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The Cross-Section of Country News, Decoupling Expectations, and Global Business Cycles*

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Abstract

We define decoupling as an increase in the cross-country heterogeneity in long-term growth expectations. We identify growth expectations from a cointegrating relation between a country's output level and its stock market valuation. Fluctuations in this output-price or *yp*-ratio reflect changes in perceptions about future real activity (output growth) or changes in the expectation of long-term stock market returns or both. Shocks to the cross-country dispersion of *yp*-ratios therefore provide information on the heterogeneity of the international cross-section of country-specific news about future real (output growth) and financial (return) opportunities. We show that shocks to the international cross-section of news have particularly high trend growth effects in Emerging Asia including China, particularly in the period since the Asian financial crisis. A factor analysis of the cross-section of stock market and output growth expectations reveals an increasing role for regional factors in both financial markets and for output growth. Whereas the role of regional factors in output growth has increased at the expense of global factors -- a possible instance of decoupling -- financial factors have become more regional at the expense of purely country-specific influences.

Keywords: International Business Cycles, Country-level Growth Expectations, Return Predictability, News Shocks, Decoupling, Emerging Markets, Global Imbalances

JEL Classification: E32, F30, F40

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1. Introduction

The recent financial crisis has brought to the fore the importance of international financial linkages in the global transmission of macroeconomic shocks. At the same time, we have seen a debate about the potential 'de-coupling' of business cycles in Asia's emerging economies from the rest of the world. The fact that the 2008-2009 global downturn also affected East Asia heavily may at first have dispelled the notion of de-coupling. However, the region's speedy exit from the global recession contrasted with a very sluggish recovery in highly industrialized economies. Hence, while complete de-coupling from global financial shocks may indeed be an illusion, the underlying growth trends in Asia and elsewhere among emerging economies appear increasingly distinct from those in the industrialized world. In this paper, we formalize this idea: we conjecture that long-term growth expectations in emerging market economies have become different from those in the rest of the world. We refer to this conjecture as the 'expectational' decoupling hypothesis.

To identify long-term expectations, we focus on the interaction between real and financial factors and, specifically, on the role that asset price movements play in signalling changes in expectations about economic activity. We capture the long-term link between finance and the real side of the economy as a cointegrating relation between a country's output level and its stock market valuation. Similar to the dividend-price ratio in the empirical asset pricing literature, we argue that fluctuations in this output-price or "*yp*"-ratio must reflect changes in perceptions about future real activity (output growth expectations) or changes in the expectation of long-term stock market returns (return expectations) or both.

Our approach builds on a recent influential literature that has emphasized the role of news shocks for macroeconomic fluctuations. We extend this literature by considering how news may affect the international cross-section of business cycles. Specifically, because *yp*-ratios signal output and stock market growth expectations for individual countries, changes in the cross-country dispersion of *yp*-ratios – that we refer to as σ_{yp} – must signal changes in the distribution of expected shares in world output and stock market capitalization. A shock to σ_{yp} therefore reflects the international cross-section of real and financial news at a given point in time. We can therefore think of σ_{yp} as a common factor that measures how heterogeneous growth and return expectations are around the globe. Hence, the factor captures the global nature of news while also allowing for the possibility that news may have different growth and return implications for different countries. This framework also allows us to operationalize the notion of a 'decoupling in expectations' as an exogenous increase in the heterogeneity of long-term growth expectations. We therefore also refer to σ_{yp} as the 'decoupling factor' or decoupling shock.

We include σ_{yp} in VAR models for individual countries in order to study how different countries react to shocks to the cross-country distribution of long-term growth and return expectations. Our empirical analysis is based on 33 countries and quarterly data spanning the period from 1991 to 2009. We find that the role of the country news factor as a driver of trend output fluctuations has increased considerably over the last decade. In particular, the decoupling factor is most influential in the newly emerged economies in East Asia and, notably, China.

For each country, we then extract output growth and stock return expectations based on the VAR. We collect these VAR-implied expectations across countries, then conduct a multi-level factor analysis, which allows us to distinguish common regional factors from global factors and to examine how they drive long-term output growth and returns. Here we find that the role of regional factors has increased in emerging market economies, in Asia in particular, for both growth and return expectations. This suggests a strong and unique pattern of regional comovement among emerging markets that is distinct from the global cycle. Interestingly, since the late 1990s, growth expectations have become more regional at the expense of the global factor – in line with our 'expectational' de-coupling hypothesis. Conversely, financial return expectations among emerging markets have become more regional mainly at the expense of idiosyncratic factors, probably reflecting the impact of financial integration on these economies. Based on the factor model we then propose a way of measuring the contribution of global and regional factors to the cross-sectional dispersion of growth and return expectations that, to the best of our knowledge, is new to the literature. Instead of the conventional variance decomposition exercise which calculates the contribution of each factor in explaining the time-series fluctuations in each country-specific variable, our index measures how different factors contribute to the cross-country dispersion of such macro variables. Based on this approach, we demonstrate that the responses of growth expectations to global shocks have become considerably more heterogeneous over the last decade. Most of this increased dispersion in responses to common shocks is driven by heterogeneity between the group of industrialized and emerging economies, but not so much within each of these groups. This is another instance of de-coupling that, to our knowledge, has not been documented in the literature. Our framework also allows us to understand de-coupling in the context of the recent global recession. While this recession was probably the most globally synchronized in terms of correlations in a long time, it was associated with a huge increase in the heterogeneity of output growth rates. To a considerable extent, this heterogeneity seems to reflect differences in long-term (trend) growth expectations.

1.1 Related Literature

The paper places itself at the intersection of different strands of the literature. First, we clearly relate to recent work on de-coupling and emerging market business cycles, both based on factor models and VAR methods. (For factor models see Kose, Otrok and Prasad, 2008 and Crucini, Kose and Otrok, 2011. VAR analyses include Kim, Lee and Park, 2009; Kim, Kose and Plummer, 2003; Fujiwara and Takahashi, 2011). While some of these papers also study the role of financial linkages, our contribution here is to explore the implications that asset prices have as forward-looking indicators of real economic activity. Also, the earlier literature generally does not attempt to make distinctions between real and financial linkages at the business cycle and the trend frequency, let alone to identify common factors in growth *expectations*, as we do here.

Our approach of using asset price movements as forward looking indicators of output growth and return expectations directly derives from a considerable body of empirical work in asset pricing and empirical finance (Campbell and Shiller, 1988 and Lettau and Ludvigson, 2001). These papers have emphasized the role of various incarnations of dividend-price ratios in helping identify long-term growth expectations. In our analysis we recognize that a country's stock market and its output are ultimately tied together, giving rise to a stationary relation between aggregate output and stock prices. This long-term link between output and stock prices has recently been explored in the context of the return predictability literature by Rangvid (2006). Differently from Rangvid (2006), however, our interest here is in what can be learned from shifts in the cross-country distribution of *yp*-ratios for the patterns of international business cycle and stock market synchronization. The idea that variation in dividend or output-price ratios can serve as an indicator for future national growth opportunities is also directly related to Dumas, Harvey and Ruiz (2003) and Bekaert et al. (2007). Whereas Dumas, Harvey and Ruiz (2003) show that variation in stock prices indeed related to subsequent output changes, Bekaert et al. (2007) construct synthetic country-specific dividend-price ratios based on global sector-level dividend-price ratios that are then averaged using country-specific industry weights. They equally demonstrate that these dividend-price ratios are successful predictors of output growth.

Finally, our interpretation of shocks to the cross-sectional dispersion of output-price ratios as a news shock builds on and extends recent empirical work on the role of expectations-driven business cycles (Beaudry and Portier, 2006). To our knowledge there is little econometric evidence on the role of news shocks for the international cross-section of business cycles. We provide such evidence here. Our results provide an extension of Beaudry and Portier (2006) to a multi-country setting. Similar to what they do in a single-economy setting, we use shocks to asset prices to identify long-term expectations. However, we also extend the setup by Beaudry and Portier along an important dimension: by drawing on the information embodied in the cross-country heterogeneity in growth expectations – our σ_{yp} -factor – we capture the idea that news is global in the sense that it travel quickly across borders while explicitly acknowledging that global news generally means different things for different economies and therefore is associated with changes in the cross-country heterogeneity of growth and return expectations.

2. Empirical Implementation

2.1 Measuring Country-Growth Expectations: The *yp*-Ratio

Our way of capturing the finance-macro linkage in the model rests on minimal theoretical assumptions. We acknowledge that stock markets and output growth are tied together in the long run by a mean-reverting price-dividend ratio. We start with the definition of the return on country *k*'s stock market

$$R_{t+1}^{k} = \frac{P_{t+1}^{k} + D_{t+1}^{k}}{P_{t}^{k}}$$

where R_{t+1}^k is the gross return, P_t^k is the stock price in period *t* and D_t^k is the dividend paid. To save notation, we drop the country-specific superscript *k* when we focus on an individual country, as we do throughout this subsection. Taking logarithms on both sides and linearizing around the long-run mean of the dividend-price ratio, $D/P = E\left(exp\left(\overline{d-p}\right)\right)$, we get the representation

$$r_{t+1} = \rho\ p_{t+1} + (1-\rho)d_{t+1} - p_t + \kappa$$

Here, lower case letters denote the logarithm of the respective variable. We can rewrite the above equation

$$d_t - p_t = r_{t+1} - \Delta d_{t+1} + \rho\left(d_{t+1} - p_{t+1}\right)$$

Using the usual transversality constraint that $lim_{k\to\infty}\rho^k\left(d_{t+k} - p_{t+k}\right) = 0$, we can solve forward to obtain the Campbell-Shiller representation

$$d_t - p_t = constant + \mathbf{E}_t\left\{\sum_{j=0}^{\infty}\rho^j\left[r_{t+j+1} - \Delta d_{t+j+1}\right]\right\} \tag{1}$$

A low dividend-price ratio either predicts declining prices or increasing dividends. In linking dividend payments to national outputs, we make the simplifying assumption that stock market dividends are a constant share of national output, so that $y_t = d_t + \mu$ for some constant μ and output growth equals dividend growth, $\Delta y_t = \Delta d_t$. Then we can write

$$y_t - p_t = constant + \mathbf{E}_t\left\{\sum_{j=0}^{\infty}\rho^j\left[r_{t+j+1} - \Delta y_{t+j+1}\right]\right\} \tag{2}$$

We refer to *y* - *p* as the output / stock price ratio or *yp*-ratio.

Figure (1) provides cross-country evidence on the long-term link between output levels and stock markets. The figure shows a cross-plot of y_t^k against p_t^k for all countries in our sample and for the period 1991Q1-2009Q2. The regression line corresponds to the regression $p_t^k = \mu^k + \gamma y_t^k$ which we estimate by panel dynamic OLS (using 2 leads and lags of the endogenous variables). The estimated coefficient is 0.87 with a standard error of 0.07. Pedroni's unit root tests for the panel residuals clearly signals the presence of cointegration in the panel. Hence, for the average country it seems reasonable to assume that stock markets and output cointegrate with cointegrating vector $\begin{bmatrix}1 & -1\end{bmatrix}'$.[1]

Figure (1) suggests that the output / stock market ratio is a very robust relation in our cross-section of industrialized and emerging economies. To see how this relation helps us identify the type of financial market shocks that we are interested in, consider a surprise increase in the stock price that leaves output unchanged in the home country. Clearly, this price shock leads to a decline in *y - p*. According to equation (2), such a shock to *y - p* implies, i) declining returns (which implies falling prices given expectations for Δd) or / and, ii) an increase in output growth. In case i), the stock price increase would at least partially be offset by future price declines – the shock would only have a transitory effect on the stock price. For example, this could be the case because a transitory drop in the price of aggregate risk leads to temporarily lower risk premia that are associated with lower expected returns. In case ii), the price increase would signal a gradual but permanent increase in the level of output, y_t . This would correspond to a news shock in the sense of Beaudry and Portier (2006): a permanent price increase would then signal news about subsequent increases in output.

Hence, by identifying a shock to prices that leaves output unaltered in a VAR context, we should expect to identify either a transitory shock to asset prices or a news shock with permanent effects on both stock prices and output![2]

2.2 The Cross-Section of Country News

For each individual country, variation in the *yp*-ratio signals expectations of output growth or stock market returns. However, ultimately our interest in this paper is to study how heterogeneous growth expectations are across countries and how this heterogeneity in expectations affects individual countries' output and stock market in the long run. We summarize the heterogeneity in the cross-section of expected stock market and output growth using the cross-country-dispersion of *yp*-ratios that we denote with σ_{yp} (*t*):

$$\sigma_{yp}(t) = \left\{ \frac{1}{K-1} \sum_{k=1}^{K} \left(yp_t^k - \overline{yp}_t \right)^2 \right\}^{1/2}$$

1 Clearly, assuming that national output comoves perfectly with the dividend stream paid in stock markets is a strong assumption. However, dividend and earnings data have their own shortcomings, e.g. they are smoothed for tax or others reasons (see Dumas et al. for a long discussion of this point). Since our interest is to study aggregate business cycles, we therefore use aggregate output instead of dividends. Our argument is that ultimately – barring catastrophic events that might lead to a complete breakdown of a stock market – a country's stock market and output will comove in the long run. We also explore the possibility that dividends grow more or less quickly than output on average, so that $E\left(\Delta y_t^k\right) = \gamma_k E\left(\Delta d_t^k\right)$ for $\gamma > 0$. This would lead to a more general cointegrating vector $\begin{bmatrix}1/\gamma & -1\end{bmatrix}'$, where the γ could potentially vary across countries. This does not substantially affect our results.

2 An increase in *y - p* due to an increase in *y* would correspond to a transitory output shock if it is offset by expected declines in output in the future. Conversely, it would be a permanent shock to both output and prices if mean-reversion is achieved by subsequent increases in prices (e.g. due to momentum in asset prices).

where *K* is the number of countries. At any point in time, $\sigma_{yp}(t)$ summarizes the heterogeneity of countries' growth expectations with respect to output and stock market returns. Shocks to $\sigma_{yp}(t)$ reflect unexpected innovations to the dispersion of growth expectations. We call these shocks, $v_t = \sigma_{yp}(t) - \boldsymbol{E}_{t-1}(\sigma_{yp}(t))$, the cross-section of country-news or simply the country-news factor. We think of v_t as a common or global factor that contains information about how common news is expected to affect countries in differential ways. We make a couple of remarks:

First, our interpretation of v_t as a global news shock signaling how news affects the cross-section of growth expectations allows us to operationalize the notion of de-coupling and re-coupling: a large positive shock to σ_{yp} would then signal de-coupling – an exogenous increase in the heterogeneity of growth expectations – whereas a (large) decline would signal re-coupling.

Second, note that the dispersion in growth expectations can be very high, even when movements in expectations are highly correlated. Hence, decoupling can be consistent with a very synchronized downturn as we saw during the 2008-2009 crisis. Indeed, we show that the financial crisis was a huge shock to the distribution of growth expectations. However, some countries, notably the emerging markets, contract much less and recover more quickly than others.

Third, we note that v_t encapsulates both financial (stock market) and real (output growth) news as well as the covariation between the two. In section 3.2, we will discuss in more detail how to decompose $\sigma_{yp}(t)$ into a global expected return dispersion and a global expected growth dispersion component. This will allow us to study expectational linkages in both financial (stock) markets and in output.

Finally, we emphasize that we are agnostic about where variation in the cross-country distribution of growth and return expectations may come from. Specifically, there is no need to assume that shocks to σ_{yp} only reflect country-specific disturbances (e.g. idiosyncratic shifts in policies). For example, if news about growth opportunities is actually sector-specific (but common to the same sector in all countries) – as is assumed for example in Bekaert et al. (2007) – then these shocks lead to expectations about sectoral shifts which in turn will translate into crosss-country variation in output growth expectations simply because countries differ in industrial structure.[3]

[3] Again, this example illustrates the role of the dispersion as a global factor: the sectoral news shock would quickly be common knowlecdge to everybody in the world. Still the shock means different things for different countries, e.g. because of the differences in industrial structure.

3. Econometric Models

The implementation of our empirical approach falls into two parts. First, we estimate cointegrated VARs for each of the 33 countries in our sample. Based on these, we study how the cross-section of country news affects trend and cycle in output and stock prices. We then extract growth and return expectations from the VARs. Secondly, we examine the international synchronization of growth and return expectations and explore the presence of regional or country-group factors (emerging markets or otherwise) in these expectations based on factor models. We discuss both elements of our approach in this section.

3.1 Country-Level VARs

Our main tool of analysis is a trivariate vector autoregression (VAR) model of the form

$$\boldsymbol{A}(L)X_t = \boldsymbol{\varepsilon}_t$$

where

$$X_t = \left[log(Y_t), \sigma_{yp}(t) \quad , \quad log(P_t)\right]'$$

is our vector of endogenous variables and $\boldsymbol{A}(L)$ is a 3 x 3 matrix polynomial in the lag operator. As is customary in the structural VAR literature, the reduced-form residuals are supposed to be a linear combination of the underlying structural shocks $\boldsymbol{e}_t$ so that

$$\boldsymbol{\varepsilon}_t = \boldsymbol{S}\boldsymbol{e}_t$$

where $\boldsymbol{S}$ is a non-singular 3 x 3 matrix and the vector $\boldsymbol{e}_t$ stacks the structural shocks. We identify these shocks as follows: let $\boldsymbol{\Omega}$ denote the variance-covariance matrix of the reduced-form residuals. Then, requiring that the structural shocks $\boldsymbol{e}_t$ have unit variance and are mutually orthogonal, we obtain

$$\boldsymbol{\Omega} = \boldsymbol{S}\boldsymbol{S}'$$

Given that $\boldsymbol{\Omega}$ is a 3 x 3 matrix, this condition imposes six non-redundant restrictions on the matrix $\boldsymbol{S}$. Since $\boldsymbol{S}$ contains nine unknown elements, we need an additional three restrictions to recover the structural shocks. Specifically, we assume that $\boldsymbol{S}$ is lower triangular:

$$S = \begin{bmatrix} * & 0 & 0 \\ * & * & 0 \\ * & * & * \end{bmatrix}$$

We motivate these restrictions on $\boldsymbol{S}$ from our previous discussion. To this end, we write the vector of structural shocks as

$$\boldsymbol{e_t} = \begin{bmatrix} e_t^{GDP} & e_t^{\sigma} & e_t^{rets} \end{bmatrix}'$$

where e_t^{GDP} is a GDP shock and e_t^{σ} is our main shock of interest – the news shock to the international cross-sectional dispersion of growth expectations. Finally, we interpret e^{rets} as a (global) expected return shock. Our identification follows the literature on news shocks in assuming that news is reflected in financial market fluctuations and helps predict future output changes but is uncorrelated with *contemporaneous* changes in output. This assumption gives rise to the two zero restrictions in the first row of $\boldsymbol{S}$. However, differently from Beaudry and Poitier, financial market shocks in our setup come in two versions: the first is a shock to *p* which also affects the international cross-section of growth expectations, $\sigma_{yp}(t)$. It is this shock to which we refer as news about the international cross-section of growth expectations. Finally, we postulate that the second financial-market shock, e^{rets}, leaves the cross-section of growth expectations unchanged, an assumption which gives rise to the third zero in the second row of $\boldsymbol{S}$. We interpret this last shock as a (global) expected return or stock market disturbance.[4]

The short-run identification allows all three shocks to have both permanent and transitory effects. To gauge the importance of each of these shocks to the trend component in output and stock markets, we now correlate e_t with the results from a long-term identification which makes direct use of the cointegrating information in the data.[5]

The first cointegrating relationship directly arises from our previous discussion and the evidence presented there – the *yp*-ratio. The second cointegrating relationship arises from the requirement that *yp*-ratios are stationary in all countries in our sample. This implies that the expectation-dispersion factor $\sigma_{yp}(t)$ should itself be stationary. With these restrictions in mind, we can rewrite our VAR as a

[4] The identifying assumption behind this interpretation is that news about future growth opportunities always leads to *some* cross-country heterogeneity in output growth and return expectations. Conversely, in a reasonably well integrated world financial market, shocks to risk premia and expected returns should be quite common across countries, leaving the dispersion of growth and return expectations unchanged.

[5] This differs from Beaudry and Poitier, who impose a Blanchard and Quah (1989) identification. We note that in our setting this identification will not be feasible, since, as we discuss next, there is only one common trend in our data set, which makes the long-run covariance matrix singular. For a broader discussion of our approach, see Cochrane (1994) and Hoffmann (2001*b*, 2003).

vector error correction model (VECM) so that

$$\boldsymbol{\Gamma}(L)\Delta X_t = \boldsymbol{\alpha\beta}' X_{t-1} + \boldsymbol{\varepsilon}_t$$

where $\boldsymbol{\Gamma}(L) = [\boldsymbol{A}(L) - \boldsymbol{A}(1)]/(1-L)$ and $\boldsymbol{\alpha\beta}' = -\boldsymbol{A}(1)$ and where the matrix $\boldsymbol{\beta}$ stacks the cointegrating vector and the coefficients of the matrix $\boldsymbol{\alpha}$ describe the error-correction behavior of the model. In our setup, we have

$$\beta = \begin{bmatrix} 0 & 1 \\ 1 & 0 \\ 0 & -1 \end{bmatrix}$$

where the first column reflects the trivial cointegrating restriction which arises through the stationarity of $\sigma_{yp}(t)$ and the second reflects the stationarity of *y* - *p*.

It is well-known that in such a cointegrated system, the space of permanent and transitory shocks can be directly identified from the adjustment loadings $\boldsymbol{\alpha}$: in the three-dimensional system here with two cointegrating relations, this implies that there is one common trend (permanent shock) and there will be two transitory shocks. As shown by Johansen (1995) and as discussed in Hoffmann (2003, 2001*a*), the permanent shocks, $\boldsymbol{\pi}_t$, in a cointegrated system are identified by

$$\boldsymbol{\pi}_t = \boldsymbol{S}_\pi' \boldsymbol{\alpha}_\perp' \boldsymbol{\varepsilon}_t \tag{3}$$

where $\boldsymbol{\alpha}_\perp$ is the orthogonal complement of $\boldsymbol{\alpha}$. Recall that $\boldsymbol{\Omega}$ denotes the covariance matrix of the reduced-form residuals $\boldsymbol{\varepsilon}_t$. Then $\boldsymbol{S}_\pi = (\boldsymbol{\alpha}_\perp' \boldsymbol{\Omega} \boldsymbol{\alpha}_\perp)^{-1/2}$ is a normalization matrix that ensures that the permanent shocks are mutually orthogonal and have unit variance: $var(\boldsymbol{\pi}_t) = I_2$. Identification of the transitory shock is achieved by requiring that these shocks are orthogonal to $\boldsymbol{\pi}_t$. From this one obtains

$$\boldsymbol{\tau}_t = \boldsymbol{S}_\tau' \boldsymbol{\alpha}' \boldsymbol{\Omega}^{-1} \boldsymbol{\varepsilon}_t$$

where $\boldsymbol{S}_\tau = (\boldsymbol{\alpha}' \boldsymbol{\Omega}^{-1} \boldsymbol{\alpha})^{1/2}$ is again a normalization matrix. Hence, we have a mapping between the reduced-form shocks and a set of permanent and transitory shocks $\boldsymbol{\theta}_t = [\pi_{t,} \quad \boldsymbol{\tau}_t']'$ so that $\boldsymbol{\theta}_t = \boldsymbol{P}\varepsilon_t$ where the matrix $\boldsymbol{P}$ is given by

$$P = \begin{bmatrix} \boldsymbol{S}_\pi' \boldsymbol{\alpha}_\perp' \\ \boldsymbol{S}_\tau' \boldsymbol{\alpha}' \boldsymbol{\Omega}^{-1} \end{bmatrix}$$

The normalization matrices $\boldsymbol{S}_\pi$ and $\boldsymbol{S}_\tau$ are not generally uniquely identified. In our model, however, there is only one permanent shock so that $\boldsymbol{\pi}_t$ is scalar and for any initial choice of $\boldsymbol{\alpha}_\perp$, $\boldsymbol{S}_\pi$ will therefore be unique. Hence, the permanent shock, which is our main interest here, is uniquely identified. To uniquely recover the two transitory shocks, however, note that the orthogonality restriction $var(\boldsymbol{\tau}_t) = \boldsymbol{I}_2$ imposes only three non-redundant restrictions on $\boldsymbol{S}_\tau$ so that one additional restriction on $\boldsymbol{S}_\tau$ is needed. The restriction we impose here is that we distinguish again between an output shock and shock to the two forward-looking variables, $\sigma_{yp}(t)$ and p_t : the former is allowed to affect output on impact whereas the shocks to the two forward-looking variables is not. To see how this helps to recover $\boldsymbol{S}_\tau$, note that the inverse of the matrix $\boldsymbol{P}$ is given by

$$\boldsymbol{P}^{-1} = [\boldsymbol{\Omega}\boldsymbol{\alpha}_\perp' \boldsymbol{S}_\pi^{-1}, \quad \boldsymbol{\alpha}\boldsymbol{S}_\tau^{-1}]$$

where the last two columns, given by $\boldsymbol{\alpha}\boldsymbol{S}_\tau^{-1}$, define the impact of the transitory shock. Using the ordering of the variables in our system (with output ordered first, σ_{yp} second, and *p* third), the restriction that one of the shocks does not affect output on impact then imposes a zero on the upper right entry of $\boldsymbol{\alpha}\boldsymbol{S}_\tau^{-1}$, thus providing the required restriction.

Note that we have now completed two identifications: the first is in terms of short-run shocks, mapping the vector $\boldsymbol{e}_t$ into the reduced-form residuals: $\boldsymbol{\varepsilon}_t = \boldsymbol{S}\boldsymbol{e}_t$. The second maps the reduced-form residuals ε_t into a vector of permanent and transitory disturbances, $\boldsymbol{\theta}_t = [\pi_t, \quad \boldsymbol{\tau}_t']'$, so that $\theta_t = \boldsymbol{P}\varepsilon_t$.

Because both $\boldsymbol{\theta}_t$ and $\boldsymbol{e}_t$ have identity variance matrix $\boldsymbol{I}$, it must be the case that $\boldsymbol{Q} = \boldsymbol{PS}$ is orthogonal so that $\boldsymbol{QQ}' = \boldsymbol{I}$. Hence, the entries q_{ij} of $\boldsymbol{Q} = \{q_{ij}\}_{i,j=1,2,3}$ measure the correlation between the *j*-th shock in $\boldsymbol{e}$ and the *i*-th shock in $\boldsymbol{\theta}$. Similarly, we can think of q_{ij}^2 as the variance contribution of the *j*-th shock in $\boldsymbol{e}$ to the *i*-th shock in $\boldsymbol{\theta}$. Specifically, given that the permanent shock π_t is ordered first in $\boldsymbol{\theta}_t$, this means that the squared elements of the first row of $\boldsymbol{Q}$ (i.e. q_{11}^2 , q_{12}^2 and q_{13}^2), measure the variance contribution of the GDP-shock and the two shocks to the forward-looking variables σ_{yp} and *p* respectively to trend output growth. This approach builds on Hoffmann (2001, 2003) and allows us to gauge to what extent each of the three structural shocks – short-term GDP shocks, shocks to the cross-section of growth expectations and global expected return shocks – contribute to the common trend in output and stock prices.

3.2 Cross-Country Analysis

The dispersion factor $\sigma_{yp}(t)$ contains information about the cross-country distribution of both output and stock market growth expectations but it does not allow us to directly distinguish between the two. However, our country-level VARs allow us to do exactly this: to extract a separate estimate of output and stock return expectations for each country. We are then able to use factor models to analyze the international comovement of the country-level real and stock market growth expectations in more detail. Specifically, we will be able to distinguish between regional and global comovement in growth expectations.

Real and Financial Expectations

For each country, the expectations on the right hand side of equation (2), restated here for convenience

$$y_t^k - p_t^k = constant + \mathbf{E}_t\left\{\sum_{j=0}^{\infty}\rho^j\left[r_{t+j+1}^k - \Delta y_{t+j+1}^k\right]\right\} = constant + z_t^r - z_t^{\Delta y}$$

can easily be approximated VAR using the usual Hansen-Sargent-prediction formula (see Campbell and Shiller, 1988).[6] Specifically, we get

$$\begin{bmatrix} z_{k,t}^r \\ z_{k,t}^{\Delta y}\end{bmatrix} = \begin{bmatrix} \sum_{j=0}^{\infty}\rho^j \mathbf{E}_t r_{t+j+1}^k \\ \sum_{j=0}^{\infty}\rho^j \mathbf{E}_t \Delta y_{t+j+1}^k\end{bmatrix} = \begin{bmatrix} \boldsymbol{e}'_{\Delta p} \\ \boldsymbol{e}'_{\Delta y}\end{bmatrix}\rho\, \boldsymbol{G_k}\left[\boldsymbol{I} - \rho\boldsymbol{G_k}\right]^{-1}\boldsymbol{X^k}_t$$

where $\boldsymbol{G_k}$ is the companion-form representation of the VECM,

$$\boldsymbol{X^k}_t = \left[\Delta X_t^{k'} \quad .. \quad \Delta X_{t-p+1}^{k'} \quad X_{t-1}^{k'}\beta\right]'$$

and $e_{\Delta p}$ and $e_{\Delta y}$ denote the appropriately dimensioned unit vectors that pick out the stock return and output growth equations – the first and the third elements of ΔX_t^k – from the long-run forecast. For further analysis, we stack the output and stock return expectations obtained in this way for the different economies into two vectors $Z_t^{r'} = \left[z_{1,t}^r \quad z_{2,t}^r \quad \ldots \quad z_{K,t}^r\right]$ and $Z_t^{\Delta y'} = \left[z_{1,t}^{\Delta y} \quad z_{2,t}^{\Delta y} \quad \ldots \quad z_{K,t}^{\Delta y}\right]$

6 Note that in this section, we re-introduce the country index into the notation.

where K is the number of economies in our sample.

Factor Models

We explore patterns of international and regional comovement in output growth expectations $Z_t^{\Delta y}$ and return expectations, Z_t^r, using a factor model. Specifically, we employ a latent multi-level factor model to decompose Z^x (with $x = \Delta y, r$) into a world component, a regional component, and a country-specific component. Let z_{kt}^x be the expectation (of output or returns) for country k. Assume country k is in region i. Then $z_{k,t}^x$ is modeled as follows

$$z_{kt}^x = \lambda_k^g g_t + \lambda_k^i f_t^i + u_{k,t}$$
$$E(u_{k,t}u_{l,t-s}) = 0, \quad for\ k \neq l\ and\ s \neq 0$$
$$E(u_{k,t}u_{k,t}) = \sigma_i^2$$

where g_t is the global factor which captures the world-wide co-movement in $z_{k,t}^x$, f_t^i is the *i-th* group-specific factor which only affects countries in that region, and $u_{k,t}$ is the country-specific component. Different countries may respond to common factors in heterogeneous ways, which are captured by the country-specific coefficients or factor loadings λ_k^g and λ_k^i.

The above system can be estimated by a number of methods. We adopt a principal component method developed by Wang (2010), due to its computational simplicity and documented robustness to potential model mis-specification.

We illustrate our approach based on output growth expectations; our handling of return expectations is analogous. Pooling output growth expectations for all countries to form a panel, $Z_t = \{z_{it}^{\Delta y}\}$, we divide the countries into two groups, emerging markets and industrial economies, and thus k = 1 or 2. Using the multi-level factor model, we can disentangle the global co-movement from group-specific factors. Idiosyncratic fluctuations will be left in the error terms u_{it}. Based on the principal components estimates, we then first conduct a variance decomposition to analyze the importance of each factor in explaining the fluctuations in these variables. For example, for country i, the variance share of the global supply factor is

$$\frac{Var(\lambda_k^g g_t)}{Var(z_{kt}^{\Delta y})} \tag{4}$$

Clearly, the higher this ratio, the stronger is the comovement of $z_{kt}^{\Delta y}$ with the global factor. Below, we report such variance shares for the global and regional factors as averages across country groups and for some important individual countries. This way of decomposing time-series variances is a quite conventional step of analysis in factor models, and it gives us an indication of the extent to which the international comovement of growth (or return) expectations is driven by the common global or regional factors.

What this time-series variance decomposition does not explicitly capture is to what extent fluctuations in the common factors contribute to the cross-country heterogeneity in growth expectations. Nor does the variance decomposition answer the question whether international comovement is driven by very large common shocks or by a strong international transmission of these shocks as reflected in the factor loadings λ_i. This is because both the size of the common shock g_t and the response to the common shock of a specific country affect the results of variance decomposition and thus the degree of comovement. Suppose, for example, that international growth expectations were perfectly synchronized because there is only one global factor. Even so, the cross-sectional dispersion of growth expectations could be high in this case if the factor loadings are very different across countries. Clearly, this distinction must be very relevant for our understanding of decoupling. For example, the recent financial crisis may well have been a global shock that led to to a very synchronized downturn. In fact, it was this high degree of synchronization that led many commentators to declare the notion of de-coupling as misleading. Still, it may also be the case that the same global shock had very different implications for long-term growth expectations in different parts of the world. This heterogeneity of responses should be reflected in the heterogeneity of the factor loadings. To resolve this issue, we propose the following index to measure the cross-country heterogeneity induced by the global factor at any given period *t* :

$$\frac{\sum_{k=1}^{K}\left(\lambda_k^g - \bar{\lambda}^g\right)^2 \times g_t^2}{K} \tag{5}$$

One way to think about this index is as the counterfactual cross-country dispersion of growth (or return) expectations that would have prevailed if only the global factor had fluctuated over the sample period. In this sense, it is a historical decomposition of the cross-county dispersion of growth expectations. Clearly, a completely analogous expression can be used for the regional factors.

Hence, while the variance decomposition based on (4) provides us with the contribution of the global factor to the time-series variance of z_{kt}^{x} over a given sample period, equation (5) is an indicator of the importance of the global factor in explaining the cross-country dispersion in z_{kt} at a given point in time *t*. This allows us to ask whether it is countries' heterogeneous responses to common shocks or rather different (e.g. global vs. regional) shocks that contribute to business cycle patterns during particular episodes such as the recent world-wide crises.

4. Data

Our output data are GDP at constant prices, collected from OECD quarterly national accounts database and IMF IFS CD-ROM. Stock return is calculated by the market indices from IMF IFS database. Our sample covers 33 economies, of which 16 are emerging markets including 10 East Asia economies, and the other 17 are industrial countries, according to United Nations classification. This sample of countries easily covers more than 70 percent of world output. Specifically, the group of industrialized countries comprises Australia, Austria, Canada, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, New Zealand, Spain, Sweden, Switzerland, Great Britain, and the United States.

The Emerging Market Economies in our sample are Brazil, Chile, China, Hong Kong, India, Indonesia, Israel, Korea, Malaysia, Mexico, the Philippines, Singapore, South Africa, Taiwan, Thailand, and Turkey.

While for some countries – notably the industrial ones – data are available before 1990, there are considerable data gaps for emerging markets before that date. Our sample period therefore is 1990-2009. All data are quarterly.

5. Results

5.1 Country-Level VARs

We report our results for several broad country groups – industrialized countries, the Asian emerging economies, non-Asian emerging markets and the Euro countries in our sample[7] – as well as for two particularly important individual countries, the US and China.

First, for all groups and countries we consider, the trend shock explains the bulk of variability in output, though clearly less at short horizons. It is also a general feature that stock prices are driven by permanent shocks only to a very limited extent. That is not surprising given the huge literature on return predictability that argues that stock prices have considerably mean-reverting components. Finally, the cross-country dispersion of growth expectations is 'explained' to varying degree by permanent shocks: to a larger extent in emerging markets – notably in Asian emerging economies and China – and to a lesser extent for industrialized countries.

By the very way it is identified, the GDP shock explains all output variance at short horizons. At longer horizons, however, its contribution to output fluctuations declines somewhat – to 70-80 percent. This pattern is very uniform across country groups. The dispersion shock explains virtually all of the

[7] For the exact composition of the country groups, see the previous section.

variability in $\sigma_{yp}(t)$. Importantly, the contribution of this shock to output growth increases at longer horizons, again particularly in the Asian emerging markets and China. Note also that this shock's contribution to stock market variability increases with the time horizon. This general pattern is consistent with our interpretation of this shock as a news disturbance.

Finally, the expected return shock is the predominant source of stock market variability at all horizons. However, its contribution declines at longer horizons – as we have seen previously mainly in favor of the dispersion shock – whereas its contribution to output increases for the industrialized countries, non-Asian emerging markets, the US and the Euro area economies.

Figures 2 shows the impulse responses to a dispersion shock (dashed line) and to a permanent shock (solid line), estimated from the whole sample period, 1991:1-2009:2. Note first that the permanent shock has equal long-run impact on both output and stock markets. While this is a direct implication of the cointegrating relationship between the two variables (and the fact that the coefficients in the cointegrating relationship are equal), it is worth noting upfront. However, the two variables differ substantially in their transitional dynamics after a permanent shock. While stock markets generally react with an initial overshooting of their long-run level (at least for the industrial countries, the Asian emerging markets, the Euro countries and the United States), output generally responds more gradually. Note also that dispersion generally reacts to the permanent shock, though it tends to do so in different directions for different country groups:[8] for the industrialized countries, including the Euro countries and the United States, the response of σ_{yp} is generally negative, whereas for emerging markets, including China, the permanent shock is generally associated with a persistent though ultimately temporary increase in dispersion. This suggests that positive permanent shocks among developed economies are generally shocks that lift growth expectations globally so that growth expectations become more homogeneous. Conversely, permanent shocks in the emerging world, and here in particular Asia and China, are associated with 'decoupling' in the sense that they coincide with an increase in the global heterogeneity of growth expectations.

Turning to the dispersion shock, we see that it generally leads to a response that is similar in shape to that of the permanent shock, though it is less pronounced in its impact on stock markets and output. Note in particular that there seem to be important permanent parts in the response of output and stock prices to the dispersion shock, suggesting that variation in the dispersion factor, at least to some extent, signals cross-country differences in the adjustment to trend shocks in output (and stock markets).

Results in Table 3 provide more evidence that a considerable share of the trend variation in output and stock prices is driven by news dispersion shocks. Panel I reports the (squared) correlations between the shocks obtained from the short-term identification and the permanent shocks (i.e. the

[8] Note that all impulse responses displayed here and all shocks are normalized to have a positive impact on output and/or stock prices. This, however, does not imply a particular restriction on the short-run response of the dispersion variable.

squared elements of the third row of $\boldsymbol{Q} = \boldsymbol{PS}$) for the period 1991-2009. While most of the permanent variation is driven by generic GDP shocks, i.e. shocks that also affect output in the short run, news dispersion and stock market shocks play a non-negligible role for global business cycles. While the impact of news dispersion on trend variation is limited in industrialized countries and notably the US, it is again in the Asian emerging markets and in China where its impact is most pronounced: the σ_{yp} shock explains 24 and 38 percent of variability in the trend for the Asian emerging economies and China, respectively.

In Table 3 Panel II, we also report results for the latter half of our sample period, now limited to 1999:1-2009:Q2. The rationale for looking at a shorter sample is that many authors have argued that business cycle patterns in emerging markets that are meaningfully distinct or 'de-coupled' from those in the industrialized economies are a phenomenon of the relatively recent past. Specifically, after the Asian crisis of the late 1990s, many countries in the region started to accumulate large current account surpluses, partly for precautionary purposes. The consequences for regional output dynamics of such a massive structural change are still unclear. Another reason to look at the sub-sample excluding the 1997 crisis is that the Asian Financial Crisis may itself have contributed to the regional business cycle comovement observed in the full sample, distorting the picture for the subperiod, a point raised by both Kose, Otrok and Prasad (2008) and He and Liao (2011). It will therefore be interesting to see how the results change after the Asian crisis.

As the results in Panel II show, the cross-section of country news indeed has a much bigger impact on trend output fluctuations in the post-1999 period than in the whole sample, but the overall patterns that were apparent from the whole sample are, if anything, strengthened: the cross-section of country-news loads more strongly on the common trend of output and stock prices in all country groups. But the increase vis-a-vis the longer sample is particularly strong for Asia's emerging economies and for China. Note that now also the US output- and stock market trend loads strongly on the global growth expectations factor.

The increased contribution of the cross-section of country news to the long-term variation in output and stock markets can also be gleaned from the impulse responses for the 1999-2009 period, presented in Figure 3. In particular for China, the responses to permanent shocks and to news dispersion are now barely distinguishable. However, the response of stock markets and dispersion to the shock are very close for Asian emerging economies and non-Asian EMEs. In addition, the shape of the output response is also very similar and a larger fraction of the permanent component in this variable now seems to be explained by the dispersion shock.

Figure 4 further illustrates the role of the dispersion shock for the two biggest economies we study: the US and China. We follow Beaudry and Poitier (2006) and plot the shocks for the 1999-2009 period to the cross-section of country news against the permanent shocks for the different country groups. As seen in the figure, the shocks are nicely scattered along the 45-degree line, indicating that shocks to the world cross-section of growth expectations indeed seem to be permanent shocks for these two countries. This is what we call 'expectational' or trend de-coupling: international differences in growth expectations increasingly reflect expectations about permanent or long-term growth rates.

5.2 The Comovement of Country News – Real and Financial Components

Our analysis so far has asked how global heterogeneity in growth and return expectations loads differently on different country groups. This sub-section looks at the nature of this heterogeneity. Specifically, we extract stock market return and output growth expectations from the individual country VARs based on the approach outlined above. We then seek to distinguish between global and regional patterns of co-fluctuation in growth and financial market expectations using the multi-level factor model described in section 3.2.

Again, we consider the samples before and after 1999Q4 separately by estimating a multi-level factor model for each. Within each subsample, we perform a variance decomposition to study the roles of global and regional factors. This allows us to investigate the evolution of synchronization patterns. In the meantime, the least squares principal components estimator achieves the best fit for the subsamples, which fits better than the full sample estimates. The full sample result is robust to the changing variance of factors but not to the changes of factor loadings over time. Given the rapid development in emerging markets recently, constant factor loadings over 30 years seem unlikely.[9]

Therefore, to gain an overall picture for the full sample but avoid the bias caused by time-varying loadings at the same time, we construct our variance decompositions using estimation results from two subsamples and then construct what is essentially an appropriately weighted average of the two periods.[10] The results are reported in Table 4 and 5.

We find that, overall, the growth expectations have a very large global component. The global factor explains about half of the growth expectation fluctuations on average from 1991 to 2009. The emerging markets factor explains a higher percentage of growth expectations on average than the

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9 We estimate both subsamples and the full sample, and we do find evidence showing that the factor loadings change between the two subsamples. Although the dynamics of estimated factors from two subsamples resemble the pattern of factors estimated from the full sample, the loadings for those factors vary a lot between the two subperiods, especially for the return expectations component.

10 To see exactly how we do this, take the global factor as an example. We first calculate the variance decomposition for two subsamples following:

$$DV1 = \left(\left(\lambda_{1i}^2 \sum_{t=1}^{\tau} g_t^2\right) / \left(\sum_{t=1}^{\tau} (z_{it})^2\right)\right) = \left(\left(\tau\lambda_{1i}^2\right)/(\tau-1)\right)$$
$$DV2 = \left(\left((T-\tau)\lambda_{2i}^2\right)/(T-\tau-1)\right)$$

where λ_{1i} and λ_{2i} are factor loadings estimated using two separate subsamples respectively, and τ is the date dividing the two subsamples which is 1999Q4 in our case. Then the full sample variance decomposition can be constructed in the following way:

$$DV = \frac{\lambda_{1i}^2 \sum_{t=1}^{\tau} g_t^2 + \lambda_{2i}^2 \sum_{t=\tau+1}^{T} g_t^2}{\sum_{t=1}^{\tau} (z_{it})^2 + \sum_{t=\tau+1}^{T} (x_{it})^2} = \frac{\tau\lambda_{1i}^2 + (T-\tau)\lambda_{2i}^2}{\tau-1+T-\tau-1}$$
$$= \frac{(\tau-1)DV1 + (T-\tau-1)DV2}{T-2}$$

industrial factor does for advanced economies (35% versus 29%), but only by a small margin. For the subsample results, the picture gets clearer. The importance of group factors increases dramatically for both groups of economies (from 11% to 42% for industrial countries, while from 8% to 57% for emerging markets). This increase in the contribution of group factors is at the expense of the global factor, which has a diminishing role for both groups of economies over the two subsamples.

For the return expectation component, however, we observe a somewhat different pattern. Here, the role of the global factor increases sharply for industrial economies (from 8% to 23%), but drops for emerging markets, especially for East Asia (from 41% to 18%). Meanwhile, the industrial group factor weakened only slightly, but the emerging group factor explains a much higher portion of returns expectation fluctuations on average. A notable exception here is China, for which the global factor has a much more important role.

Another pattern worth noting is that the increase in the variance contribution of the regional factor for emerging markets and notably Asia exceeds by far the decline in the importance of the global factor for these countries. That implies that the purely idiosyncratic part of return expectations has decreased considerably. The same is true, though to a lesser extent, for industrialized countries. Here, the regional factor has decreased in importance but this effect is more than offset by the global factor, again implying that purely idiosyncratic movements in return expectations have decreased. Clearly, this general pattern is consistent with what one would expect given the continued impact of financial globalization. It would seem plausible, as we find here, that this effect is stronger on emerging markets and in Asia, which started from lower levels of international financial integration. What is interesting, however, is that increased financial integration has strengthened the impact of global factors for expected return dynamics in industrialized economies but strengthened the regional factor for emerging markets and notably Asia – with the exception of China, which seems to follow the industrialized countries in this respect.

Summing up, the variance-decompositions here tell us a story of increased regional comovement of output growth and return expectations in the emerging world and particularly in Asia. For output growth expectations, this increased comovement has come at the expense of global factors; while for financial return expectations, the increased comovement reflects a decline in idiosyncratic factors. Hence, regionalization can partly be understood as a de-coupling of emerging markets in Asia and elsewhere from the growth expectations in the industrialized world. In financial terms, however, it also largely reflects increased financial integration that has lowered the impact of idiosyncratic expectations in terms of long-term stock market returns.

5.3 The International Dispersion of News: Global vs. Regional Factors

As a final exercise, we now turn to examining how global and regional fluctuations have contributed to cross-country heterogeneity in growth and return expectations.

First, Figure 5 presents the dispersion in expectations both worldwide and within each group. The left column is for growth expectations, and the right column for return expectations. The top row gives the global dispersion, and the second and third rows give the respective dispersions within the industrial county and the emerging market group.

First, we can observe much larger heterogeneity in terms of output growth expectations within the industrial countries group compared with the emerging markets group in the recent global crisis. Secondly, we see that growth expectations are generally much more dispersed than return expectations.

In Figures 6 and 7 we now apply our index (5) of the cross-sectional dispersion of growth and return expectations. For comparison, in each figure the green dotted line reproduces the total (global or within-group) dispersion as it already appears in Figure 5. This allows us to see to what extent global and regional factors have contributed to the global and within-country-group dispersion.

Figure 6 provides a striking illustration of financial decoupling in the last two crises: within-group dispersions (as driven by global shock) stay low. This means that the global dispersion largely reflects the between-group dispersion which, if it had only been for the global factor, increased markedly. A similar picture emerges for the real growth expectations dispersion in the recent crisis, with the global component of dispersion again largely reflecting between-group dispersion and increasing over time. So, in addition to a shifting importance in the relative role of regional and global factors as we documented in the last sub-section, it is also a different transmission of large global shocks that has changed the patterns of the international business cycle. In tranquil times, when global shocks are small, this result does not come out very clearly, so the overall dispersion is pretty low.

Lastly, Figure 7 shows that still most of the within-group dispersion is due to different reactions to the global factor, and not so much due to differences in how countries react to the regional factor. In fact, the regional factor seems to weigh similarly on most members, and the counterfactual contribution of the regional factor to within group dispersion is generally very small. The exception is the regional factor in growth expectations in industrialized economies during the recent great recession. Here we also see a part of the increase in the post-2008 dispersion within the group being driven by the regional factor, probably reflecting the divisions within the industrialized country groups, since countries such as Germany and other parts of continental Europe (France, the Netherlands, Switzerland) got through the crisis relatively smoothly with only modest or short-lived output losses, while the UK and US were hit much harder.

6. Summary and Conclusion

There is a widespread perception that emerging economies have in some sense de-coupled from growth in the mature industrialized economies in North America and Japan. While the recent financial crisis at first seems to have dispelled this notion of de-coupling, emerging economies eventually recover much more vigorously from the ensuing global recession than the industrialized economies. In this paper, we suggest to focus on the notion of a de-coupling of expectations defined as an increasing global dispersion of country-specific long-term growth expectations. We identify such expectations from the long-run relationship between output and stock markets. Similar to the dividend-price ratio in the empirical asset pricing literature, we argue that fluctuations in this output-price or *yp*-ratio must reflect changes in perceptions about future real activity (output growth expectations) or changes in the expectation of long-term stock market returns (return expectations) or both. Shocks to the cross-country dispersion of *yp*-ratios therefore provide information on the heterogeneity of the international cross-section of country-specific news about future real (growth) and financial (return) opportunities.

Estimating cointegrated VARs in output, stock prices and this global dispersion factor, we show that the cross-section of country news has an increasing impact on trend output growth in the emerging world and notably in East Asia – a first notion of a de-coupling of expectations. We then employ the individual VARs to extract output and stock market growth expectations at the individual country level which we then analyze in a factor model. This allows us to distinguish between global, regional and idiosyncratic components and to analyze a) the role of these factors in changing patterns of international synchronization and b) their evolving impact on the cross-country dispersion in growth expectations.

Our results suggest that both stock market (return) and output growth expectations among emerging markets and in Asia have become more regionally synchronized. While the role of regional factors has grown at the expense of global factors in as far as output growth expectations are concerned, the bigger role of regional factors among stock market return expectations has come largely at the expense of idiosyncratic return expectations. Again, this is an indication of real de-coupling in terms of output growth expectations, while changes in the synchronization of stock markets are probably more consistent with the continued impact of financial integration.

Based on the factor model, we then also propose a novel method of measuring the contribution of global and regional factors to the cross-sectional dispersion of growth and return expectations. We demonstrate that the responses of growth expectations to global shocks have become considerably more heterogeneous over the last decade. Most of this increased dispersion in responses to common shocks is driven by heterogeneity between the group of industrialized and emerging economies (and not so much within each of these groups). This is another instance of de-coupling that has not been previously documented in the literature. Our framework also allows us to understand the role of de-coupling in the context of the recent global recession. While the recession was highly globally synchronized in terms of correlations, it was associated with a huge increase in the heterogeneity of output growth rates. To a considerable extent, this heterogeneity seems to reflect differences in long-term (trend) growth expectations.

In future extensions of our approach here, it will be interesting to relate our results to changing patterns of global imbalances in capital flows.

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Table 1. Variance Contribution of Trend Shocks (1991-2009 Sample)

	Industrial Countries			Asia			Non-Asian EMEs		
	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$
1	0.74	0.17	0.20	0.67	0.21	0.21	0.57	0.12	0.20
4	0.83	0.13	0.32	0.71	0.22	0.29	0.62	0.18	0.21
8	0.88	0.11	0.37	0.78	0.27	0.36	0.70	0.19	0.23
16	0.93	0.11	0.39	0.87	0.30	0.42	0.80	0.21	0.24
	Euro Countries			United States			China		
	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$
1	0.67	0.20	0.30	0.86	0.01	0.01	0.62	0.43	0.03
4	0.85	0.14	0.46	0.67	0.01	0.08	0.74	0.57	0.02
8	0.91	0.12	0.52	0.70	0.01	0.10	0.85	0.58	0.06
16	0.96	0.11	0.53	0.77	0.01	0.12	0.92	0.58	0.14

Table 2 Panel I. Variance Contribution of GDP Shocks (1991-2009 Sample)

	Industrial Countries			Asia			Non-Asian EMEs		
	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$
1	1.00	0.01	0.07	1.00	0.01	0.10	1.00	0.01	0.05
4	0.90	0.03	0.15	0.94	0.04	0.20	0.92	0.02	0.10
8	0.86	0.04	0.17	0.92	0.05	0.22	0.88	0.02	0.13
16	0.82	0.04	0.17	0.87	0.06	0.22	0.81	0.02	0.16
	Euro Countries			United States			China		
	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$
1	1.00	0.01	0.06	1.00	0.00	0.17	1.00	0.00	0.00
4	0.86	0.02	0.15	0.93	0.00	0.29	0.95	0.04	0.00
8	0.80	0.04	0.17	0.91	0.00	0.30	0.90	0.05	0.00
16	0.75	0.04	0.16	0.89	0.01	0.29	0.81	0.05	0.02

Panel II: Variance Contribution of Dispersion News (1991-2009 Sample)

	Industrial Countries			Asia			Non-Asian EMEs		
	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$
1	0.00	0.99	0.01	0.00	0.99	0.01	0.00	0.99	0.02
4	0.02	0.95	0.05	0.02	0.93	0.02	0.04	0.93	0.04
8	0.04	0.91	0.13	0.05	0.84	0.08	0.05	0.86	0.06
16	0.08	0.89	0.21	0.10	0.79	0.16	0.06	0.77	0.08
	Euro Countries			United States			China		
	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$
1	0.00	0.99	0.01	0.00	1.00	0.03	0.00	1.00	0.05
4	0.02	0.97	0.04	0.01	1.00	0.11	0.03	0.95	0.04
8	0.05	0.95	0.12	0.05	0.99	0.20	0.09	0.94	0.10
16	0.09	0.94	0.22	0.08	0.96	0.30	0.19	0.93	0.19

Panel III: Variance Contribution of Return Shocks (1991-2009 Sample)

	Industrial Countries			Asia			Non-Asian EMEs		
	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$
1	0.00	0.00	0.92	0.00	0.00	0.89	0.00	0.00	0.92
4	0.08	0.02	0.79	0.04	0.03	0.77	0.04	0.05	0.86
8	0.10	0.05	0.70	0.03	0.11	0.70	0.07	0.12	0.80
16	0.10	0.07	0.62	0.03	0.16	0.62	0.13	0.20	0.76
	Euro Countries			United States			China		
	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$	$log(Y_t)$	$\sigma_{yp}(t)$	$log(P_t)$
1	0.00	0.00	0.93	0.00	0.00	0.80	0.00	0.00	0.95
4	0.12	0.01	0.80	0.07	0.00	0.60	0.02	0.00	0.96
8	0.15	0.02	0.71	0.05	0.01	0.49	0.01	0.01	0.90
16	0.16	0.02	0.62	0.03	0.03	0.41	0.00	0.02	0.80

Table 3. Contribution of Short-Run Shocks to Trend Variance

Panel I: 1991-2009 sample

Industrial Countries			Asia			Non-Asian EMEs		
GDP	News	Returns	GDP	News	Returns	GDP	News	Returns
$\left(e^{TFP}\right)$	$\left(e^{disp}\right)$	$\left(e^{ret}\right)$	$\left(e^{TFP}\right)$	$\left(e^{disp}\right)$	$\left(e^{ret}\right)$	$\left(e^{TFP}\right)$	$\left(e^{disp}\right)$	$\left(e^{ret}\right)$
0.74	0.14	0.12	0.67	0.24	0.08	0.57	0.13	0.30
Euro Countries			**United States**			**China**		
$\left(e^{TFP}\right)$	$\left(e^{disp}\right)$	$\left(e^{ret}\right)$	$\left(e^{TFP}\right)$	$\left(e^{disp}\right)$	$\left(e^{ret}\right)$	$\left(e^{TFP}\right)$	$\left(e^{disp}\right)$	$\left(e^{ret}\right)$
0.67	0.16	0.17	0.86	0.01	0.13	0.62	0.38	0.00

Panel II: 1999-2009 sample

Industrial Countries			Asia			Non-Asian EMEs		
GDP	News	Returns	GDP	News	Returns	GDP	News	Returns
$\left(e^{TFP}\right)$	$\left(e^{disp}\right)$	$\left(e^{ret}\right)$	$\left(e^{TFP}\right)$	$\left(e^{disp}\right)$	$\left(e^{ret}\right)$	$\left(e^{TFP}\right)$	$\left(e^{disp}\right)$	$\left(e^{ret}\right)$
0.67	0.21	0.12	0.46	0.44	0.10	0.62	0.24	0.14
Euro Countries			**United States**			**China**		
$\left(e^{TFP}\right)$	$\left(e^{disp}\right)$	$\left(e^{ret}\right)$	$\left(e^{TFP}\right)$	$\left(e^{disp}\right)$	$\left(e^{ret}\right)$	$\left(e^{TFP}\right)$	$\left(e^{disp}\right)$	$\left(e^{ret}\right)$
0.60	0.21	0.19	0.50	0.47	0.03	0.05	0.84	0.11

Table 4. Variance Contribution of Global and Group Factors for Growth Expectations

	Industrial Countries		EMEs		Asian EMEs	
Growth Expectation	World	Group	World	Group	World	Group
1991-1999	0.60	0.11	0.77	0.08	0.90	0.02
1999-2009	0.35	0.42	0.29	0.57	0.31	0.55
1991-2009	0.46	0.29	0.50	0.35	0.57	0.32
	Euro Countries		United States		China	
Growth Expectation	World	Group	World	Group	World	Group
1991-1999	0.76	0.08	0.79	0.11	0.96	0.00
1999-2009	0.35	0.45	0.53	0.40	0.52	0.42
1991-2009	0.53	0.28	0.64	0.27	0.71	0.23

Table 5. Variance Contribution of Global and Group Factors for Returns Expectations

	Industrial Countries		EMEs		Asian EMEs	
Returns Expectation	World	Group	World	Group	World	Group
1991-1999	0.08	0.76	0.37	0.27	0.41	0.28
1999-2009	0.23	0.67	0.26	0.57	0.18	0.64
1991-2009	0.16	0.72	0.31	0.44	0.28	0.48
	Euro Countries		United States		China	
Returns Expectation	World	Group	World	Group	World	Group
1991-1999	0.08	0.76	0.05	0.88	0.14	0.15
1999-2009	0.23	0.69	0.42	0.50	0.59	0.13
1991-2009	0.16	0.72	0.26	0.67	0.39	0.14

Figure 1. Pooled output and stock market data (country-demeaned) vs. fitted values (red, dashed line) from the Panel Dynamic OLS regression $p_t^k = \gamma y_t^k + \sum_{l=-2}^{2} \beta_l \Delta y_{t-l}^k + \mu^k$. The estimate of γ is 0.87. The black line is the 45-degree line.

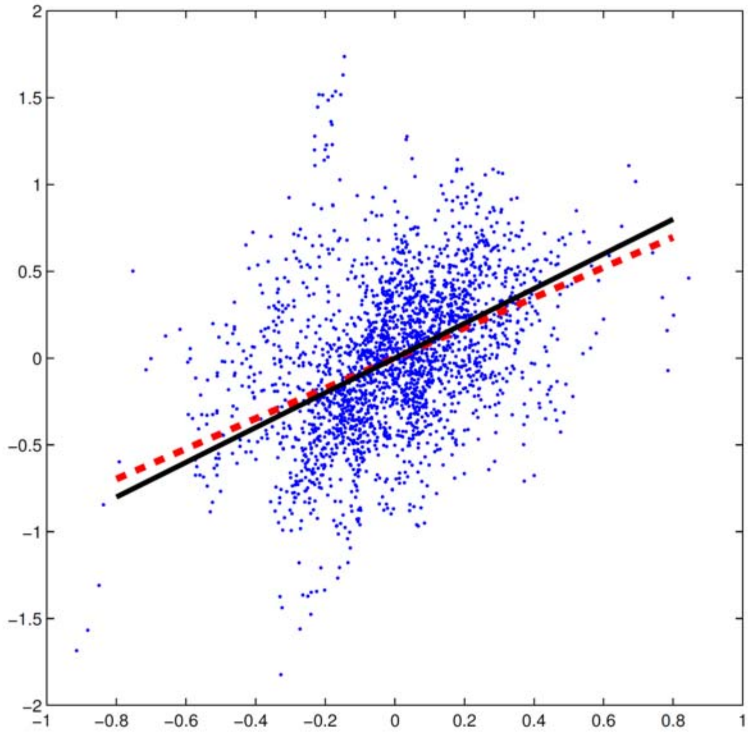


Figure 2. Impulse Responses 1991-2009

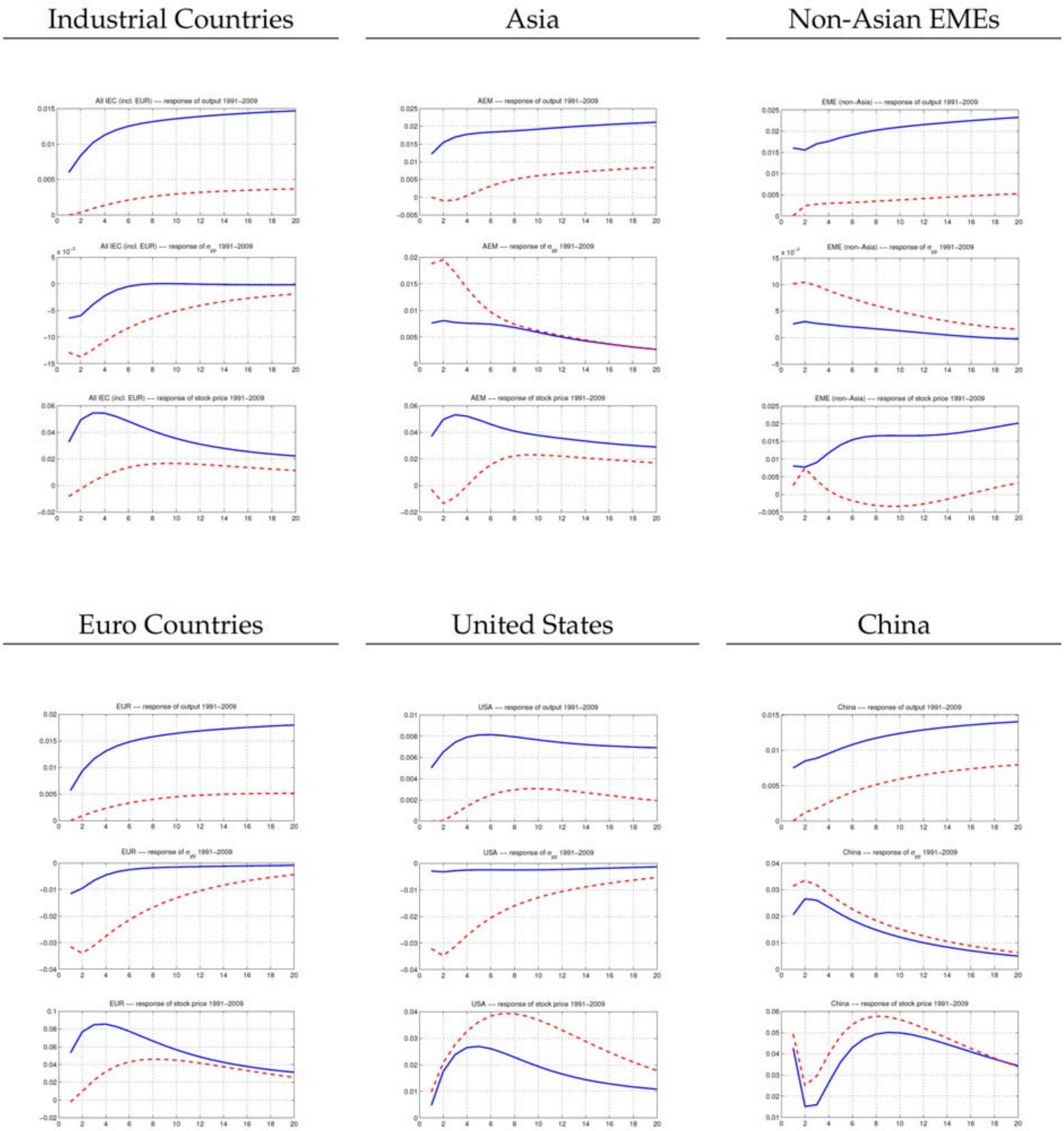


Figure shows impulse responses to the permanent (blue, solid line) and to the dispersion (red, dashed line) shocks for the period 1991-2009. The upper panel gives the response of output, the middle panel that of dispersion and the lower panel that of the stock price. Plotted impulse responses are averages for the respective country group.

Figure 3. Impulse Responses 1999-2009

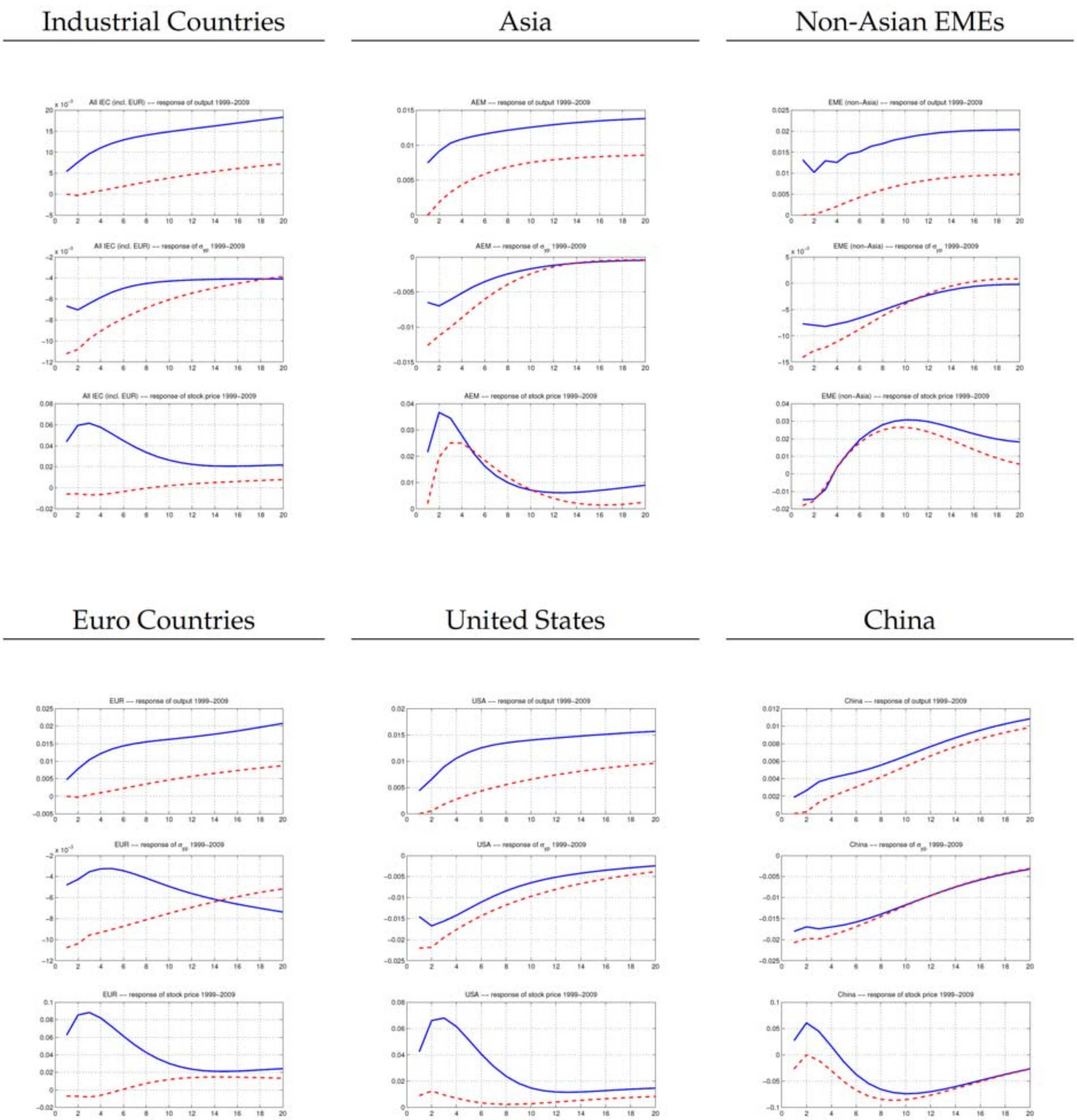


Figure shows impulse responses to the permanent (blue, solid line) and to the dispersion (red, dashed line) shocks for the period 1999-2009. The upper panel gives the response of output, the middle panel that of dispersion and the lower panel that of the stock price. Impulse responses are averages for the respective country group.

Figure 4. For the US (left) and China (right), the figure plots the dispersion shock identified from the individual country VARs against the permanent shock. Sample period is 1999-2009.

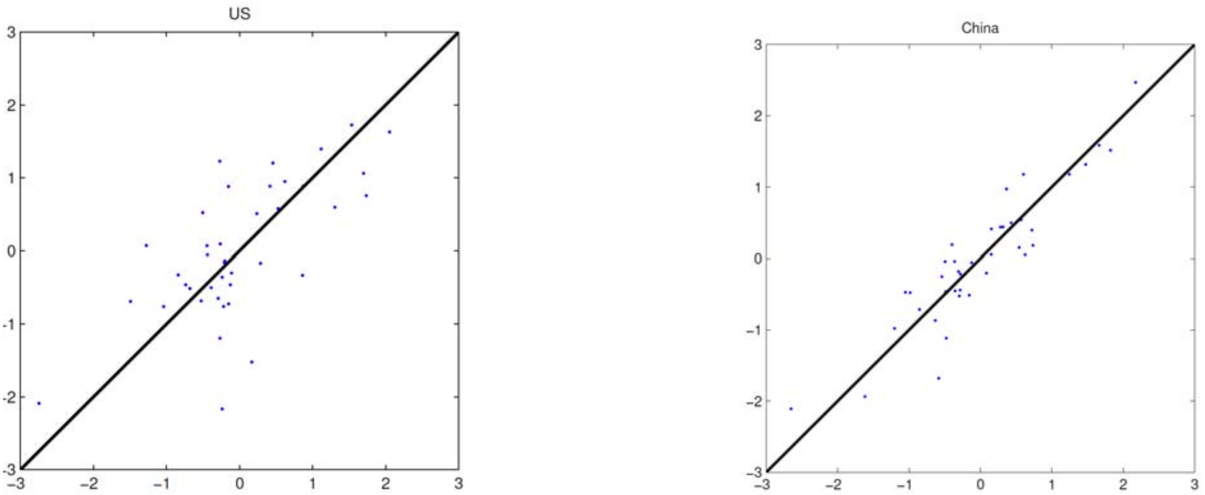


Figure 5. Cross-Country Dispersion in Growth and Return Expectations

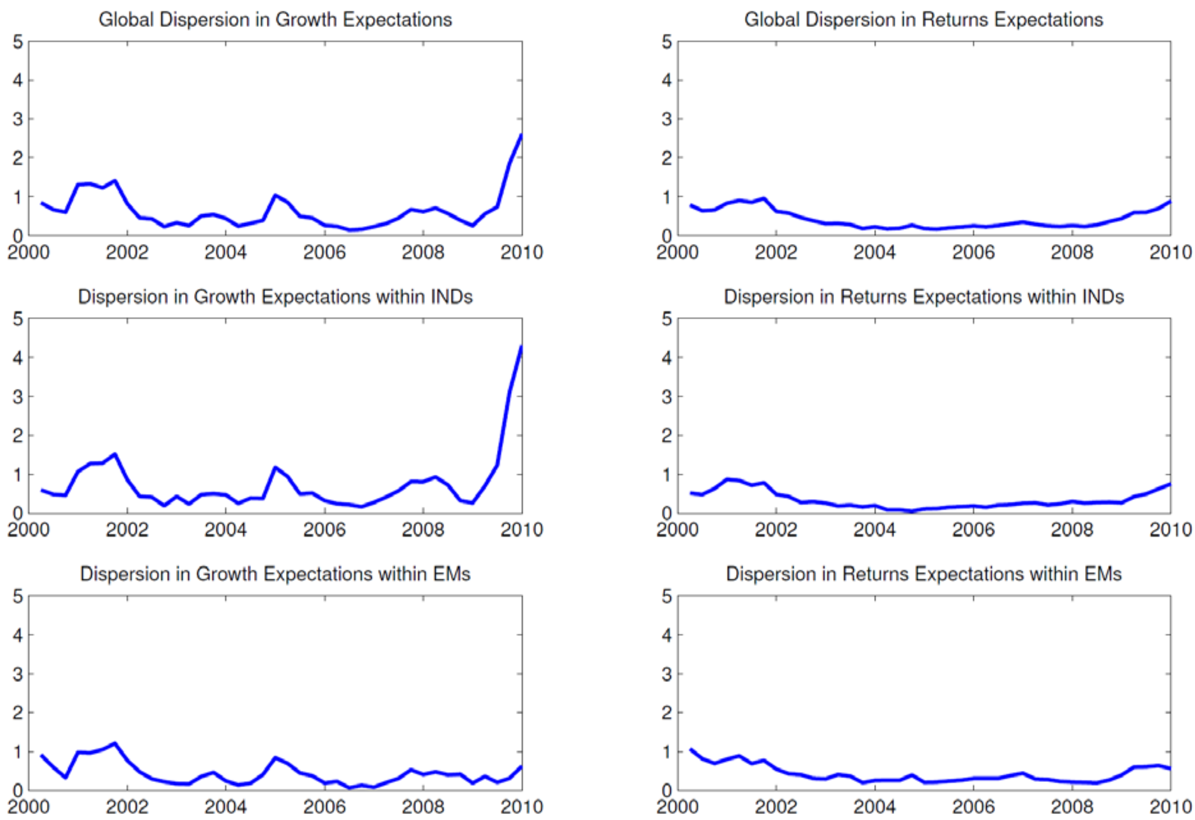
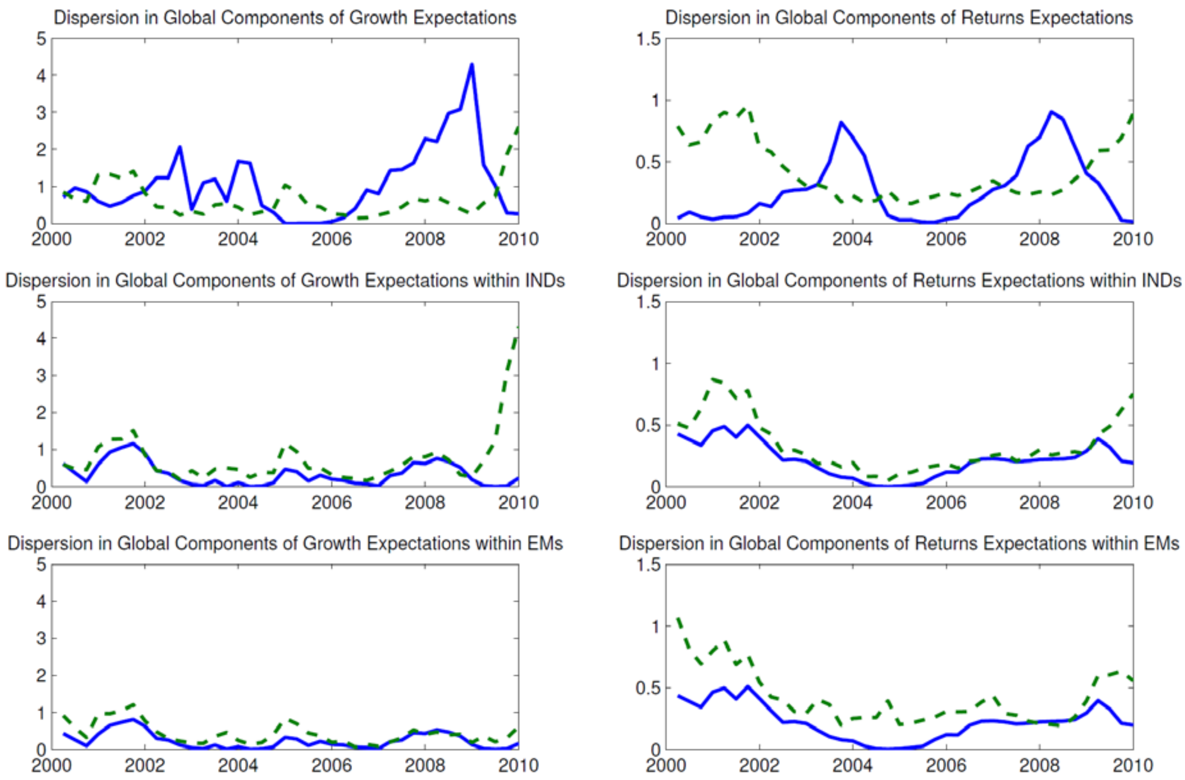


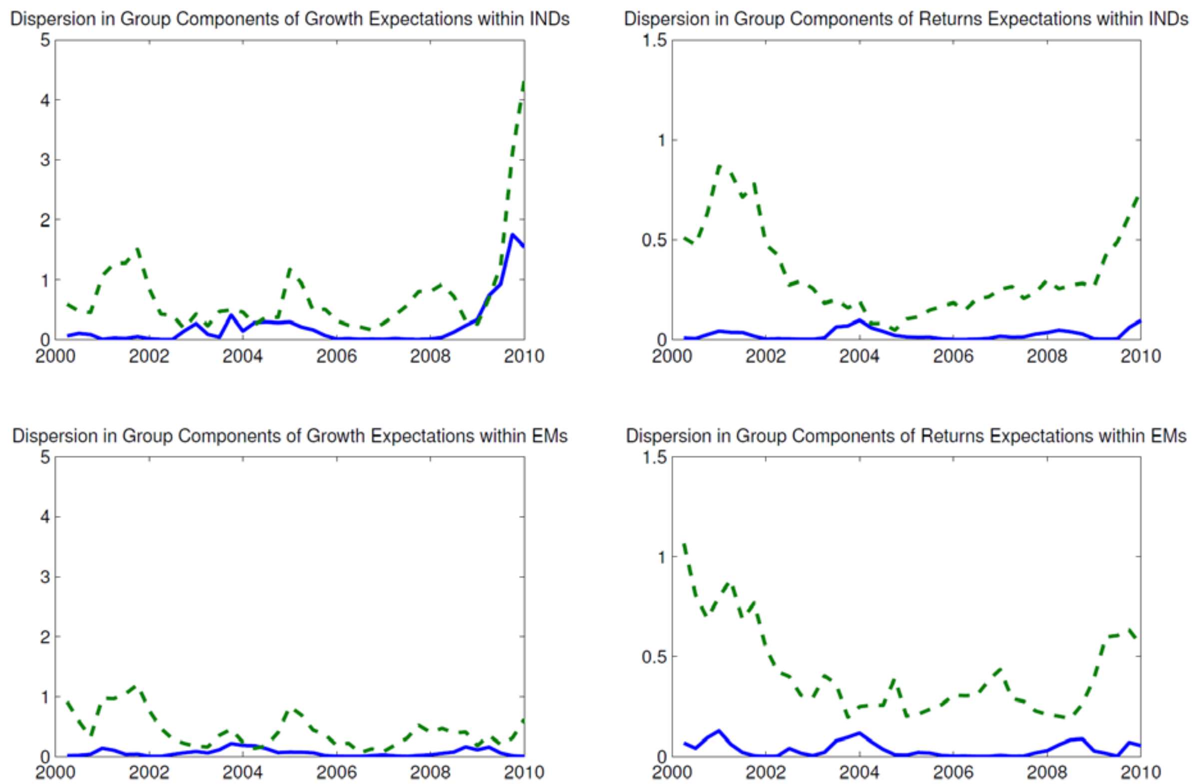
Figure shows dispersions in the VAR-based real or financial components for the period 1999-2009.

Figure 6. Dispersion in Global Components of Growth and Return Expectations



For both real and financial components in country news shocks based on the VAR decomposition, Figure shows cross-country dispersion in global components (blue, solid line) and the dispersion in the VAR-based real or financial components themselves (green, dashed line, as previously reported in Figure 5) for the period 1999-2009.

Figure 7. Dispersion in Group Components of News Shocks



For both real and financial components in country news shocks based on the VAR decomposition, Figure shows cross-country dispersion in group components (blue, solid line) and the dispersion in the VAR-based real or financial components themselves (green, dashed line, as previously reported in Figure 5) for the period 1999-2009.