world - both non-financial sector corporate debt and especially government debt - may be constraining corporate investment<sup>17</sup> more than economic models would predict – both directly and indirectly, the latter as corporates envisage higher risks of future taxation requirements rising; the Ricardian equivalence thesis.

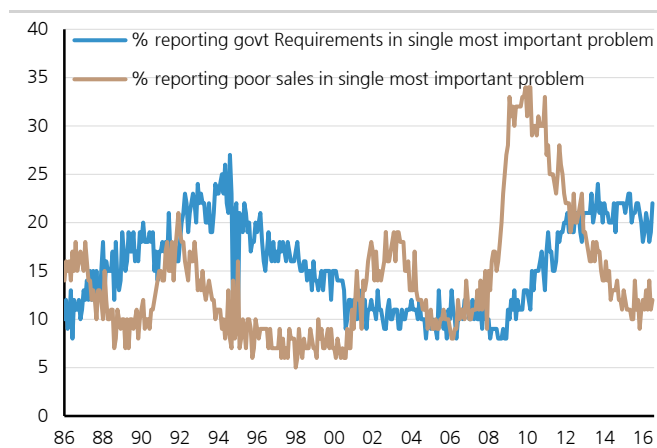
**Lower commodity prices don't explain weak advanced economy investment**

**It does seem lame to posit an unobservable -uncertainty- as an explanation for an unknown - why investment is weak- but that is read from small business surveys.**

**Seven years on from the crisis there has been little or no deleveraging, especially when including the government sector**

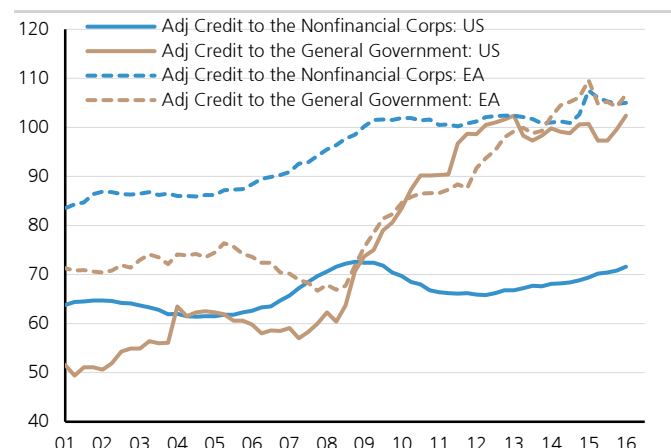
<sup>17</sup> ' Secular stagnation, debt overhang and other rationales for sluggish growth, six years on', S Lo and KRogoff, BIS, Feb 2015

**Figure 14: US small business optimism index**



Source: Haver, UBS

**Figure 15: Credit to non-fin sector & Govt: US & Euro Area**



Source: Haver, UBS estimates

**Higher levels of industry concentration in the US** – effectively growth of monopolistic structures – has reduced competition and may be serving to restrict incentives for output and investment. Pointing to the growing dominance of the very biggest companies, the Economist recently showed that 2/3 of US industries became more concentrated between 1997-2012, and that the share of employment creation at large US firms almost doubled to 30% in 2010-2015 from 16% in 2002-2007<sup>18</sup>. The outsized growth of sectors such as healthcare<sup>19</sup> and IT in particular where patents can afford effective monopoly power to large companies may also help to explain this tilt towards growing concentration, leading in turn to sub optimal output and investment.

**Rapid technological change in consumer-centric services** has also resulted in weaker investment outcomes relative to growth in durable goods industries, for instance. As Larry Summers has pointed out in his secular stagnation thesis, for example, the remarkable growth technology companies in recent years has required substantially less investment compared to electronics makers of earlier decades. This helps explain structurally lower rates of investment to GDP and fewer demands on global trade as the import demands of such services are lower.

**Weakness in residential investment:** Though significantly smaller in size than non-residential investment, the fact that residential investment today still stands at 3.5%/GDP, well below its 6% peak in 2006, may help to explain the overall weakness in investment/GDP. However, the high level of residential investment pre-crisis probably represented an unstable equilibrium rather than a steady state to which the economy may converge over the next several years.

**Growth of oligopolistic or monopolistic structures may be keeping output and investment at sub optimal levels**

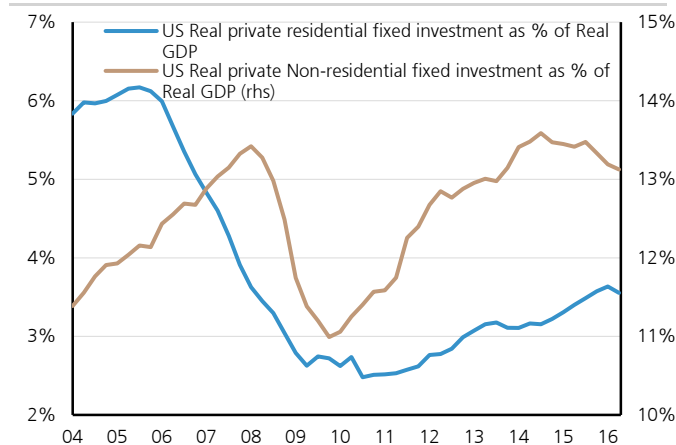
**See also [Section V: From stuff to fluff](#)**

**Not safe as houses**

<sup>18</sup> [Too much of a good thing](#): The Economist

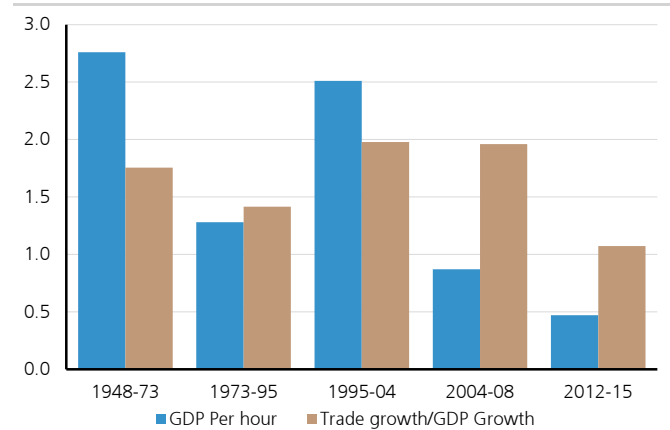
<sup>19</sup> See <https://www.project-syndicate.org/commentary/us-health-insurance-mergers-by-j--bradford-delong-and-michael-m--delong-2016-09>

**Figure 16: US real private fixed investment as % of GDP**



Source: Haver, UBS

**Figure 17: GDP per hour and beta of trade to GDP growth**



Source: J Fernald, San Fran Fed, Haver, BEA, BLS, UBS

**Thinking in productivity and growth regimes.** Byrne, Fernald, and Reinsdorf<sup>20</sup> (2016), argue that the emergence of the Internet, reorganization of distribution sectors, and IT investments cumulated in 'abnormally' strong productivity growth between 1995-2004. That is, it was a one off. J Fernald of the San Fran Fed has also recently argued that productivity, growth and investment go through regimes, and that we are now in a regular as opposed to a high productivity regime.<sup>21</sup> It is interesting to see how productivity regimes seem quite correlated with the elasticity of trade growth to GDP, or the pace at which the tradables sector is growing relative to the rest of the economy (Figure 17).

**China rebalancing:** China alone accounted for a third of global investment between 2010 and 2015. Slowing urbanisation, excess capacity in several large sectors (steel, cement, aluminium, solar, among others), high corporate and local government leverage, greater focus on infrastructure vs. real estate investment, environmental protection and anti-corruption drives have all, and will likely continue to, contribute to slower investment growth. In other large EMs such as Korea, Malaysia, Russia and Brazil, a combination of higher leverage and/or deteriorating demographic profiles also point to structurally slower investment growth rates ahead<sup>22</sup>, but no one moves the needle like China does. More detail on this next.

**There is no fighting the math of a Chinese investment slowdown and its impact on global investment and trade. This is what we turn to in [Section 3: How changes in China are changing the world](#)**

<sup>20</sup> See "Does the US have a productivity slowdown or a measurement problem?", Brookings, 2016 & "Challenges to Mismeasurement Explanations for the U.S. Productivity Slowdown", Syverson, NBER, 2016

<sup>21</sup> See 'Re-assessing longer run US growth: how low?', J Fernald, FRB of San Fran, Aug 2016

<sup>22</sup> See 'Investment in EM' N Magud and S Sosa, IMF working paper, April 2015

### 3: How changes in China are changing the world

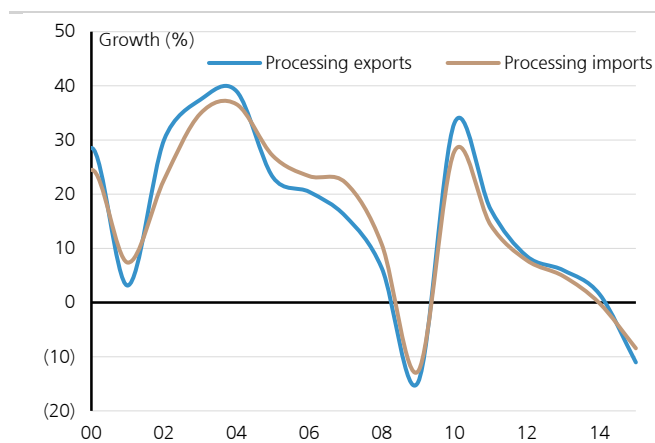
- *China explains just under a quarter of the slowdown in global trade, according out model. Why has Chinese trade slowed?*
- *Slowing global growth led to weaker Chinese exports and related imports. A part of the reason here is shrinking GVCs in other countries.*
- *China's imports have fallen as investment slowed and the economy rebalanced towards consumption. The import content of private and government consumption is considerably lower than that of investment and exports in most countries. China is no exception.*
- *The heavy investment of previous years helped China increase capacity, on-shore production and move up the value added chain. There has been talk about on-shoring of production in the US or Europe, but it's China where there is clearest evidence of this phenomenon*

#### (a) As an important part of the global supply chain, weaker global demand is an important driver for the slowdown in Chinese's imports

Over the past two decades, especially since its WTO entrance in 2001, China has become an important part of the global supply chain. Processing exports accounted for 42% of China's total exports in 2015, and processing imports for re-exports stood at 44% of total imports, both having coming down in recent years. The broad weakness in global demand, and more specifically the fact that global value chains not lengthening anymore, has led to a slowdown in China's processing export growth, which naturally led to similar weakening of processing imports (Figure 18). We estimate that the changes in China's processing imports have contributed to about 43% to changes in China's overall imports (Figure 19).

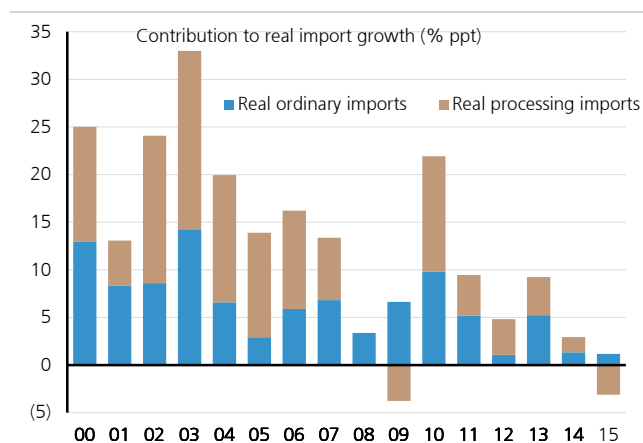
**Weak global demand and a shrinking of value chains accounts for about 43% of the decline in China's trade.**

**Figure 18: Processing imports follows processing exports**



Source: CEIC, UBS estimates

**Figure 19: Weakness in processing imports is a big contributor to overall import weakness**



Source: CEIC, UBS estimates

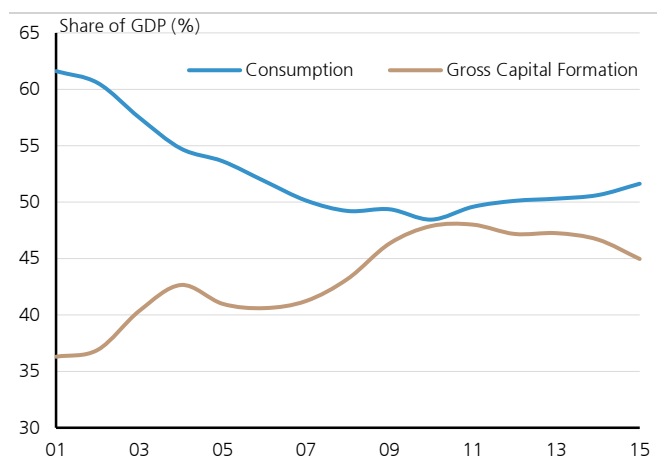
## (b) China investment slowdown and rebalancing

There are both cyclical and structural aspects here, though we would at the margin emphasise the latter.

The property adjustment since 2013 has led to weakening fixed investment in real estate, mining and manufacturing, which the government's higher infrastructure investment has not able to fully offset. The property adjustment is underpinned by both structural and cyclical factors- slowing urbanisation and already high level of construction as a percentage of GDP on the structural side, and inventory adjustment and financial conditions on the cyclical side.

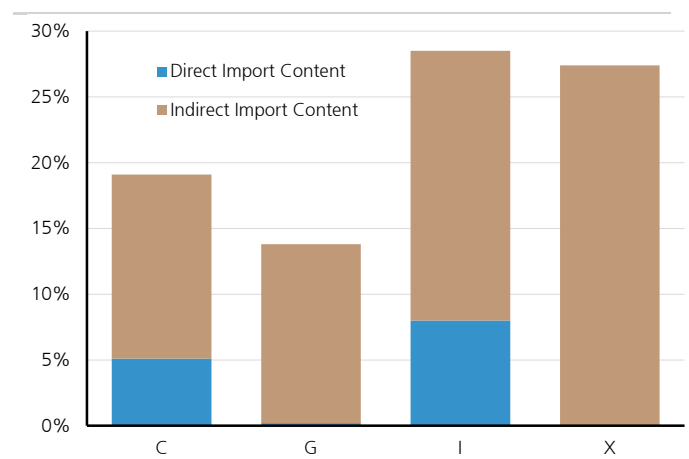
From a structural point of view, after decades of rapid investment growth which has brought investment as a share of GDP to a record high of 47% in 2010-2011, China is gradually moving to a more consumption-oriented growth pattern. While this shift is partly a result of significant investment slowdown, it has also been facilitated by conscious policy effort to support consumption<sup>23</sup> (Figure 20). As a result of both factors, consumption as a share of GDP has steadily risen and investment has contributed less to GDP growth in recent years (Figure 20)

**Figure 20: Rebalancing expenditure patterns in China**



Source: CEIS, UBS

**Figure 21: Import content in different forms of expenditure in China**



Source: OECD I/O Tables, UBS

The slowdown in exports and corporate investment against resilient consumption and increased government infrastructure investment has important ramifications. As Figure 21 shows, the import content of consumption and government spending is just over half of that of investment and exports.<sup>1</sup> This is the same data, based on OECD STAN input-output database, as presented in Figure 1, but here we break it down into direct import demands of a form of expenditure, and its indirect use of imports via consuming domestic goods that, in turn, have an import content (for example, buying a locally assembled machine that has foreign ore or parts content). So, unsurprisingly, this year as corporate/private investment spending has been subdued and the government has stepped up public investment (Figure 22), the latter has managed to support overall FAI, but has had limited impact on imports.

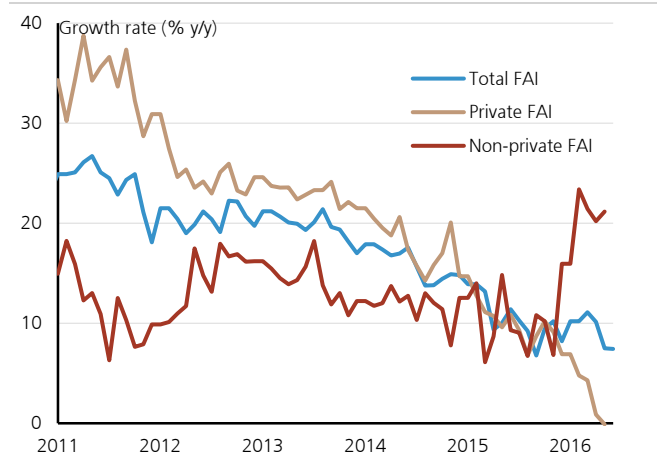
**The slowdown in property investment may still be seen as cyclical**

**But consumption, both private and government, is structurally rising relative to investment and exports**

**Consumption and government spending, the parts of expenditure, that are growing strongly, have much lower import content than do investment and exports, both of which are slowing**

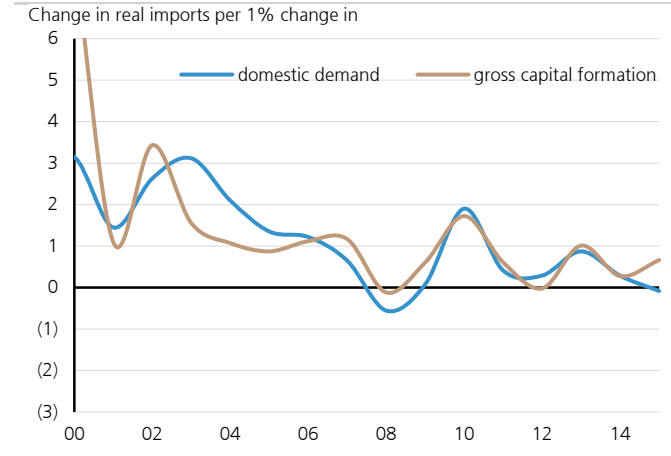
<sup>23</sup> The Chinese government has expanded social safety net such as pension and health care insurance coverage, lowered tax and fees for small and micro businesses, raised pension payments and subsistence living allowances, raised minimum wages, and enacted other pro-employment policies. All of these have helped to support employment, income growth and consumption against the headwind of slowing economic growth.

**Figure 22: Public, private and overall FAI**



Source: CEIC, UBS estimates

**Figure 23: Propensity to import has slowed**



Source: CEIC, UBS estimates

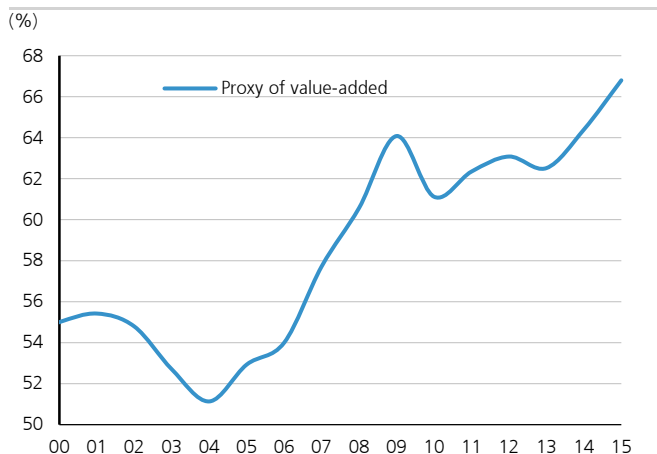
### (c) China moving up the value-added chain, import substitution

China's propensity to import has slowed in recent years comparing to the past- the slowdown in ordinary imports cannot be fully explained by the drop in investment growth alone. Other than the recent shift from private to public investment, this fall can also be explained by China moving up the value chain, and increased reliance on domestic production for intermediate and investment goods.

In the early years after China's entrance into the WTO, China's imports of processing components first increased as a share of total imports, as China integrated further into the global supply chain. In recent years, however, as China's domestic capabilities increased, more on-shoring has taken place. This development can be evidenced by rising share of domestic value-added in China's total exports (Figure 24), based on our rough proxy for value-added, as well as in the WTO-OECD TIVA data (Figure 25)

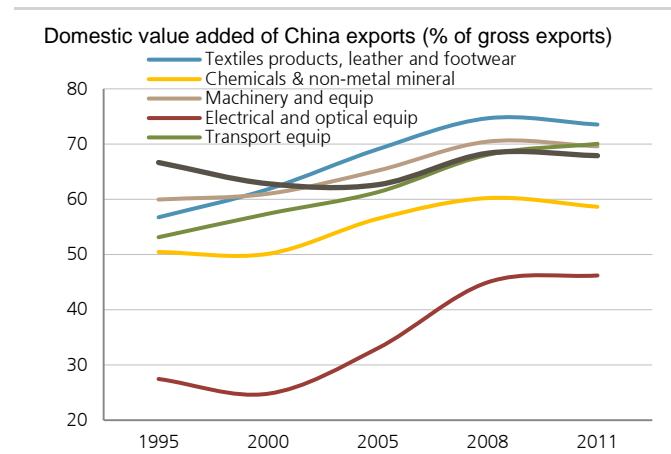
**Much higher domestic value added in exports reflects China having on-shored production**

**Figure 24: China moving up the value chain in exports**



Source: CEIC, UBS estimates

**Figure 25: China's value-added in exports has increased**

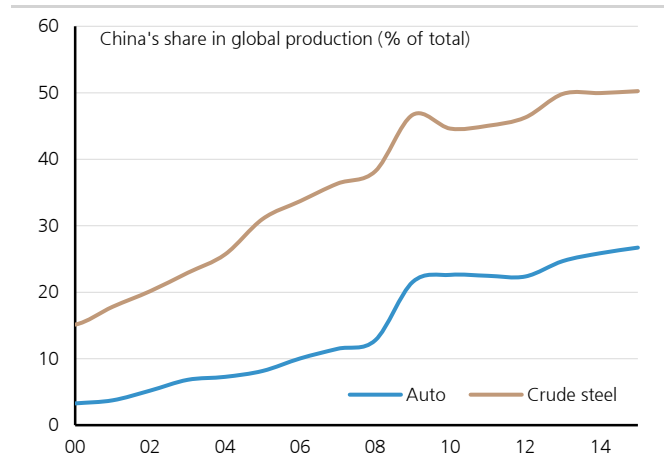


Source: CEIC, UBS estimates

But this is not just an exports story. China's rapid investment since the beginning of the previous decade has helped to increase domestic capacity, and move China's industrial production to higher value added products more generally, reducing the imports of these products. Most notable is perhaps what happened in

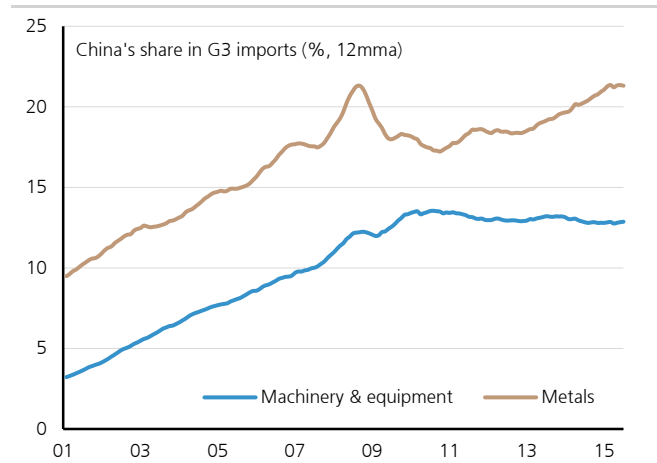
the metals and machinery sector. As China's production capabilities in steel, automobile and machinery increased (Figure 26), China's import reliance in these areas declined, and its share in global markets increased (Figure 27).

**Figure 26: China's steel and automobile capacity has increased**



Source: CEIC, Steel statistical yearbook, UBS estimates

**Figure 27: China has gained market share in metals and machinery**



Source: CEIC, Eurostat, UBS estimates



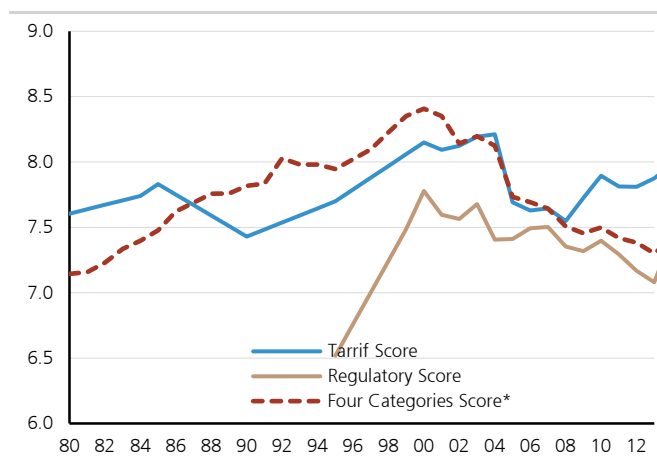
## 4: Is protectionism killing global trade?

- The world moved towards liberal trade policies in the broadest, most concerted fashion in the 1990s and early 2000s. However, as inequality rose, policies turned less helpful even before the crisis, and certainly after it.
- After a sharp decline in the 1990s tariffs have now stopped falling. They are not rising, but non-tariff interventions are certainly increasing.
- A switch from liberal to protectionist trade policies explains just under 7% of the decline in world trade growth. This may be an underestimation as data on restrictions becomes available with a lag, but protectionism is far from the main reason behind weak trade.
- Over long periods of time technology is a much bigger driver of trade than is government policy.

While there were several drivers of the secular growth in global trade volumes through the 1990s and early 2000s, liberal trade policies clearly played a supportive role (Figure 3). The fall of the Berlin wall, the exit from isolation of many emerging countries, the formation of the Eurozone, NAFTA, GATT, which subsequently rolled into WTO, and an explosion in free trade agreements (Figure 29) all made this a time when global institutions leaned towards free trade at a faster, broader and more coordinated pattern than they had ever done.

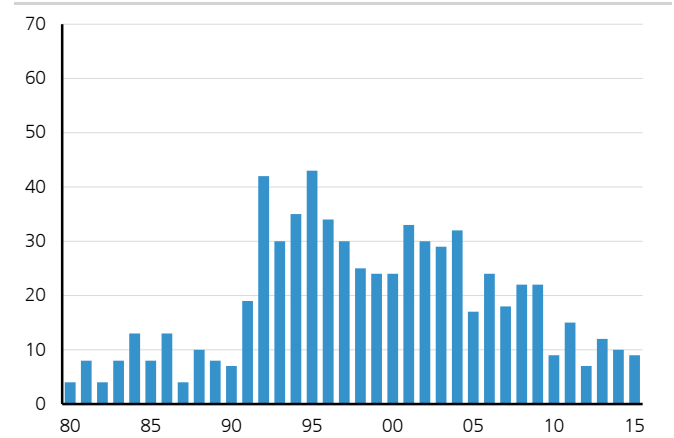
**Global policy makers leaned towards free trade in the 1990s like never before**

**Figure 28: Global freedom to trade indices (higher=freer)**



Source: Fraser Institute, UBS, Average score using (i) Tariffs, (ii) Regulatory trade barriers, (iii) Black market exchange rates and (iv) Controls of the movement of capital and people; Its GDP weighted measure of 130 Countries

**Figure 29: Free trade agreements by year of signature: Yet another dimension along with 1990-2005 was special**

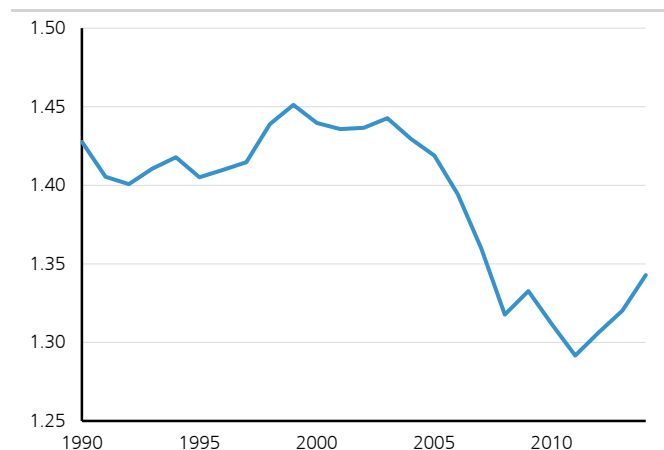


Source: DESTA database, UBS

At the same time though, while globalisation reduced inter country inequality, it increased intra-country inequality. Voices against free trade strengthened over time, and the direction of policy changed.

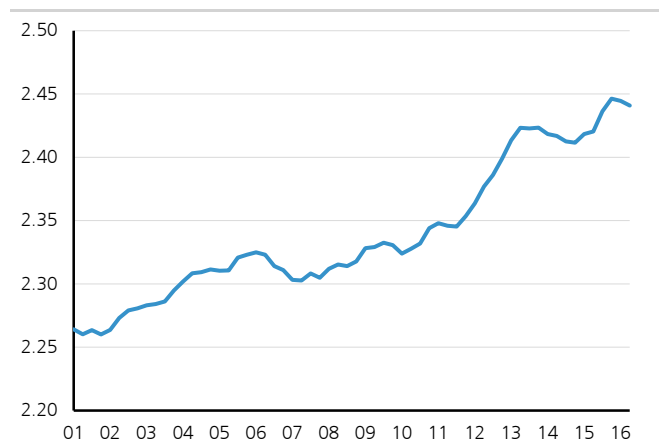
**Lower inter country inequality but higher intra country inequality**

**Figure 30: Inter-country inequality fell : Coefficient of variation in per capita income growth for the top 25 economies in the world**



Source: Haver, UBS

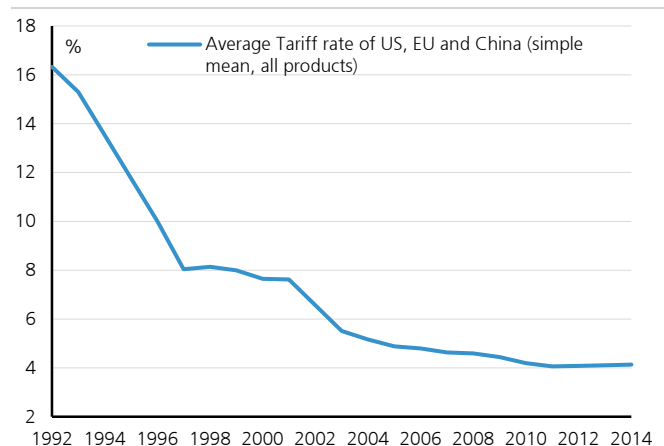
**Figure 31: Intra-country inequality rose: ratio of third quartile to first quartile earnings (weekly earnings in \$)**



Source: Haver, UBS

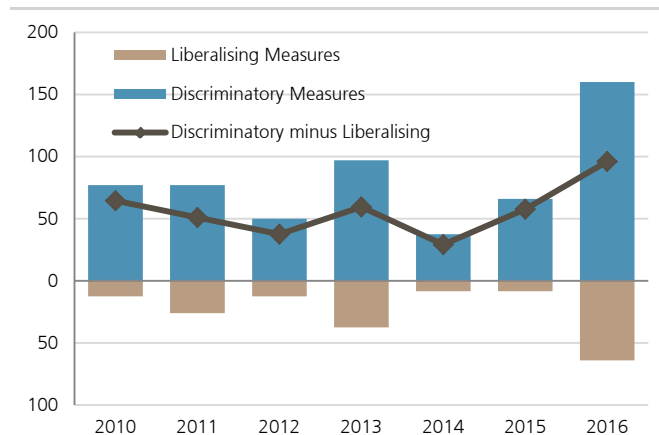
The drop in global tariff rates has stagnated (Figure 32), and the number of discriminatory trade measures has firmly outpaced liberalising trade measures (Figure 33).

**Figure 32: US, Euro Area and China Average import tariff rate**



Source: Haver, UBS

**Figure 33: Number of discriminatory and liberalising measures implemented worldwide**



Source: Global Trade Alert, UBS

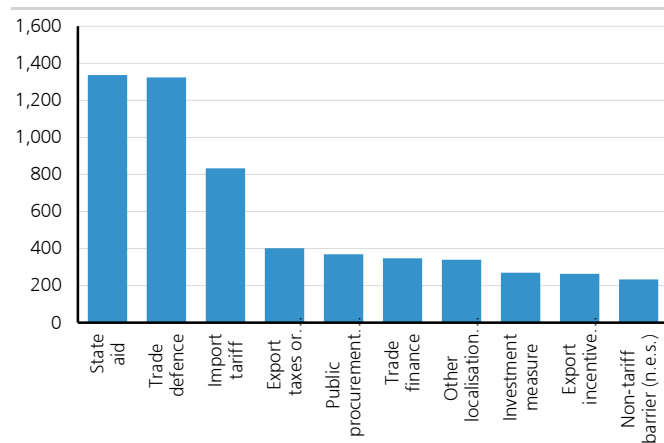
It is important to note that the kind of measures being implemented, generally are not import taxes or import quotas as they were before the 1990s. State aid appears to be a key mechanism through which trade protectionism is being implemented as documented by the Global Trade Alert<sup>24</sup> and Hufbauer and Jung (2016). More broadly these 'micro-protectionist' measures include local procurement legislation requiring certain percentages of final goods to be sourced domestically, tax benefits for export and domestic industry subsidisation, and heightened regulatory standards (e.g. safety, environmental), public procurement discrimination (particularly in relatively fast growing technology-driven fields such as media, cybersecurity and data processing). While these interventions do create distortions, they are not immediately inflationary.

**The new micro protectionism is distortionary but not immediately inflationary**

<sup>24</sup> Simon J Evenett and Johannes Fritz have painstakingly recorded every trade measure taken by every country since 2009 as a part of the Global Trade Alert.

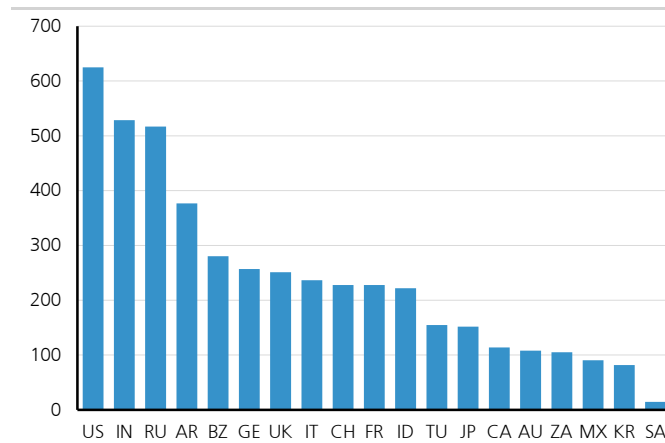
The data suggests that this creeping protectionism has been applied both across DM and EM economies<sup>25</sup>, but particularly so EM economies (Figure 35).

**Figure 34: Top 10 most used harmful measures since the crisis began**



Source: Global Trade Alert, Simon J Evenett and Johannes Fritz

**Figure 35: Number of discriminatory measures implemented between Nov 2008 to May 2016 by country**



Source: Global Trade Alert, Simon J Evenett and Johannes Fritz

The trading environment has soured somewhat after opening very aggressively in the 1990s. Populist sentiment seems to be on the rise, but its dominance is by no means inevitable. We agree with academics like Dani Rodrik, who have noted<sup>26</sup> that slight pull back in the pace of globalisation and/or a change in its form to better accommodate those who lose from it may be exactly what's needed to ensure globalisation's longer term survival. Whether or not it is myopic to be alarmed by the rise in populism, what is certainly true is that over the longer term most waves of globalisation are driven by technology, not by state policy.

Protectionism's role in pulling trade lower is bigger in the popular narrative than in reality. It is certainly a downside risk that we will be tracking carefully, but it's not the first thing we worry about.

**Is there reason to be alarmist about protectionism?**

<sup>25</sup> It is possible that the US looks higher than most due to the easier availability of data here.

<sup>26</sup> <https://www.project-syndicate.org/commentary/protectionism-for-global-openness-by-dani-rodrik-2016-10>

## 5: From Stuff to Fluff

- *There is another possible reason why the decline in investment doesn't fully explain the decline in imports – the import propensity of investment itself is falling as greater proportions are focussed on services, which are less traded than goods.*
- *This variable was rejected by our model as being unimportant in explaining the drop in trade growth. But we suspect data limitations or our inability to come up with a decent data proxy to test this. We can see this is happening.*
- *Changing technology and ageing societies may be the primary drivers of this change, which is reflected in a secular terms of trade shifting away from goods, towards services.*

Increasing de-materialisation of the economy, a phenomenon Arvind Subramanian and Martin Kessler<sup>27</sup> have described as a move from 'stuff to fluff' refers to services becoming a larger part of both consumption and investment.

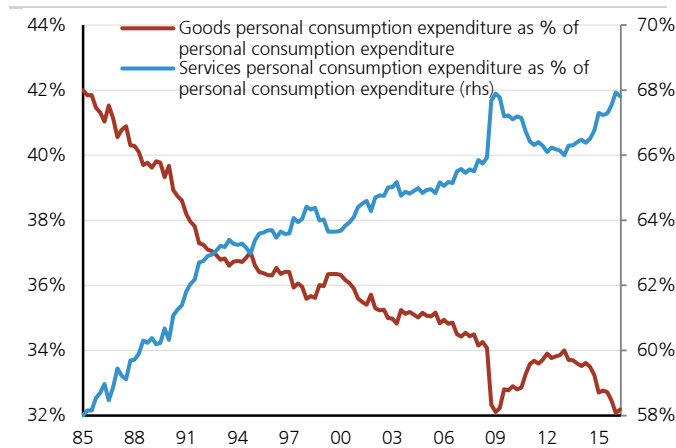
In itself this shift doesn't mean trade will go in reverse - service trade will surely rise, but because services are often focussed in the non-tradeables sector, and today are a much smaller part of global trade than are goods, this phenomenon can help to explain the loosening relationship between global growth and trade.

Subramanian and Kessler give the example of the much higher degree of value in a smartphone coming from intelligent software relative to the value in assembling the hardware pieces, and promise strong growth ahead. Larry Summers has also referenced this phenomenon, but to justify 'secular stagnation'<sup>28</sup>. Whatever the context, that this is happening is quite evident. Services is becoming a larger part of overall expenditure (Figure 36) and value added (Figure 37).

**From stuff to fluff: the global economy is becoming de-materialised as services become a larger part**

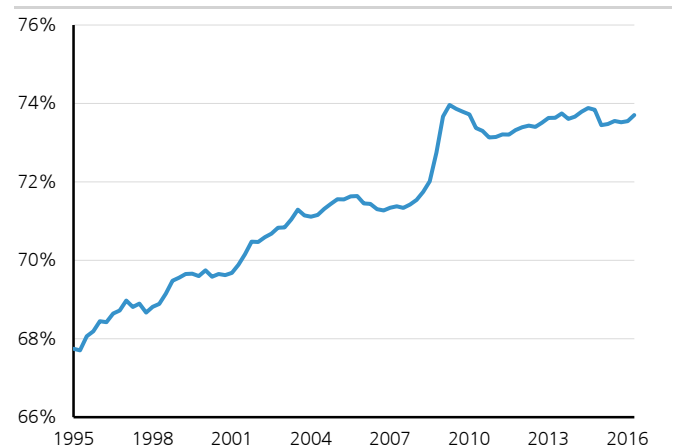
**This change also been posited as being central to the secular stagnation thesis**

**Figure 36: US services consumption as proportion of total consumption**



Source: Haver, UBS

**Figure 37: Europe: Gross value added- services as a proportion of total value added**



Source: Haver, UBS

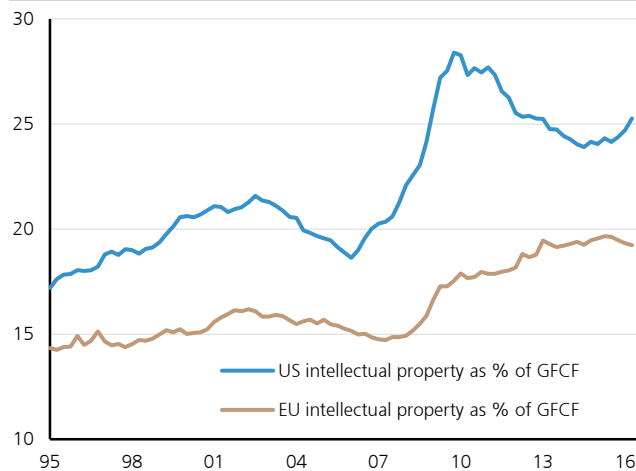
<sup>27</sup> The Hyperglobalisation of trade and its future: A Subramanian and M Kessler, July 2013

<sup>28</sup> See <http://larrysummers.com/2015/02/25/reflections-on-secular-stagnation/>. Summers sees new technology driving new types of business which make much lower demands on 'goods'. He sees this as one of the key reasons behind a surplus of investment over savings, which puts secular downward pressure on the market clearing neutral real rate

Within investment too, intellectual property has become a larger part. This has been a secular trend in the US and Europe (Figure 38) but has begun to look more important after the crisis as other forms of investment have weakened, and this hasn't. In the other major world economy, China, this trend is nascent- tertiary investment has only very recently begun to gain more importance relative to investment in secondary activities such as manufacturing and construction (Figure 39). It has a long way to go.

**In all major economies of the world a larger part of investment is now in services**

**Figure 38: US & European investment in intellectual property products as proportion of total fixed investment**



Source: Haver, UBS

**Figure 39: Tertiary investment relative to secondary investment in China (2010 = 100)**



Source: Haver, UBS

So why are societies moving from stuff to fluff? Is this change durable?

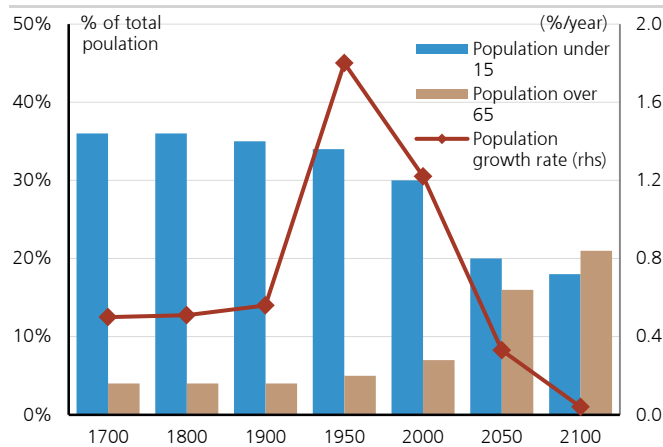
We would speculate that this is due to a variety of reasons:

- a) **Technology** – which allows things to be consumed as services rather than goods. Downloading books or films rather than buying DVDs, storing records in the virtual space rather than physical offices, internet technology reducing the demands on bricks and mortar (consider the impact of online sales or individual hotel businesses on the construction of malls and big hotels, respectively.)
- b) **Ageing** – In this century human society will age at a faster pace than it has done any time in the last 400 years that we have been able to find data for (Figure 40). Older societies expend a larger proportion of incomes on services than they do goods. In particular the demand for transport, clothing, and household electronics falls compared to healthcare and leisure (Figure 41). Many of these services are more domestic in nature.

**When was the last time you bought a CD?**

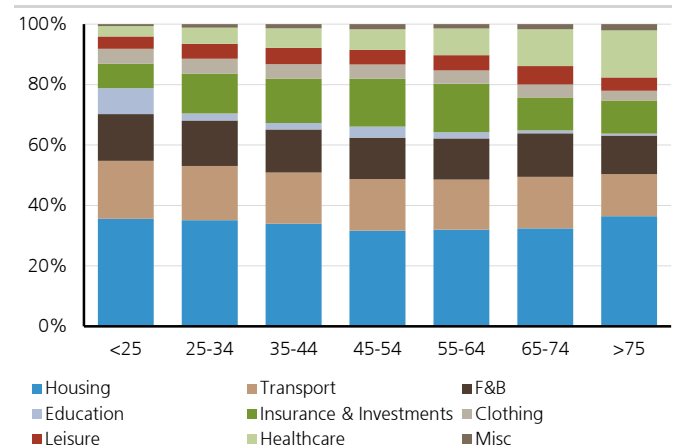
**In this century human society will age at a faster pace than any-time in the last 400 years. This changes consumption patterns.**

**Figure 40: Age structure of the world over 4 centuries** <sup>29</sup>



Source: Lee (2003), UBS

**Figure 41: US: Consumption patterns and age structure**



Source: US Bureau of Labour Statistics, UBS Estimates

- c) **Terms of trade:** A big part of the secular rise in fluff over stuff is down to prices. Services like education, entertainment and leisure continue to rise in price relative to consumer durables like televisions. However, given that the quality of a service can't be measured as easily as the physical number of goods, it is difficult to know whether increase in price of a service is pure inflation or attributable to a better service. In any case, the terms of trade shift away from goods towards services seems secular, and should not be ignored.

**A part of the shift in favour of services is nominal, but this is no temporary phenomenon**

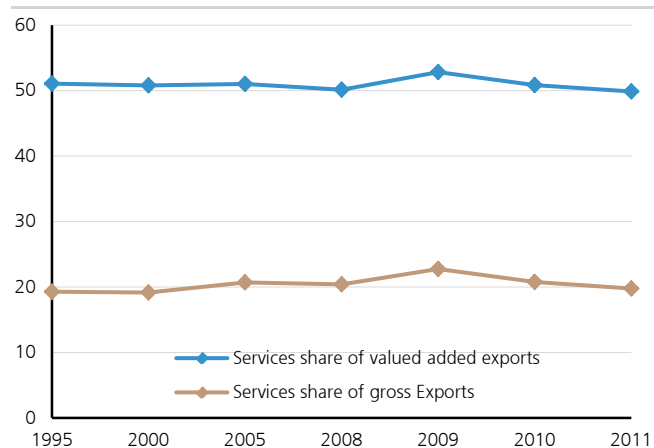
It is not clear yet whether the shift from stuff to fluff really undermines growth (as per the secular stagnation thesis), but it certainly helps domestic trade relative to goods heavy gross international trade. We emphasise 'gross' international trade because as we have noted in [The What, Why & So-What of Globalisation – I. Separating myth from reality](#) services form a much larger part of value added trade than they do of goods trade (Figure 42). As a last point, we would note that at the margin this move from stuff to fluff plays into the hands of DM countries, which retain a larger global share of services exports and a comparative advantage in high-tech services (Figure 43)<sup>30</sup>.

**Stuff to fluff helps domestic over international trade, DM over EM**

<sup>29</sup> [The Demographics transition: Three centuries of Fundamental Change Ronald Lee](#) (2003)

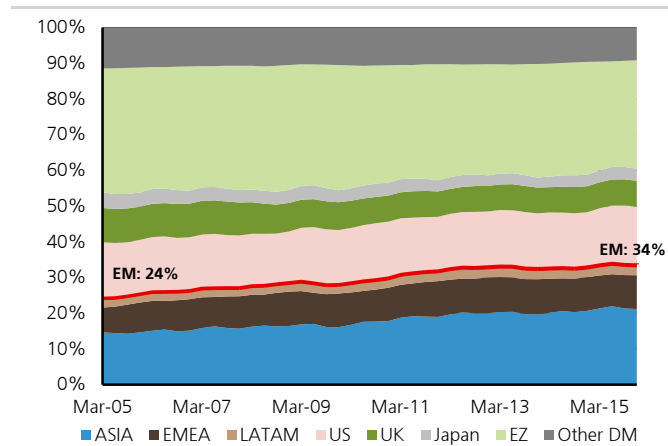
<sup>30</sup> EM's share of global imports of services has grown much quicker, and is now over 45%

**Figure 42: Share of services in gross and value added trade**



Source: UNCTAD, TIVA Database, UBS

**Figure 43: Share by region of exports of services (% of global)**



Source: Haver, UBS estimates.

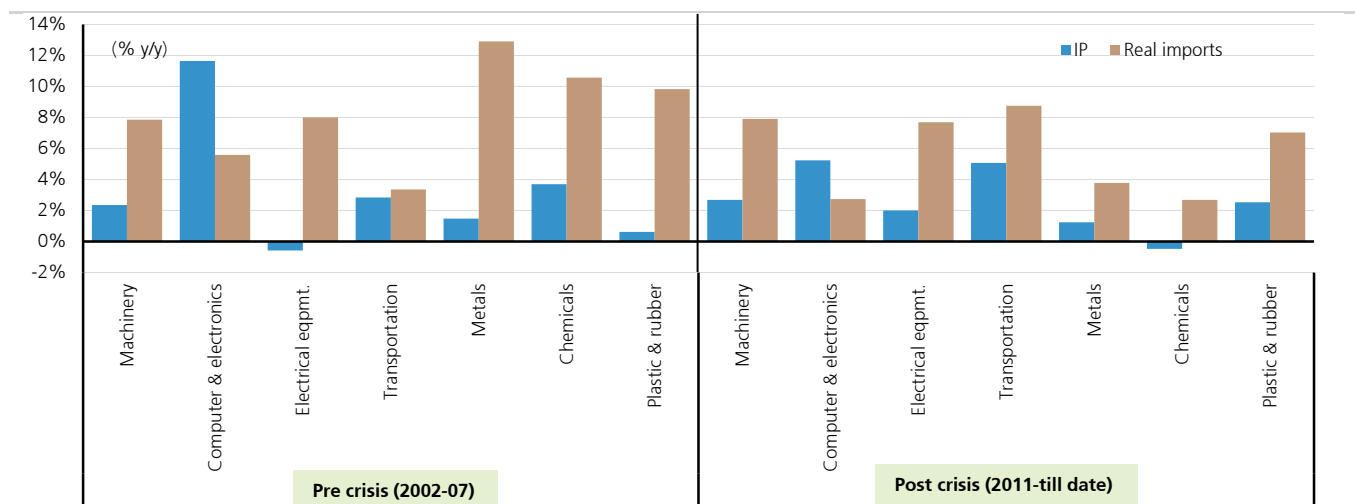
## 6: Are re-shoring and automation undermining global trade?

- *With wage growth outstripping productivity gains across most of EM<sup>31</sup>, and the competitive advantage in new technology lying within the developed world, the idea of a DM manufacturing renaissance has captured the imagination of many.*
- *News stories about the production of low value added manufactures, such as footwear, now being undertaken in the west using automated manufacturing techniques seem to validate this concept<sup>32</sup>.*
- *It is very possible that such events become a reality within the next decade given how technology is evolving. However, thus far we see little actual evidence of new manufacturing techniques or new competitive advantages having driven a major import substitution in developed markets.*

If the manufacturing of certain goods had shifted back to the developed world we would have expected to see a clear decline in the imports of these goods relative to their domestic production. Both at an aggregate level (see [The What, Why & So-What of Globalisation – I. Separating myth from reality](#)) and by drilling down into individual goods categories (Figure 44) we find little evidence of import substitution. Both imports and IP are weak in the post crisis period compared to the pre-crisis period, but there is no sudden shift away from imports to domestic production in any product category. There is obviously a switch in oil drilling activity relative to oil imports, and also a continuing domestic advantage in high technology products (computers and electronics in Figure 44) but this hardly constitutes a manufacturing renaissance in the US.

**Little evidence of import substitution in the US...**

**Figure 44: Breakdown of industrial production and import growth by NAICS product category, pre and post crisis**



Source: Haver, UBS.

<sup>31</sup> See 'Made in America Again: Why Manufacturing will Return to the US, BCG August 2011

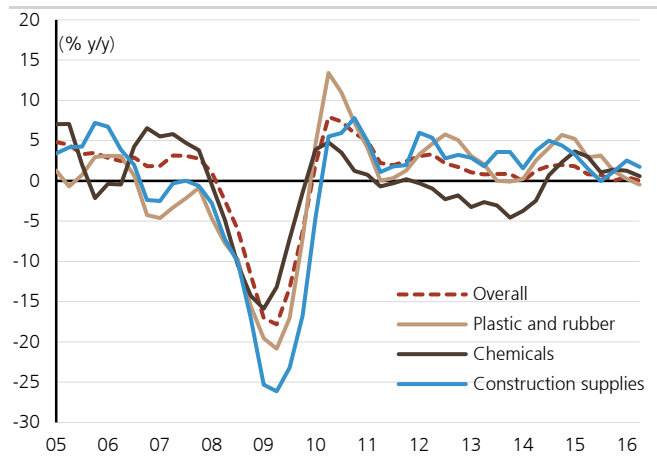
<sup>32</sup> See <https://www.ft.com/content/7eaffc5a-289c-11e6-8b18-91555f2f4fde>



If lower energy costs in the US were driving a domestic production resurgence we would expect to see it first in the most energy intense non-durable manufacturing sectors such as chemicals, construction supplies, plastics and rubber. As Figure 45 shows, there is little evidence of this.

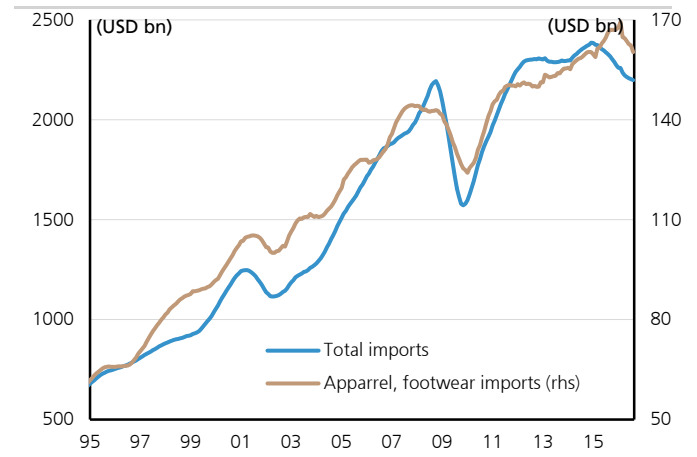
...nor, surprisingly, is there any of lower energy costs lifting energy hungry manufacturing sectors

**Figure 45: US Industrial production growth**



Source: Haver, UBS

**Figure 46: Imports of low value added goods and total imports : USA**



Source: Haver, UBS

We also don't find clues of items being made by robots at such a scale that it is shutting down factories and killing exports in EM. For instance, DM imports of low value added items such as textiles, apparel, shoes and toys have slowed down, but only in line with the slowdown in overall imports. To the extent that there is demand for them, these items still seemed to be shipped from the emerging world rather than produced by or printed by machines at home. (Figure 46)

**Figure 47: U.S. Additive manufacturing (AM) shipments, 2011**

Category	Shipments of US made AM products (\$ bn)*	Total industry shipments (\$ bn)	AM share of total industry shipments (%)
Motor vehicles	0.048	445.3	0.01
Aerospace	0.03	157.7	0.02
Industrial/business	0.027	365.7	0.01
Medical/dental	0.037	89.5	0.04
Government/military	0.015	32.8	0.05
Architectural	0.074	72.2	0.01
Consumer products/electronics, academic institutions, and other	0.083	895.7	0.01
<b>Total</b>	<b>25</b>	<b>2,058.90</b>	<b>0.01</b>

Source: US International Trade Commission.

Techniques such as additive manufacturing are most applicable today in 'adding' polymers, ceramics and metals in order to produce items such as motor parts, consumer non-durables, medical equipment. Again we find (Figure 47) that production through these new technologies in the western world doesn't seem to have reached a meaningful scale to make for a big decline in their imports. The truth is that products made by this technology do not register on the bigger scale in manufacturing today. At the turn of the current decade revenues from additive

A significant prospect for the future... but it hasn't changed the present

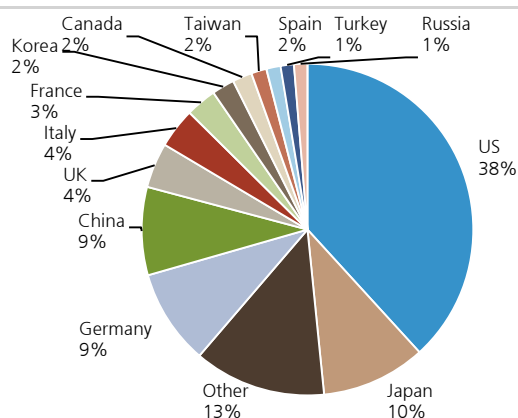
manufacturing were less than 0.01% of total manufacturing shipments in the US (Figure 47). According to the US international trade commission<sup>33</sup>, worldwide revenue for products made using additive manufacturing is due to rise to USD 21 bn by 2020, which would still constitute less than 0.8% of US manufacturing value added.

Lest we are accused of possessing no imagination at all, we should clarify that we believe technology is very promising from the perspective of reducing production time and waste, enabling small manufacturers, and perhaps ending the need for inventories. Our only point is that in the coming five years it is unlikely to make a dent at a macro level.

If there is one thing we have learnt in doing all the research on globalisation, it is that the single biggest driver of trade, for both domestic and international, over time is technology. Protectionism comes and goes, as do economic cycles, but it is technology that changes the world in fundamental ways. Speaking of which, if current trends of 3-D printers installation are anything to go by, the developed world will be the disproportionate beneficiary of this revolution in production techniques (Figure 48).

**If there is one lesson from all the work we have done on globalisation, it is that technology is the main driver of trade over time.**

**Figure 48: Cumulative additive manufacturing machines, installed by country, 1988-2011 (% of global)**



Source: 'Additive manufacturing technology: Potential implications for US manufacturing competitiveness', US International Trade Commission, Sept 2014

<sup>33</sup> 'Additive manufacturing technology: Potential implications for US manufacturing competitiveness', US International Trade Commission, Sept 2014

# Appendix 1

## Estimating contributions of cyclical and structural factors to World Import growth: Annual data since 1990

In order to quantify each factor's explanation of world import growth over time we decompose import growth in the following way:

$$\Delta \ln M_t = c + \beta_1 \Delta \ln IAD + \beta_2 \Delta GVC + \beta_3 \Delta TradeLiberalisation + \beta_4 \Delta \ln China$$

Our response variable measures annual growth in world imports taken from CPB.

Explanatory variables in the model capture both demand and structural drivers of import growth. IAD is the *Import Adjusted Demand* variable, a new measure of aggregate demand as computed in Bussière (2013). It is interpreted as the import intensity-adjusted demand that takes into account import content of each expenditure component. Given that trade intensity associated with each demand component is different, an aggregate demand measure like IAD vis-à-vis GDP is better suited to quantify trade elasticities to demand.

**Import Adjusted Demand: A measure of aggregate demand that takes into account import content of each expenditure component.**

The primary source of data for measuring import intensities is OECD's *Input-Output Tables*.<sup>34</sup> These cover two aspects of the flow of goods in an economy - the flow of goods between sectors to produce final output; and also the flow of goods from these sectors that are directly consumed by final expenditure components. That is, output produced by the sectors in the IO tables is used as input in final production by purchasing sectors, and also go on to satisfy final demand. The IO tables allow us to differentiate the goods that are bought and sold on the basis of their origin: The Imports matrix under the IO tables allow us to aggregate across these sectors and compute the value of *direct imports* for the demand components - Private Consumption, Government Consumption and Investment Expenditure (GFCF). It also allows us to value the flow of imported inputs between the sectors, which forms the first part of *indirect imports* induced by each expenditure component.

The domestic matrix allows us to compute the Leontief Inverse which summarises the effect of a unit increase in final demand on the supply of the selling sectors. This effect is a combination of direct as well as induced through expenditure on domestically produced goods. The indirect effect comes from the fact that domestic output or capital used in production may already incorporate imports. The Leontief Inverse forms the second part of indirect imports demand. The third part denotes final demand for indirect imports for each component - Private Consumption, Government Consumption Investment Expenditure (GFCF), as well as Exports, computed from the domestic matrix in the same way as in the case of direct imports for final expenditure. From these, one arrives at import content attributed to each expenditure component. *Direct import content* is calculated as the share of final expenditure on direct imports in total final demand for domestic output plus imports. Similarly, *indirect import content* is calculated as share of indirect imports in total final demand for domestic output plus imports.

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<sup>34</sup> [https://stats.oecd.org/Index.aspx?DataSetCode=STAN\\_IO\\_TOT\\_DOM\\_IMP#](https://stats.oecd.org/Index.aspx?DataSetCode=STAN_IO_TOT_DOM_IMP#)

Together, the direct and indirect import contents for a country give us total import intensity or import content in each final expenditure component. The total import content is calculated for the available years 1995, 2000 and 2005. To construct time-varying import contents, we linearly interpolate between the available years and assume constant weights pre-1995 and post-2005. These import contents or weights are used to construct the aggregate demand measure IAD by weighting each expenditure component<sup>35</sup>. This linearly weighted aggregate IAD is computed by linearising the function using logarithms.

We construct AD series for 15 countries including US, UK, Germany, France, Italy, Japan, Australia, Canada, Netherlands, Korea, Mexico, Turkey, Brazil, India and South Africa (accounting for 63% of world GDP in 2015). For the model above, we create a GDP weighted IAD aggregating individual country IADs.

GVC measures *Global Value Chains* or Vertical Integration in our 15 countries. This variable uses data on import of intermediate goods from OECD's *Bilateral Trade Database in Goods (Rev 4)*<sup>36</sup>. For the model above, we take a ratio of this over GDP for each country, and create the GDP weighted GVC indicator.

**Global Value Chains: A measure of intermediate goods import**

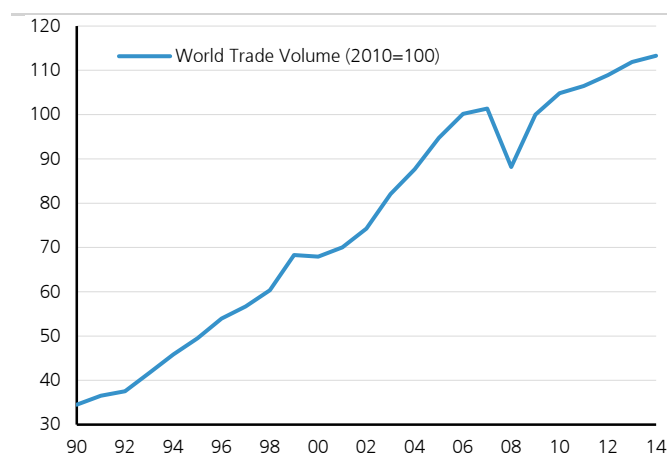
To quantify the role played by changing national trade policies we use Fraser Institute's latest Index on Freedom to Trade Internationally<sup>37</sup> as a proxy for *Trade Liberalisation*. This index is an average measure of the scores given (between 1 to 10) to each of the four areas under this index – Tariffs, Regulatory Trade Barriers, Black market exchange rates, and Controls of movement of capital and people. A higher score implies less restrictive trade policies.

**Trade Liberalisation: A measure of freedom to trade**

**China's trade volume's** being a structural driver of world trade growth, we also include China's volume of trade in goods and services weighted by its share in world trade volumes as in OECD (2016)<sup>38</sup>

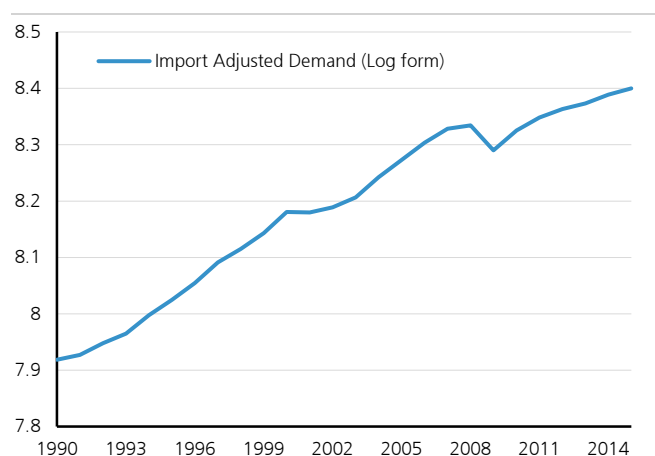
## Exhibit: Datasets

**Figure 49: World Trade Volumes**



Source: Haver, UBS

**Figure 50: Import Adjusted Demand\***



Source: I/O Tables, Haver, UBS \* GDP weighted for 15 countries

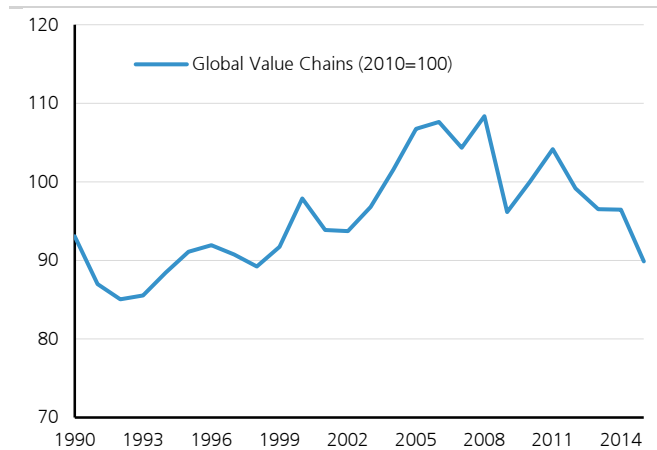
<sup>35</sup> Bussiere et al (2013)

<sup>36</sup> [https://stats.oecd.org/Index.aspx?DataSetCode=STAN\\_IO\\_TOT\\_DOM\\_IMP#](https://stats.oecd.org/Index.aspx?DataSetCode=STAN_IO_TOT_DOM_IMP#)

<sup>37</sup> James Gwartney, Robert Lawson, and Joshua Hall. 2016. "Economic Freedom of the World: 2016 Annual Report." *Fraser Institute*.

<sup>38</sup> Haugh, Kopoin, Rusticelli, Turner and Dutu. 2016. "Cardiac Arrest or Dizzy Spell: Why is World Trade So Weak and What can Policy Do About It?." *OECD Economic Policy Paper No. 18*.

Figure 51: Global Value Chains



Source: OECD, Haver, UBS \* GDP weighted for 15 countries

Figure 52: China Trade Volume



Source: Haver, UBS

Exhibit 2: Estimated model coefficients

Variable	Coefficient	p-value
Import Adjusted Demand	2.221	0.000
Global Value Chains	1.961	0.013
Trade Liberalisation	0.040	0.106
China	0.050	0.025

Source: UBS

Exhibit 3: Key conclusions from the model

	IAD	GVC	Trade Liberalisation	China	Actual	Predicted
<b>Contribution by explanatory variable to world import growth</b>						
1990-2007	5.35%	0.31%	0.16%	1.39%	6.27%	6.26%
2011-15	3.32%	-0.06%	-0.07%	0.57%	2.50%	2.81%
Contribution in 2011-15 relative to 1990-2007	-2.03%	-0.38%	-0.24%	-0.81%	-3.78%	-3.45%
Explaining the drop in import growth	53.77%	9.94%	6.28%	21.51%		
<b>Share of Total Explained</b>	<b>58.76%</b>	<b>10.86%</b>	<b>6.87%</b>	<b>23.51%</b>		

Source: UBS

## Appendix 2

### What does the gravity model of trade predict?

The gravity model of trade, which, somewhat pompously, takes its name from Newton's gravity equation in physics, predicts that trade between two countries varies directly with the economic size of the two countries and inversely with the 'economic distance' between them. In its simplest form the model is laid out as

$$T_{A,B} \propto \frac{(GDP_A)^\alpha (GDP_B)^\beta}{(Dist_{AB})^\zeta}$$

With  $\beta, \zeta \approx 1$ , the so called "gravity equation" in international trade has proven surprisingly stable over time and across different samples of countries and

**Naturally, bigger countries with shorter "economic distance" trade more**

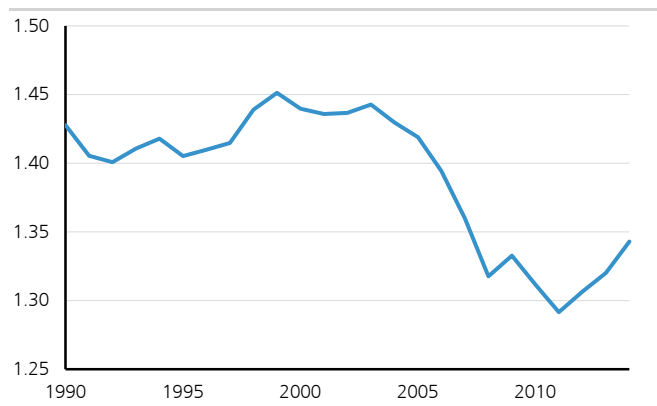
methodologies. It stands among the most stable and robust empirical regularities in economics.

Where  $T_{A,B}$  is the trade between two countries,  $A$  and  $B$  are the sizes of the two countries and  $Dist_{AB}$  is the economic distance between them. The economic distance should be thought of as trade barriers and transportation costs between the two countries. This basic model can be enhanced to include dummies for a common border, common language or colonial past etc.

The important intuition behind the gravity model is that big countries trade more, and that as two countries become of similar size the trade between them increases non-linearly. If global growth is being driven by a middle-sized open economy growing quickly, trade will rise disproportionately. This is exactly the phenomenon we have had in place beginning the late 1990s as growth in most emerging economies, led by China, attained a trajectory not seen since the 1950s, and more consistently so.

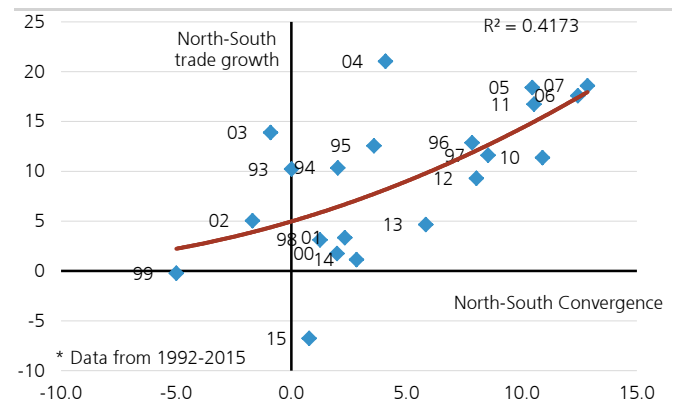
**As two countries grows to similar size, trade between them increases non-linearly.**

**Figure 53: Coefficient of variation of GDP for selected G25 economies, 1990-2014**



Source: Penn world tables, UBS

**Figure 54: DM exports to EM and convergence**



Source: Haver, UBS. Rate of convergence (horizontal axis) measured as the weighted average annual change in the ratio of GDP of developed to developing countries; vertical axis shows the average annual variation in North-South trade; growth rates are smoothed using a three-year weighted moving average and the Crisis years (2008-2009) are removed from the sample.

As EM growth rose so sharply, the income gap between this group and developed markets began to narrow quickly. Figure 53 shows how the coefficient of variation in per capita incomes between the top 25 economies in the world began to decline sharply in the 2000s. This 'convergence' of incomes, in line with the prediction of the gravity model, led to a significant rise in trade between the developed world and the emerging world.

Over the last 3-4 years, however, this process of convergence in incomes has slowed considerably as EM per capita incomes have risen at a much slower pace. Again, this is the period over which global trade has also slowed down. We don't model the gravity equation separately because we believe the China factor in our broader model picks up the idea of convergence of EM and DM incomes well.

With a major country like China now potentially heading into a middle income trap, and large other parts of the EM universe also under high levels of debt, we would expect the convergence of per capita incomes to slow down further, implying trade growth between EM and DM could be more subdued than it was before the crisis.

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