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A Disaggregate Characterisation of Recessions

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April 2012

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A Disaggregate Characterisation of Recessions

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Abstract: The Great Recession has inspired renewed interest in analyzing the behaviour of the economy during recession episodes, and how these temporary events can shape the productive structure of the economy for long periods. Most of the existing literature focuses on recessions at the aggregate level. We provide evidence on the behavior of a large set of developed and emerging markets at the disaggregate level around recession dates. We analyze sectoral value added (VA), employment, productivity, concentration, and structural change, and whether patterns arise in a systematic way. We unveil a set of regularities in the behaviour of these variables for both sets of countries and depending on the productivity level and the level of external financial dependence of industries. We distinguish financial from normal recessions, and look at the patterns of the above variables according to the productivity level and the level of external financial dependence of industries. This study leads to a rich set of results grouped in 14 stylized facts. Most importantly, we found that recessions tend to be more industry specific events in emerging markets and economy-wide phenomena in developed economies. Moreover, the amplitude of the cycle for VA and productivity growth is larger for emerging markets. The opposite is generally true for employment growth. Also, industries with high dependence on external finance generally face higher contractions in VA growth the year of the recession, and those contractions are higher in the case of financial than in the case of normal recessions. Finally, concentration of both VA and employment is higher among emerging markets, and especially when looking at employment shares.

JEL Classification: E32, O14, O47
Keywords: recessions, sectoral restructuring, permanent productivity effects.

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1. Introduction

There is renewed interest in analyzing the behaviour of the economy during recession episodes, and how these temporary events can shape the productive structure of the economy having long-lasting impacts. This interest has gained importance with the recent 2008/09 financial crisis and global recession. In this paper, we make a first step towards understanding the behaviour of economies around recession periods at a more disaggregate level by looking at industrial data for a set of 37 developed and emerging economies. Our study addresses several important questions. First, are recessions more industry-specific or economy-wide events in developed and emerging economies? Second, depending on the one hand on the productivity level and on the other hand, on the level of external financial dependence, how do main macroeconomic variables and sectoral shares evolve during a recession in developed as compared to emerging markets? Third, how would those same variables evolve in the case of financial versus any other shock[1] related recessions? Fourth, do recession episodes lead to concentration/specialization of VA and employment shares? Finally, are country-level productivity changes driven by changes in the labour productivity growth within industries or by changes in the allocation of labour between industries?

To address these questions, we carry out a purely descriptive analysis about the evolution of a set of variables around recession episodes. We analyse a total of 120 recessions, among which 29 are identified as financial episodes, for 28 industries for a set of 37 developed and emerging economies. For each country, recessions are identified as observations where GDP displays negative growth. This enables us to detect which industries are facing a drop in VA growth in recession years and to analyse whether recession episodes tend to be more concentrated on a few industries or they are economy-wide events. We then focus on the evolution of Value Added (VA), employment, productivity, industrial concentration and sectoral shares, and distinguish for both emerging and developed economies between sectors depending on either their productivity level or their level of external financial dependence. The same analysis is performed when distinguishing between normal and financial recessions. Moreover, we make use of the Gini and HHI indexes to examine whether recessions are associated with any significant changes in the degree of concentration of VA and employment. Following Imbs and Wacziarg (2003), we can interpret concentration as 'specialization', that is, whether a significant proportion of output (inputs) in the economy is being produced (used) by a few industries. Finally, we make use of a shift-share analysis to identify whether changes in productivity growth are linked to differential growth of labour productivity or to the reallocation of labour between industries. Although it is not possible to extract meaningful causal or structural interpretations from our results, they provide a set of stylized facts that are useful for both policy and model building.

This allows us to provide an empirical investigation of the behaviour of an economy at a disaggregate level during recession episodes. Firstly, to our knowledge, no study has been made so far to characterize the disaggregate performance of economies around recessions. Lien (2006) characterizes research on the effects of recessions at an industrial or sectoral level a 'byproduct'. Secondly, as we will see later on, there is a wide body of theoretical literature on the reallocation effects of recessions (i.e., Hall, 1991, and Caballero and Hammour, 1994). There is also a body of empirical literature analysing the permanent effects of recessions, both normal and financial (i.e., Cerra and Saxena, 2008 and Reinhart and Rogoff, 2008a, 2009a). The former focuses on individual country experiences and is limited by data availability. This makes it difficult to analyse whether recessions have systematic effects that differ according to the level of firstly, economic development, secondly, industrial productivity, and thirdly, industrial external financial dependence. The latter focuses on aggregate time-series evidence, and aims at unveiling whether recovery after a recession is complete or partial. This evidence, although very relevant, cannot dissect what lies behind these potential permanent effects: reallocation of factors of production, within sector productivity effects, permanent changes in the level of

[1] We will be calling recessions that do not arise from financial shocks, 'normal' episodes.

sectoral investment and employment, etc. This study aims to fill this gap by analysing the effects of recessions on structural change and the sources of productivity growth by focusing on a large industry-level dataset for a large set of countries. Thirdly, our descriptive analysis enables us to report the characteristics of business cycle across industries in recession years. This examination is important for understanding the sources for business cycles. Many researchers have analysed the role of sector-specific factors in shaping business cycles in a closed economy setting. For instance, Long and Plosser (1987) use factor analysis to estimate the importance of disaggregate shocks in the US. Their results show that although disaggregated shocks are important, aggregate ones remain the most important source in explaining industrial output fluctuations. Similar results were shown by Norrbin and Schlagenhauf (1988, 1990) and Pesaran et al. (1993). This could also then have important effects on the coordination of international business cycles. Imbs (2004) argues that, given that individual industries are subject to common shocks, two countries with similar production structure will be subject to greater co-movement[2]. Clearly, understanding how economies respond to recessions at a disaggregate level is crucial for both policies and model-building. Finally, the literature has treated separately the analysis of business cycles in advanced and in emerging economies. In this study we compare the experience of both sets of countries. This comparison is particularly relevant as market institutions significantly differ across advanced and emerging economies, especially with respect to the development of financial markets. The development of financial markets is crucial both for the transmission of shocks to the economy and for the capability of an economy to support an efficient reallocation of resources across sectors.

This study led to a rich set of results grouped in 14 stylized facts. Here, we report the most important findings of this paper. Recessions tend to be more industry specific events in emerging markets and economy-wide phenomena in developed countries. While emerging markets display more dispersion in VA growth rates and hence more industry-specific recessions, this dispersion behaves counter-cyclically for developed countries and pro-cyclically for emerging markets. Moreover, whether industries are grouped in terms of their productivity level or their level of external financial dependence, the amplitude of the cycle for VA and productivity growth is larger for emerging markets. The opposite is generally true for employment growth. Also, overall, recovery in developed countries is mostly productivity driven, independently of the level of industrial productivity, while for emerging markets recovery is mostly employment driven. Importantly, in developed countries there seems to be a redistribution of VA and employment shares from the lowest productivity group to the rest of the industries. This only holds for employment shares in the emerging countries. Likewise, when looking at the level of external financial dependence, industries with high dependence on external finance generally face higher contractions in VA growth the year of the recession, and those contractions are higher in the case of financial than in the case of normal recessions. Also, industries with high dependence generally face a higher output growth after a recession than the industries with low dependence. Moreover, after a recession episode, VA shares are redistributed from the industries that have Low or No external financial dependence towards the other groups with higher dependence. This pattern holds for both the developed and the emerging countries. For employment shares the same pattern is observed but only for the developed economies.

Furthermore, the analysis comparing normal and financial recessions shows that when the latter occur, industries face larger contractions in VA growth, independently of whether industries are grouped in terms of productivity level or external financial dependence. Also, VA and productivity growth follows a W shaped pattern for both methodologies of grouping

[2] A minority of researchers have expanded this analysis to an international setting. Norrbin and Schlagenhauf (1996) show that although the industry-specific shock explains a small part of the variance of the forecast error, nation-specific shocks are more important in explaining variations in output. Recently, Karadimitropoulou and León-Ledesma (2012) highlighted the importance of understanding international output fluctuations from a multi-sector perspective. Their research showed that sectors play an important role in the transmission of international output fluctuations.

industries. That is, although one year after the recession growth has recovered to pre-recession levels, most of the industries face a larger contraction two years following the episode. Additionally, while in the occurrence of normal recessions there seems to be a redistribution of VA shares from the most productive to the less productive groups, in the case of financial crises the opposite is observed. However, employment shares are generally redistributed from the less productive group(s) to the most productive ones for both normal and financial recessions.

We also find that changes in industrial concentration around recessions are small for both groups of countries, but in general they lead to slightly higher concentration, especially for emerging countries. Finally, country-level productivity changes are mainly driven by changes in the labour productivity growth within industries, as the within-shift effect is positive for the majority of the countries considered.

Traditional business cycle literature models assume that cycles and growth are independent. However, there is a wide body of theoretical literature suggesting several mechanisms linking recessions and productivity growth.[3] Essentially, there are two broad groups characterising this literature. The first emphasizes the positive impact of cycle booms, due to productive activities or technical progress, on productivity growth. The second emphasizes the positive impact that recessions have on productivity. The first group is represented by the learning-by-doing model of Stadler (1990) and the R&D models of Aghion et al. (2005) and Barlevy (2007), pointing towards pro-cyclical productivity effects due to endogenous innovations.[4] The second group is represented by the Shumpeterian models of Caballero and Hammour (1994) and Hall (1991), which emphasize how recessions can eliminate unproductive firms under certain stringent conditions. In particular, the former study argues that recessions can have a "cleansing effect" on the economy by eliminating industries that have inefficient and unproductive units, leading to an increased average productivity. The latter research emphasizes on the opportunity cost view, which recognises that recession periods usually lead to reallocation of activities within firms, and argues that, given that the cost of eliminating production and asset values is lower, then the opportunity cost of restructuring will also be lower. However, if the entry of new firms in the market is slower during recessions, then the 'insulating effect' could substantially reduce the cleansing effect.[5,6]

A large number of empirical studies have also examined the effects of recessions on the productive structure of the economy, with special focus on whether those temporary events can have long-lasting impacts. For instance, Gali and Hammour (1993) show that, in the US, productivity growth in the medium- to long-run increases after a recession episode. In contrast, Caballero and Hammour (2005) suggest that the cumulative amount of restructuring in the manufacturing sector of the US falls when recessions occur. Cerra and Saxena (2008) study the aggregate effect of recessions and find that, far from being temporary phenomena, they can lead to permanent output losses. This conclusion appears to be supported by the experience of African countries according to Arbache and Page (2007 and 2010). Recently, Christopoulos and León-Ledesma (2009), also study the impact of recessions on frontier productivity and technical inefficiency. They find that the average cumulative impact of recessions on productivity up to four years after its end is negative and significant. There is also a large body of evidence on volatility and growth, as reviewed by Loayza et al. (2007), focusing on the impact of amplitude and duration of cycles on growth.

[3] For a survey on this literature, see Saint-Paul (1997).

[4] Malley and Muscatelli (1999) investigate the relationship between business cycles and productivity growth in US manufacturing. Using an exactly identified VAR model, they show that recessions can lead to total factor productivity growth through reorganization and restructuring effects. However, empirical evidence at the micro level, especially for the US, usually focuses on job flows data, as in Davis and Haltiwanger (1990, 1992, 1995) and in Davis et al. (1996).

[5] For more details on those two effects, see Caballero and Hammour (1994).

[6] As Barlevy (2002) explains, these effects do not highlight that recessions lead to welfare gains. For instance, a fall in aggregate productivity, which makes agents worse off, may also lead to the elimination of the less efficient productivity firms.

Moreover, Reinhart and Rogoff (2008a, 2009a) and Claessens et al. (2008) focus on how financial variables and asset prices interact with output contractions. They show that financial distress can lead to highly persistent (sometimes permanent) and deep recessions. Kaminsky and Reinhart (1999) and Eichengreen and Rose (1998) found similar results, that is, banking crises lead to a deceleration of aggregate output. Ceccheti et al. (2009) demonstrate that banking episodes coincide with large output contractions and recovery does take several years. In essence, those events seem to lead to long-lasting negative output effects. Reinhart and Rogoff (2008b) use historical data financial crises dating from the mid-fourteenth century default of England to the current subprime crisis in the US. Their study reveals a number of important facts. Episodes of serial default and high inflation are nearly universal and they are often associated with shocks to commodity prices, capital flows, interest rates and investors' confidence. Some years or decades separate major defaults and this pattern has given rise to the "this time is different" syndrome. This syndrome has been expanding as not only countries but also creditors and policymakers believe to have learned from previous mistakes and consequently, a default is unlikely to be faced.

Furthermore, a large body of literature focuses on the relationship between financial development and economic growth.[7] In essence, industries differ in their dependence on external finance. During recession period, the ability to acquire external finance is restricted. The literature distinguishes two main reasons for this effect, namely the balance sheet channel (Bernanke and Gertler, 1989 and 1990) and the bank lending channel (Bernanke and Blinder, 1998). In 1998, Rajan and Zingales identify the level of an industry's dependence on external finance (the difference between investments and cash generated by operations) from data on US firms. By assuming that capital markets in the US are relatively frictionless, this method allows them to identify an industry's technological demand for external financing. Then, by also assuming that such technological demands are carried over to other countries, they can use an industry's dependence on external finance as identified in the US as a measure of its dependence in other countries. The index provided measures an industry's external financial dependence in the 1980's. Their results show that industries that are more dependent on external finance grow faster in countries, where financial markets are more developed. Braun and Larrain (2005), using productivity growth for a large number of manufacturing industries for over 100 countries and a sample period of approximately 40 years, show that recessions hit harder industries that are more dependent on external finance. This effect is even more pronounced in countries with poor financial contractibility. Similarly, Kroszner et al. (2007) find that, during banking crises, sectors relying heavily on external finance will experience greater VA contractions in countries with deeper than in the ones with shallower financial systems.

The rest of the paper is organised as follows. Section 2 discusses the data. Section 3 describes recession episodes at the aggregate and sectoral level. Section 4 discusses the methodology used for the descriptive analysis. Section 5 presents the results and, finally, Section 6 concludes.

2. Data description

We make use of the UNIDO Industrial statistics database (INDSTAT). The INDSTAT, in accordance with Revision 2 of the International Standard Industrial Classification of All Economic Activities (ISIC), presents the dataset arranged at the 3-digit level of the ISIC code, which provides 28 industrial branches of the manufacturing sector (plus the total manufacturing aggregate). **Appendix A** lists the manufacturing industries with their associated ISIC codes. The fact that the dataset only covers the manufacturing sector is also its main disadvantage. It may have been possible to overcome this problem by making use of the EU KLEMS database,[8] which provides measures of output, value added, employment by skills, capital, energy and

[7] See Levine (1997, 2005) for a survey on this literature.

[8] See O'Mahony and Timmer (2009) and the web link at: http://www.euklems.net/

material inputs, and multi-factor productivity at the sectoral level for the European Union, the US, South Korea and Japan. However, the main disadvantage of this database is that it limits the sample coverage only to developed countries. Given our interest in performing a comparison between developed and emerging countries and covering a wide set of economies by income level and volatility, the UNIDO dataset is more suitable for this study.[9] It is also likely that input and output data in services sectors is also subject to greater measurement error. Moreover, we focus on a sector that is generally considered vital for a country's development process.

We also collected data for annual GDP growth from the World Bank WDI database in order to identify the recession years. The business cycle dating literature normally uses quarterly indicators as in the NBER definition of recessions, but quarterly data are not available for the majority of countries selected. Recessions are then identified as observations where GDP displays negative growth. We consider not only a definition of "deep recession" when the GDP percentage drop is larger than the mean drop of output in all the recessions faced by the other countries in the sample, but also a definition of deep recessions where the mean output drop for comparison is split depending on the country group (developed and emerging). This is because GDP growth tends to be more volatile in emerging economies. By comparing them to all countries, we would be considering too many deep recessions, especially because developed countries are over-represented due to data availability.[10]

The UNIDO dataset spans the 1963-2003 period. However, data availability for the 1963-1969 period and for 2003 is very limited, so we effectively limited the study to the 1970-2002 period. The sample selection of countries and periods from the UNIDO dataset was based on data availability. We used three criteria for the inclusion of countries. Firstly, we require at least 18 years of observations (half of the available sample) to ensure data was not available only for specific periods, especially when the country reaches a certain level of development. Secondly, we require data availability for at least 13 industrial branches of the manufacturing sector (roughly half the number of branches). Finally, every country in the sample must have experienced at least one recession according to the definition above. Based on those criteria, a total 37 countries were selected for the analysis, including 22 developed and 15 emerging economies. Because of discontinuities and gaps in the data, missing values of up to three years in the observations were recovered by data interpolation. Clearly, the number of sectors remains constant in each country over time; however, it does vary across countries.

VA data are given in nominal terms and UNIDO does not provide sectoral VA deflators. It does, however, contain industrial production data, which are in "volume" index number, as well as nominal output data for all countries. Using these data we then obtained production deflators for each branch and country. West Germany was the only country for which the "volume" index was not available and, therefore, we made use of the EU KLEMS dataset which provides the VA Manufacturing deflator at a disaggregated level from 1970 to 1991. VA was then deflated to obtain real VA (RVA) in the standard way: $RVA_{ijt} = \frac{VA_{ijt}}{PY_{ijt}}$, where *PY* is the output deflator, *j* is a country index, *i* is an industry branch index, and *t* is the time index. This also enables us to construct the real labour productivity level as the level of *RVA* in local currency per worker (*L*): $LP_{ijt} = \frac{RVA_{ijt}}{L_{ijt}}$. Data on capital stock is not available, and because investment data is very sparse and available only for a few countries, we cannot build measures of capital stock using standard inventories methods. Hence, although arguably a less satisfactory measure of productivity than TFP, labour productivity ensures less

[9] Imbs and Wacziarg (2003) report that measures such as industrial concentration and specialization for UNIDO tend to display less variation than databases containing other sectors such as agriculture, mining and services. However, this pattern is exclusive to rich countries.

[10] Deep recessions are only used for the analysis of the incidence, duration and amplitude of recessions at the aggregate level.

measurement error. Also, *LP* will reflect productivity effects coming from both supply and demand shocks.

3. Recessions: some descriptive analysis

3.1. Incidence, Duration and Amplitude of recessions

From 1970 to 2002, we observe 120 recessions for the 37 country sample as reported in **Table 1**. The Table reports the sample period for each country (column 2), the cumulative sum of the drop in GDP(column 3) and the mean GDP drop (column 4) during all recessions faced by each country, and column 5, 6, and 7 display the number of recessions, their average duration, and the number of deep recessions, respectively. 71 of those recessions took place within the developed group of countries and the remaining 49 were faced by the emerging markets, implying a similar number of recessions per country for both groups. However, sample periods are generally shorter for emerging markets, which implies a slightly higher incidence of recessions for that group. Iran underwent the largest number of recessions, 11, between 1970 and 2002 and this clearly places it first in the sum drop of output list. Indonesia experienced the largest average fall in GDP during recessions, but it only experienced one recession in 1997. Other countries like the UK and the US faced five recessions each during the time period considered with the impact on GDP growth being larger for the UK than for the US. Overall, we can see that the severity of recessions in emerging markets exceeds that of developed countries, which is a common feature analyzed in, for instance, Aguiar and Gopinath (2007). This happens not because of a higher incidence of recessions, but because, primarily, recessions in the emerging world are deeper. We can also see this by looking into the incidence of deep recessions. 32 out of the 120 recessions were classed as "deep" when considering all countries; 6 of them took place in developed countries and the remaining 26 in the emerging markets. In other words, out of the 120 recessions, 32 produced a higher drop in output than the mean drop of output faced by all countries (2.73%). When using developed and emerging country averages as reference groups, we see that for developed countries 29 out of 71 recessions were considered deep, whereas 20 out of 49 recessions are deep for emerging economies.

The average duration of recessions is very close for both groups of countries, only slightly shorter for the developed group. On average recessions last about one year and four months. However, it is likely that this figure is inflated because we only have annual data, setting a floor of one year to the minimum recession duration. Finland is the country facing the largest average duration due to the deep and long-lasting depression during the early 1990s. On average, also, recessions tend to happen every 9 years, although this number is slightly lower for emerging countries.

3.2. Industry Specific versus Economic Wide Recessions

An interesting feature to analyze in the data is whether recession episodes tend to be more concentrated on a few industries or they are economy-wide events. Note that, given that we identify recessions using GDP and our UNIDO data only contains manufacturing, this may tend to underestimate the incidence of recessions with a sector-specific bias. Nevertheless, comparisons between countries are still possible. Using our definition of recessions, we identify which industries are facing a drop in VA growth in recession years. This enables us to show the average percentage of industries in recession during the episode, and hence to classify recessions according to the percentage of industries in recession. That is, whether there are co-ordinated business cycles across industries in recession years.

Another metric to report the degree of business cycle coordination across industries is the standard deviation of the growth rate of VA across industries within a country. If recessions predominantly affect a few industries with little spillover effects over others, we would expect to see an increase in the dispersion of growth rates at recession episodes.

Table 2 shows the average percentage of industries facing a negative VA growth during recession years (t = REC) for each country and group. It also shows the percentage of recessions

for each country where different percentages of industry branches showed negative VA growth. This enables us to identify whether countries face predominantly industry-specific or economy-wide recessions. We can see that the average percentage of contracting industries at the time of recession episodes is slightly higher for developed than emerging countries, 67.43% and 63.98% respectively. While Canada and West Germany display the highest percentage of contracting industries at the time of the episode (85.89% and 81.48% respectively) Ireland displays the lowest percentage out of all the countries (35.19%). From the emerging countries group, we can see that in Colombia, Honk Kong, and Indonesia, 88.71%, 84.62% and 86.36% of industries, respectively, are contracting at t = REC. Malta, India and Jordan represent the other extreme in this group.

Perhaps more informative, in the second part of the table from which we can see that, in developed countries, 47.14% of the recessions were associated with VA contraction for 70% or more industries, 21.43% with between 60 and 70%, 12.86% with between 50 and 60% of the industries and, finally, only 18.571% with less than 50% contracting industries. In contrast, the numbers for emerging markets are consistently lower for high percentages of industries. In fact, almost 37% of recessions were accompanied by less that 50% of industrial branches contracting, with 16.327% of them being characterised by a contraction in less than 30% of the industrial branches. Perhaps unsurprisingly, given the low export diversification of these countries and their sensitivity to terms of trade shocks, we can conclude that emerging market recession tend to be more industry-specific as compared to developed countries, where co-ordination appears to be stronger.

Table 3 reports the average standard deviation of industrial VA growth for each country for the 7 years spanning before, during, and after a recession (that is, for t -3, t-2,..., t, t+1,..., t+3, with t being the recession year)[11]. Looking at the group averages at the bottom of the table, we can see that, consistent with the results in **Table 2**, the dispersion of industrial growth rates for emerging markets is always higher than for developed economies and of an order of magnitude of almost twice. **Figure 1** shows the average standard deviation of the VA growth rates together with the upper and lower quartile for each group of countries. This figure and **Table 2** show the behaviour of this metric around recession points. We can observe that, while the standard deviation for developed countries increases during recessions (and the year before),[12] for emerging markets the dispersion of growth rates actually increases during the recovery period. During recessions and the two preceding years, the dispersion of VA growth rates is actually smaller than for the rest of the years.

These results point to a marked difference between the behaviour of sectors across the two groups of countries: while emerging markets display more dispersion in VA growth rates and hence more industry-specific recessions, this dispersion behaves counter-cyclically for developed countries and pro-cyclically for emerging markets.

4. Methodology

4.1. Sectoral activity and shares

Good part of our descriptive analysis will focus on how economic activity at a sectoral level behaves around recessions episodes. We are particularly interested on the evolution of VA, employment, productivity, and VA and employment shares as indicators of sectoral reallocation. Given the definition of a recession discussed above, we plot the evolution of these variables for the 7 years that span the 3 pre-recession and the 3 post-recession years (*REC*-3 to *REC*+3).[13] The plots contain the average behaviour of the variable across all recessions for each country. We analyzed the results for each country and industry. However, to facilitate presentation, we only report averages for the two groups of developed and emerging countries.

[11] More on this in the next section.
[12] Eisfeldt and Rampini (2006) report a similar result that the dispersion of capital productivity among firms and of sectoral TFP are both countercyclical.
[13] Much like a standard "Burns-Mitchell" diagram.

Furthermore, because presentation and interpretation is obscured by the large number of industries and variables available, we also collapse industries in four groups depending on their (labour) productivity level. This is because a question of interest, rather than the specific branches themselves, is whether activity relocates between branches with different productivity characteristics. We classify industries into the following 4 categories: High, Medium-High, Medium-Low, and Low productivity. We used 2 different methodologies for this classification. The first simply ranks industries for each country (within) in terms of their productivity levels and assigns them into their corresponding groups by quartiles. The second methodology, rather than using a within country criterion, ranks industries by their level of productivity *relative* to the same industry in the US. That is, this classification normalizes by the standard dispersion in productivity that exists across different industries because of technical characteristics using the US as the reference country. Although there are some non-negligible differences between these two classification methods regarding the composition of branches, both gave similar results in terms of their behaviour around recession points. For this reason, we report here only the results using the first method.[14] Also, this classification is perhaps more interesting as it ranks industries according to their *within* country productivity level and is hence compatible with a definition of comparative advantage.[15] All variables were then averaged out for the industries in each group for both groups of developed and emerging countries.[16]

Moreover, Rajan and Zingales (1998) identify the level of an industry's dependence on external finance (the difference between investments and cash generated by operations) from data on US firms[17]. We make use of this index and collapse industries in four groups depending on the level of external financial dependence: Low to No external financial dependence, Medium-Low, Medium-High, and High external financial dependence. Given that their index provides a measure of an industry's external financial dependence in the 1980's, we assume that the same ordering will hold for the specific time period under examination in this study, 1970-2002. Importantly, we want to observe whether the depth of the recession and the speed of recovery alter for different levels of financial dependency, and whether this result is different between developed and developing countries.[18] All variables were then averaged out for the industries in each group for both groups of developed and emerging countries.

Finally, we distinguish between normal and financial recessions by externally identifying banking crises using Reinhart and Rogoff (2008a). Also, we compare financial episodes in developed and emerging economies. From the 120 recessions analysed in this study, 29 were identified as financial recessions, among which 19 took place in the developed economies and the remaining 10 occurred in the emerging markets. **Appendix B** shows the countries and years for which financial recessions took place. We then carry on the same analysis as above and compare the results on the one hand, with normal, i.e. non-financial, recessions and on the other hand, of developed and emerging countries.[19]

[14] The results from the second method are available on request.

[15] The classification of the industries included in each group of productivity for all countries is available upon request.

[16] Results were also obtained by arranging the recession plots by industry, but are not reported here for space reasons.

[17] In particular, assuming that capital markets in the US are relatively frictionless, this method allows them to identify an industry's technological demand for external financing. Then, by also assuming that such technological demands are carried over to other countries, they can use an industry's dependence on external finance as identified in the US as a measure of its dependence in other countries. The index provided measures an industry's external financial dependence in the 1980's.

[18] The classification of the industries included in each group of external financial dependence is available upon request.

[19] We also derive the evolution of all the variables for each industry in the case of normal versus financial recessions when averaging across all countries, together with the evolution of all variables for each industry for developed and emerging economies around financial episodes. Results are available upon request.

4.2. Gini and HHI Indexes

We also examined whether recessions are associated with any significant changes in the degree of concentration of VA and employment. We can interpret this concentration as "specialisation" as in Imbs and Wacziarg (2003), that is, whether a significant proportion of output (inputs) in the economy is being produced (used) by a few industries. By looking at VA and employment concentration, we can also infer the dispersion of productivity across industries. Whether recessions are associated with greater or lower specialisation, of course, will depend on institutions, availability of credit, labour market frictions, changes in the composition of demand, openness, etc. We make use of two different measures: the Gini coefficient and the Herfindahl-Hirschman Index.

The Gini coefficient uses information on how VA and Employment shares are distributed across the different industries. Employment shares have commonly been used in the empirical literature concerning sectoral specialization as a measure of sector size. However, making use of sectoral VA shares helps generalizing the evidence based on sectoral labor inputs.

A simple expression for the Gini index is based on the covariance between the ranked shares of VA or employment by industry, S_R, and rank that the industry occupies in the distribution of VA/Employment share, F. This rank takes a value between zero for the lowest VA/Employment share and one for the highest. The Gini index, varying between 0 for lowest and 1 for highest inequality, is then defined as this covariance is multiplied by 2 and divided through by the average VA/Employment share $\bar{S}_R$:

$$\text{Gini} = \frac{2Cov(S_R, F)}{\bar{S}_R} \tag{2}$$

The Herfindahl-Hirschman Index (HHI) is another indicator of the level of concentration/specialization among industries in a sector used in the industrial organisation literature. It is defined as the sum of the squared market shares of each industry branch in the sector. Again, we made use of both VA shares and employment shares to obtain the HHI. A decrease in the HHI indicates a decrease in concentration (a more diversified sector). The expression for HHI is then:

$$H = \sum_{i=1}^{N} S_i^2, \tag{3}$$

where S_i is the share (of VA or employment) of branch i in the manufacturing sector, and N is the number of branches. The HHI (H) ranges from 1/N to one. If all branches have an equal share, the reciprocal of the index shows the number of industries in the sector. The HHI takes into account the relative size and distribution of the industries in a sector and approaches zero when a sector consists of a large number of industries of relatively equal size. The HHI increases both as the number of industries in the market decreases and as the disparity in size between those industries increases. Because of this dependence on N, and given that countries in our sample have unequal numbers of branches, we prefer to use the normalized Herfindahl-Hirschman Index:

$$H^* = \frac{\left(H - 1/N\right)}{1 - 1/N}. \tag{4}$$

While the H ranges from 1/N to 1, H^* ranges from 0 to 1 regardless of the number of branches considered.

4.3. Accounting for Structural Change: a Shift-Share Analysis

Shift-share analysis is a descriptive technique to analyze the sources of productivity growth. First proposed by Maddison (1952), it shows how aggregate growth is mechanically linked to differential growth of labour productivity and the reallocation of labour between

industries. It has been widely applied for analysing the effect of industrial structural change on productivity growth (e.g. Fagerberg, 2000 and Peneder 2003) and microeconomic evidence on the sources of growth (e.g. Foster *et al*, 2001).

Let us define *LP* = Labour Productivity, VA = Value Added, *L* = Labour input, and i = industry index with i = (1,…,N). Then,

$$LP = \frac{VA}{L} = \frac{\sum_i VA_i}{\sum_i L_i} = \sum_i \left[\frac{VA_i}{L_i} . \frac{L_i}{\sum_i L_i} \right] \quad (5)$$

Define $S_i = \frac{L_i}{\sum_i L_i}$ as the share of industry *i* in total employment. Then we have that:

$$LP = \sum_i \left[LP_i . S_i \right] \quad (6)$$

Defining $\mathrm{D}LP = LP_1 - LP_0, \mathrm{D}S = S_1 - S_o$ and using equation (6), we have:

$$DLP = \sum_i \left[LP_{i0} DS_i + S_{i0} DLP_i + DLP_i DS_i \right] \quad (7)$$

We can express (7) in growth rate form:

$$\frac{DLP}{LP_0} = \sum_i \left[\frac{LP_{i0} DS_i}{LP_0} + \frac{S_{i0} DLP_i}{LP_0} + \frac{DLP_i DS_i}{LP_0} \right] \quad (8)$$

The percentage change in labour productivity between time $t = 0$ and $t = 1$ is hence decomposed into three distinct effects. The first component of eq. (8) is the so-called 'between-shift effect' and it measures the impact that changes in the allocation of labour between industries have on productivity growth. It will be positive if the share of high productivity industries increases in total employment by attracting more labour resources at the expense of low productivity industries. In other words, this term will reflect the ability of a country to reallocate labour resources from low to high productive industries.

The second term in (8) is the so-called 'within-shift effect' and it measures the change in productivity that would have prevailed if no change in sectoral shares had taken place between 0 and 1. That is, it measures only productivity gains that have occurred only within industries. Hence, this effect identifies the contribution from labour productivity growth weighted by employment shares at time 0.

Finally, the third effect is the so-called 'dynamic-shift effect'. It captures interactions between changes in sectoral structure and within productivity effects. This effect will be positive if changes in shares favour those industries where productivity is *growing*. Thus, the 'dynamic-shift effect' reflects whether a country reallocates its labour resources towards the fast growing productivity industries.[20]

5. Results

5.1. Sectoral activity and shares

As mentioned above, we present here graphical evidence on the behaviour of several variables of interest around recession dates. The results are presented grouping industries firstly, by levels of productivity, and secondly, by levels of external financing dependence. Using these two groupings, on the one hand, we distinguish between developed and emerging economies,

[20] These effects are also commonly associated to Baumol et al. (1985) *asymptotic stagnancy* theory, which views productivity growth as the result of changes in sectoral structure at different stages of development.

and on the other hand, between normal and financial recessions. We show evidence on the evolution of VA growth, employment growth, productivity growth, productivity level, and VA and employment shares from three years before (*REC-3*) to three years after (*REC+3*) the recession (*REC*).

5.1.1. Developed versus Emerging economies

(i) By levels of productivity for each group of countries

Figure 2 shows the evolution of averaged VA growth from REC-3 to REC+3 for developed and emerging countries. Both groups of countries display a V shaped pattern at the REC point. The amplitude of the cycle is larger for emerging markets for all groups of productivity levels. Note that, at t=REC, the lower the productivity level of an industry in developed countries the higher the contraction it will face. When comparing REC-3 to REC+3 values, we can see that neither emerging nor developed economies recover to pre-recession rates within the 3 years following the recession. Despite that fact, some notable differences exist. Emerging markets generally face larger contractions than the developed countries, except for the medium-high productivity level group. Moreover, while the two highly productive groups of industries face the largest drops in VA growth in developed countries, in the emerging economies it is the two lowest productive groups that seem to be affected the most by recession episodes in terms of recovery. In particular, for the developed countries the medium-high productivity group displays the largest contraction (≈2.5%) and for the emerging economies, it is the medium-low productivity group (≈3.6%).

Similarly, **Figure 3** displays the evolution of averaged employment growth from REC-3 to REC+3 for developed and emerging countries. Both groups of countries display a V shaped pattern around the recession time period, although the amplitude of the cycle is larger for developed countries. Moreover, the recovery in employment is much stronger for emerging than for developed economies, suggesting a higher degree of real wage flexibility in emerging economies.[21] For the majority of the groups, the deepest contraction is observed the year of the recession. However, notable exceptions exist. For the developed countries, the high and low productivity groups are lagging the recession by one year, while for the emerging economies the medium-high productivity group is leading the recession by one year. Moreover, on the one hand, the high productivity group of the emerging markets does not face negative growth throughout the 7 years of analysis and on the other hand, the low productivity group of the developed countries displays negative growth from REC-3 to REC+3. Importantly, when comparing pre- to post-recession values, this figure shows that on average, the majority of manufacturing sectors in developed countries face very persistent employment losses after a recession. The opposite is true for the emerging markets, as for any given productivity level, industries do on average recover to higher growth rates after the recession episode. Interestingly, while the two lowest productive groups of the emerging markets face the highest contractions in VA growth, they face the largest expansions in employment growth, although the latter are bigger than the former. This is also reflected by **Figure 4**, which displays the evolution of productivity growth. This graph reflects a combination of the VA and employment growth figures.

Overall, recovery in developed countries is mostly productivity driven, as the majority of the groups face long-lasting employment losses. In contrast, for emerging markets recovery is mostly employment driven, as all categories of productivity level face long-lasting employment gains together with long-lasting productivity losses. Moreover, we can see that productivity level catches-up immediately with pre-recession levels, except for the highly productive industries of the emerging countries, which do not reach pre-recession levels within the 3 years following the recession (**Figure 5**). Of course, the level is also driven by the trend, so it's not

[21] Agenor and Montiel (2008) stress in their textbook, on macroeconomics in developing countries, that emerging economies display higher real wage flexibility than developed economies.

possible to conclude that recessions do not have permanent effects unless we have a definition of the trend (i.e. what would productivity be with no recession).

Moreover, the evolution of averaged VA share per level of productivity is shown by **Figure 6.** Shares in general do not display very marked variation around the recession date. Some underlying trends appear to be dominating, especially for the developed countries. But, in general, in developed countries there seems to be a redistribution of VA shares from the lowest productivity group to the three remaining groups, albeit very small. The emerging economies are not characterized by any restructuring in VA shares after a recession episode, as all industries seem to have faced small gains in shares. Those results must be driven by particular countries facing higher than average gains in output shares. For instance, for the medium-low productivity group, Hungary and Indonesia display significant increases in output shares, while the majority of the remaining countries face slight falls in their VA shares. Similarly, in the low productive group it is Honk-Kong and Jordan that drive the average VA shares to increase, as their shares increased from ≈11.5% to ≈12.5% and from ≈7.4% to ≈8.6%, respectively.[22] Despite that we can see that the larger gains in output shares are faced by the lowest productive group of industries.

Moreover, employment share's evolution also shows that trend dominates the cyclical pattern for both developed and emerging economies (**Figure 7**). Overall, both developed and emerging countries, we can say that there is a redistribution of employment shares from the less productive group to the remaining industries. While the medium-high productive group gains most shares after a recession episode in developed countries, in the emerging markets it is the medium-low productive group facing the highest gain.

Finally, there is clear relationship between industrial productivity level and the distribution of VA and employment shares for emerging countries. In particular, the higher the productivity level of an industry the higher the average level of VA shares and the lower the average level of employment shares. This could be as a consequence of sectoral concentration if the manufacturing sector of emerging markets is more specialised for both VA and employment. Indeed, we will show later on that, although differenced are very small, emerging markets display higher sectoral concentration or specialization that developed countries.

(ii) By level of external financial dependence

The amplitude of the cycle is larger for emerging markets, independently of the level of external financial dependence of the industries (**Figure 8).** When comparing pre- to post-recession values, overall, emerging countries face large and persistent output losses, except for the group of industries which have medium-high external financial dependence. For the developed countries, the only group facing gains in VA levels is the Low to No external financial dependence, for which recovery occurs within the three years following the recession. The two groups with the highest external financial dependence also face the largest contractions from REC-3 to REC+3 (≈2.4). Moreover, industries with high dependence on external finance face larger contraction in VA growth in both developed and emerging countries. This result is in line with the ones found in Braun and Larrain (2005).

Figure 9 shows that on average developed countries are lagging the recession episode by one year for all groups of financial external dependence, except from the medium-high one. This is in contrast to the emerging markets where the largest contractions are in general coinciding with the recession's year.[23] Moreover, the amplitude of the cycle is larger for developed countries, except for those industries with high external financial dependence. As for VA growth, the industries with Low to No external financial dependence are the only group of the developed countries recovering to pre-recession levels after three years. In the emerging countries, the opposite pattern is observed.

[22] Results per country for each group of productivity level are available upon request.

[23] The Low to No external financial dependence seems to be leading the recession by one year, although only marginal difference exists between REC-1 and REC growth rates.

Combining the above results, we can see that, although only the medium-low dependence group of the developed countries faces permanent gains in productivity levels, recovery happens overall quicker in developed than in emerging economies (**Figure 10**). This result is of course confirmed by **Figure 11**, which shows the evolution of productivity levels. Clearly, recovery in the emerging markets is productivity driven in the Low to No external financial dependence group of industries, as it faces long-lasting employment losses together with productivity gains. For the remaining three groups (medium-low, medium-high, and high external financial dependence) recovery is employment driven, as those groups are characterised by gains in employment levels together with large and persistent productive losses. On the other hand, for the developed countries the pattern is vaguer. The recovery of the Low to No external financial dependence group is employment driven, while the one of the medium-low is productivity driven. For the two groups with the highest external financial dependence, recovery is as much productivity as employment driven, given that both groups face permanent losses in employment and productivity levels.

As for the previous grouping, the average evolution of VA and employment shares per level of external financial dependence do not display very marked variations around the recession date (**Figures 12 and 13, respectively**). In general, there seems to be a redistribution of shares from the industries that have No or Low external financial dependence towards the other three groups with higher dependence. This pattern holds for both the developed and the emerging countries, although for the latter only the medium-low category of industries seems to be gaining employment shares after a recession episode. As expected, developed countries, which are more open to international capital flows, have a larger average of shares in those industries that are medium-highly or highly dependent on external finance than the emerging markets. The opposite is true for the low dependence groups. Interestingly, as opposed to the previous results where industries were grouped in terms of productivity levels, there is no clear relationship between the level of industrial external financial dependence and the distribution of VA and employment shares for either emerging or developed countries. Therefore, sectoral concentration in emerging markets occurs according to industrial productivity levels.

5.1.2. Normal versus Financial Recessions

In this part we compare normal and financial recessions. Note that to compare results between the previous and the current analysis, one will have to look at the average evolution for all countries and all recessions. However, results are likely to present slight differences as averages are taken by country and not by the number of recessions or industries within a country. In other words, because we assume that countries in our sample are equally important we don't estimate weighted averages to account for the number of recessions in each industry and each category (productivity level or external financial dependence). For instance, because of missing data one country might have only 4 industries in each grouping instead of 7, which would be the case for a country which has no missing industries. If we were to perform a weighted average to account for the number of industries in each grouping, we would be assuming that industries in the former country are more "important" than industries in the latter. The same would hold for the number of recessions. Based on that, results are deemed to slightly differ from one analysis to the other.

(i) By levels of productivity

Figure 14 shows the evolution of average VA growth per level of productivity from REC-3 to REC+3 for all countries, when normal or financial recessions occur. For any given group of productivity level, we can see that contractions always take place at t=REC for both normal and financial recessions. However, those are larger for the case of financial recessions. Moreover, those type of episodes display a W shaped pattern, as growth at REC+1 is at higher levels than pre-recession, but during the following two years growth falls to lower levels. Therefore, when comparing REC-3 to REC+3 values, all industries seem to face losses in VA levels, except from those that have low productivity levels. This is the only group which recovers from financial recessions within three years. For normal recessions, the recovery is

even slower as none of the four groups displays post-recession growth higher than pre-recession one. Therefore, whatever the productivity level when normal recessions occur, industries face losses in VA values. This result is also supported by Reinhart and Rogoff (2009b) who found that during the year of the crises, emerging markets face a sharper fall in real GDP growth but a somewhat faster comeback to growth than advanced economies. Similar results are also presented by Calderón and Fuentes (2010). **Figure 25**, which compares financial recessions for emerging and developed economies, highlights some major differences between those two groups of countries. Firstly, the W shape pattern observed in **Figure 13** is mainly driven by the developed countries as, independently of the productivity group, industries seem to face major contractions two years after the recession. Secondly, most of the industries seem to recover financial recessions in emerging economies, while the opposite holds for the advanced countries. Finally, emerging markets face larger contractions at t=REC than developed countries.

Employment growth seems to be lagging the financial recessions by one year in the high and low productivity industries (**Figure 14**).[24] Overall, recovery happens immediately after a financial episode and the majority of the industries face large gains in employment levels. On the other hand, the recovery for normal recessions is much slower and three years after the episode growth has still not reached pre-recession levels. Clearly, whatever the productivity level of an industry when normal recessions occur, industries on average face permanent losses in employment levels.

Productivity growth displays the W shaped pattern for financial recessions, with the peaks usually happening at REC-1 and REC+1 and the troughs at REC and REC+2 (**Figure 15**). Again, this pattern is driven by the developed countries as we can see from **Figure 27**. When financial recessions occur, recovery is mostly employment driven for three out of four groups, namely the high, medium-high and low productivity level groups, as they are characterized by long-lasting employment gains together with long-lasting productivity losses. Normal recessions display a less volatile productivity growth around the year of the episode and gains in productivity level occur, independently of the industries' productivity level. For this type of recessions, recovery is as much productivity as employment driven as they face losses in both, except for the high productivity group for which recovery is clearly productivity driven.

Figure 17 shows the average VA share for all countries for normal and financial recessions. Although shares do not display much variation around the REC point, some cyclicality is observable especially for the two highest productive groups of industries. When normal recessions occur, there seems to be a redistribution of VA shares from the most productive groups to the low productive ones. For financial recession, VA shares are redistributed from the low productivity group to the remaining three, with the two middle productivity industries facing the biggest gains in VA shares. **Figure 29** suggests that emerging markets display more cyclicality than developed countries during a financial episode. Moreover, while for developed countries the redistribution in VA shares happens from the less productive to the most productive industries, the opposite is true for developed markets. Employment shares show more pronounced trends than in the case of VA shares (**Figure 18**). For financial recessions, the redistribution of employment shares happens in the same direction as for the VA shares. However, in the occurrence of normal recessions, industries in the two lowest productive groups lose shares and the ones in the two highest productive groups gain shares, which is the opposite pattern to the one displayed by the evolution of VA shares. **Figure 30** displays no major differences in the redistribution of employment shares for developed and developing countries.

(ii) By levels of external financial dependence

In this section, we present the evolution of the different variables for normal and financial recessions, with industries being ranked by their level of external financial

[24] As **Figure 26** shows this pattern is driven by the developed countries.

dependence. Clearly, the general picture follows very closely the one observed under the productivity level classification.[25]

Figure 20, displaying the evolution of VA growth, shows that, on average, the amplitude of the cycle is larger for financial than for normal recessions. However, the difference is much smaller for the industries that have medium-low or Low to No external financial dependence than the other two groups (1.5 percentage points for the Low to No external financial dependence industries, 0.7 percentage points for the medium-low group, 5.6 and 6.8 percentage points for the medium-high and high external financial dependence groups, respectively). Overall, industries with high external financial dependence face larger contractions in VA growth the year of the episodes, with contractions being larger for the case of financial recessions. In the case of normal recessions, industries do generally face losses in VA levels as post-recession growth is lower than pre-recession one. When financial episodes hit an economy, it seems that the medium-high and Low to No external financial dependence groups recover within 3 years following the recession. The opposite holds for the two remaining groups of industries.

Employment growth is lagging the financial recession episodes for the medium-low and Low to No external financial dependence groups (**Figure 21**). This type of recessions leads to gains in employment levels for all industries, except from the ones that have medium-low external financial dependence. For normal recessions, the largest contractions occur the year of the episode and in general industries face losses in employment levels. Only the medium-high external financial dependence group recovers to pre-recession growth levels (2.5% at REC-3 versus 3.1% at REC+3).

From the evolution of productivity growth plotted in **Figure 22** we can see that for the two lowest groups of external financial dependence industries, contractions at t=REC are larger when normal recession occurs, but post-recession growth is higher than pre-recession one. Therefore, industries that have medium-low or Low to No external financial dependence also face gains in productivity growth. Clearly, the recovery in these groups is mostly productivity driven, as they face long-lasting employment losses together with long-lasting productivity gains. The remaining two groups, which have higher dependence on external finance, face losses in productivity levels. While the recovery in the medium-high category is mostly employment driven, the one in the high dependence group is as much productivity as employment driven. For the case of financial recessions, recovery is mostly employment driven as the majority of the groups face long-lasting employment gains together with long-lasting productivity losses.

Shares do not display much variation around the recession points, especially for the case of normal recessions **(Figures 24** and **25** for VA and employment shares, respectively). As opposed to the previous results when industries were categorised in terms of productivity levels, normal recessions lead to a redistribution of VA shares from the 3 groups of industries with the lowest external financial dependence to the highly dependent industries. There is no particular patter characterising the redistribution of VA shares for the case of financial recessions. The exact opposite effects are observed for employment shares. This time, normal recessions do not display any particular distributional pattern, while for financial recessions, redistribution occurs from the industries that have no or low external financial dependence to the remaining groups with higher dependence.

5.2. *Sectoral concentration/specialisation*

Tables 4 to 7 present the Gini and HHI coefficients for sectoral VA and employment shares, respectively. Results are presented for all countries together with the averages for the developed and the emerging economies from 3 years before to 3 years after a recession episode.

[25] **Figure 31** to **Figure 36** compare the evolution of all variables and all groups of industries, ranked in terms of the level of external financial dependence, during financial episodes for developed and emerging countries. Results are very similar to the ones observed when industries were ranked in terms of productivity levels.

Overall, it is obvious that changes in sectoral specialisation/concentration are small. Despite that, some important patterns can be observed. When looking at the Gini coefficient two main conclusions can be drawn:

1. The manufacturing sector of developed countries is less specialised for both VA and Employment, when compared to emerging markets (0.488 versus 0.497 when using sectoral VA shares and 0.507 versus 0.517 when using sectoral employment shares as a measure of sector size).
2. For both developed and emerging countries, employment shares are in general more unequally distributed than VA shares. Although for emerging markets the gap between those two measures is marginally larger the three years before the recession, at t=REC and the three years following the recession this gap becomes larger for the developed economies. This implies that before the recession, productivity is more concentrated in emerging than in developed countries. However, at the recession year and the three years that follow productivity becomes more concentrated in developed than in emerging countries.

Moreover, when looking at the HHI index, results indicate that:

1. With the exception of a few countries like Singapore, Ecuador and Panama, all countries display low concentration (HHI<0.1) whether using sectoral employment or VA shares.
2. When using either the sectoral VA or employment shares to estimate the HHI, concentration is significantly higher among emerging markets than it is among developed countries (0.0502 versus 0.0385 and 0.0582 versus 0.0410, respectively).
3. As for the Gini coefficient, employment shares are in general more unequally distributed than VA shares. Therefore, productivity is more concentrated in emerging than in developed countries, as the gap between the two measures (VA and employment shares) is larger for the former group of countries throughout the seven years of analysis. Although the gap is slightly higher for emerging markets, after a recession this closes down much more for emerging than for developed countries.

When looking at the behaviour around recessions of either the Gini coefficient or the HHI index we can see that for developed countries both VA and employment shares result in a small increase of the concentration around the recession episode. The same is observed for emerging markets when using sectoral VA shares to measure concentration. However, when using employment shares to estimate the sectoral concentration, the Gini coefficient suggests that recessions lead to a minimal decrease in the concentration of sectors. Nevertheless, note that magnitude changes are in general relatively small.

5.3. Shift-Share analysis

In this section, we present the results obtained from the shift-share analysis. **Figure 37** plots the 3 effects, namely the within-, the between-, and the dynamic-shift effects, together with the recession dates shaded in red for all countries considered.

Overall, as expected, the within-shift effect is positive for the great majority of countries considered. This result implies that, on aggregate, reallocations of labour between industries (with different productivity levels) do not play an important effect on overall productivity growth. This effect appears to be dominating the structural components, which is in line with results reported in the literature.[26] Of course, at this level of aggregation, all structural shifts between firms within branches will be included in the within effect. To the extent that little resource shift happens between very different branches, we would then expect the between-shift effect to be of a smaller magnitude. The other two effects, the between- and dynamic-shift effects, are more volatile and can be either positive or negative.

One pattern that seems to distinguish developed and emerging countries is that the dynamic-shift plays a more important role in the latter than in the former. In particular, for developed countries while the within- and the between-shift effects seem to be compensating for each other's movements, the dynamic-shift effect usually moves around the 0% line. On the other hand, for emerging markets this effect is much more pronounced and appears to

[26] See for instance Fagenberg (2000) and Peneder (2003).

compensate for the "jumps" observed in the within- or the between-shift effects. There are of course exceptions to these observations with the most striking examples being the case of Israel, Finland, Netherlands, Spain and the UK. For those countries there is at least one year during the sample period where the dynamic-shift effect becomes a major structural component.

There does not seem to be a clear pattern between the structural components and the recession episodes. Therefore, one could perhaps conclude that sector-level reallocation doesn't seem to be associated with the state of the business cycle but rather with technological and institutional changes. Thus, at this level of disaggregation at least, this contradicts theories predicting that during recessions, there will be more restructuring (i.e., Hall (1991), and Caballero and Hammour (1994).

6. Conclusions

In this study, we characterize the behaviour of economies around recession periods at a more disaggregate level by looking at industrial data for a set of 37 developed and emerging countries. Industries are categorised in terms of on the one hand, their productivity level and on the other, their level of external financial dependence. Based on those groupings, we look at the evolution of VA, employment, productivity, industrial concentration and sectoral shares. We also distinguish between normal and financial recessions to examine the evolution of those same variables when industries are either ranked in terms of productivity levels or in terms of their level of external financial dependence. Moreover, we look at the incidence of economy-wide versus industry-specific recessions. Using the Gini coefficient and the HHI index, we measure concentration of VA and employment shares around the recession episodes. Finally, we identify the sources of productivity growth using shift-share analysis. Although it is not possible to extract meaningful causal or structural interpretations from our results, they provide a set of stylized facts that are useful for both policy and model building.

Fact 1: Recessions tend to have only slightly higher incidence and duration in emerging markets when compared with developed ones. However, the amplitude of these events is much larger leading, in general, to much deeper output losses. This confirms previous aggregate evidence (i.e., Aguiar and Gopinath, 2007, Loayaza et al., 2007, and Calderon and Fuentes, 2010).

Fact 2: Recessions tend to be more industry specific events in emerging markets and economy-wide phenomena in developed countries.

Fact 3: While emerging markets display more dispersion in VA growth rates and hence more industry-specific recessions, this dispersion behaves counter-cyclically for developed countries and pro-cyclically for emerging markets.

Fact 4: Whether industries are grouped in terms of their productivity level or their level of external financial dependence, the amplitude of the cycle for VA and productivity growth is larger for emerging markets. The opposite is generally true for employment growth. The lower variability in employment in emerging economies suggests a higher degree of real wage flexibility in these countries.

Fact 5: In developed countries, the two highly productive groups of industries display the slowest comeback in VA growth after a recession, while in the emerging economies it is the two lowest productive groups that seem to be affected the most.

Fact 6: Overall, recovery in developed countries is mostly productivity driven, independently of the level of industrial productivity, while for emerging markets recovery is mostly employment driven.

Fact 7: In developed countries there seems to be a redistribution of VA and employment shares from the lowest productivity group to the rest of the industries. This only holds for employment shares in the emerging countries.

Fact 8: Industries with high dependence on external finance generally face higher contractions in VA growth the year of the recession, and those contractions are higher on the one hand, for the emerging countries when compared to developed economies, and on the other hand, in the case of financial than in the case of normal recessions.

Fact 9: After a recession episode, VA shares are redistributed from the industries that have Low or No external financial dependence towards the other groups with higher dependence. This pattern holds for both the developed and the emerging countries. For employment shares the same pattern is observed but only for the developed economies.

Fact 10: When financial recessions occur, industries face larger contractions in VA growth, independently of whether industries are grouped in terms of productivity level or external financial dependence.

Fact 11: While in the occurrence of normal recessions there seems to be a redistribution of VA shares from the most productive to the less productive groups, in the case of financial episodes the opposite is observed. However, employment shares are generally redistributed from the less productive group(s) to the most productive ones for both normal and financial recessions.

Fact 12: Concentration of both VA and employment is higher among emerging markets, and especially when looking at employment shares. Overall, productivity is more concentrated in emerging than in developed countries. However, the Gini coefficient suggests that at the recession and the three following years, productivity becomes more concentrated in developed than in emerging countries.

Fact 13: Changes in industrial concentration around recessions are small for both groups of countries, but in general they lead to slightly higher concentration.

Fact 14: Productivity growth is mostly driven by within-branch productivity gains, confirming previous aggregate evidence (i.e., Fagenberg, 2000 and Peneder, 2003). For emerging markets, there is a non-negligible dynamic-shift effect too. However, the relation between recessions and productivity decomposition is not clear cut. One could conclude with caution that at this level of disaggregation, sector-level reallocation doesn't seem to be associated with the state of the business cycle but rather with technological and institutional changes.

Table 1: List of countries and descriptive analysis of recessions

Country	Sample Period	Sum Drop of Output	Mean Drop of Output	Nb. of REC	Aver. Duration of REC	Nb. of Deep Recessions
Australia	1970-2001	-3.012	-1.506	2	1.000	0
Austria	1970-2002	-0.669	-0.167	4	1.000	0
Belgium	1970-2001	-2.568	-0.856	3	1.000	0
Canada	1970-2002	-4.953	-2.477	2	1.000	1
Chile	1970-1998	-31.233	-6.247	5	1.667	4
Colombia	1970-1999	-4.204	-4.204	1	1.000	1
Denmark	1970-1991	-3.432	-0.686	5	1.667	0
Ecuador	1970-2002	-11.546	-2.887	4	1.500	1
Finland	1970-2002	-10.899	-3.633	3	3.000	2
France	1970-2002	-1.886	-0.943	2	1.000	0
Germany	1970-1991	-1.834	-0.917	2	1.000	0
Greece	1970-1998	-14.062	-2.344	6	1.500	1
Honk Kong	1973-2002	-6.026	-6.026	1	1.000	1
Hungary	1970-2002	-19.347	-3.225	6	2.000	3
India	1970-2002	-5.787	-2.894	2	1.000	1
Indonesia	1970-2002	-13.127	-13.127	1	1.000	1
Iran	1970-2002	-54.708	-4.973	11	2.500	6
Ireland	1970-2001	-0.672	-0.336	2	1.000	0
Israel	1970-2002	-1.574	-0.525	3	1.000	0
Italy	1970-2002	-2.979	-1.490	2	1.000	0
Japan	1970-2002	-3.416	-1.139	3	1.500	0
Jordan	1979-2002	-15.304	-7.652	2	2.000	1
Korea	1970-2001	-8.342	-4.171	2	1.000	1
Malaysia	1970-2002	-8.481	-4.241	2	1.000	1
Malta	1975-2000	-0.612	-0.612	1	1.000	0
Netherlands	1970-1993	-1.797	-0.899	2	2.000	0
New Zealand	1970-1987	-7.775	-1.555	5	2.000	1
Norway	1970-2001	-0.173	-0.173	1	1.000	0
Panama	1970-2000	-19.680	-6.560	3	1.500	2
Portugal	1970-2002	-8.443	-2.111	4	1.333	1
Singapore	1970-2002	-5.219	-1.740	3	1.000	0
Spain	1970-2002	-1.165	-0.583	2	1.000	0
Sweden	1970-2000	-6.046	-1.209	5	1.667	0
Turkey	1970-1997	-7.739	-2.580	3	1.500	1
UK	1970-2002	-6.910	-1.382	5	1.667	0
US	1970-2002	-3.058	-0.612	5	1.250	0
Zimbabwe	1970-1995	-22.422	-4.484	5	1.250	2
ALL		**-8.590**	**-2.734**	**120**	**1.365**	**32**
Developed		**-4.207**	**-1.240**	**71**	**1.345**	**6 (All) / 29 (DV)**
Emerging		**-15.237**	**-4.925**	**49**	**1.394**	**26 (All) / 20 (EM)**

Table 2: Industry-specific and economy-wide recessions

Countries	% of industries in recession at t=REC	*% of recessions leading X% of industries to be in recession*					
		0 - 30%	*30 - 40%*	*40 - 50%*	*50 - 60%*	*60 - 70%*	*70 - 100%*
Australia	78.571					50.000	50.000
Austria	57.143		25.000	25.000		25.000	25.000
Belgium	73.333				33.333		66.667
Canada	88.889						100.000
Denmark	60.714		20.000			60.000	20.000
Finland	62.821			33.333	33.333		33.333
France	58.000			50.000		50.000	
West Germany	81.481						100.000
Greece	61.905			33.333		50.000	16.667
Ireland	35.185	50.000		50.000			
Israel	56.667	33.333					66.667
Italy	75.000						100.000
Japan	77.778				33.333		66.667
Netherlands	63.043				50.000	50.000	
New Zealand	50.000	25.000			25.000	50.000	
Norway	75.000						100.000
Portugal	57.407			25.000	25.000	25.000	25.000
Singapore	75.362					33.333	66.667
Spain	75.926				50.000		50.000
Sweden	71.429	20.000					80.000
UK	72.857				20.000	20.000	60.000
US	75.000				20.000		80.000
Total Dv	***67.432***	***5.714***	***2.857***	***10.000***	***12.857***	***21.429***	***47.143***
Chile	57.857	20.000	20.000		20.000		40.000
Colombia	85.714						100.000
Ecuador	65.385	25.000					75.000
Honk Kong	84.615						100.000
Hungary	59.615	16.667	16.667			16.667	50.000
India	44.643	50.000				50.000	
Indonesia	86.364						100.000
Iran	51.818	36.364	9.091	9.091	9.091		36.364
Jordan	46.875		50.000			50.000	
Korea	75.926					50.000	50.000
Malaysia	69.231					50.000	50.000
Malta	41.667			100.000			
Panama	61.111			66.667			33.333
Turkey	63.095		33.333			33.333	33.333
Zimbabwe	65.833			20.000	20.000	20.000	40.000
Total Em	***63.983***	***16.327***	***10.204***	***10.204***	***6.122***	***14.286***	***42.857***
Total Dv&Em	***65.708***	***10.084***	***5.882***	***10.084***	***10.084***	***18.487***	***45.378***

Table 3: Standard Deviation of VA growth across industries

Countries	REC-3	REC-2	REC-1	REC	REC+1	REC+2	REC+3
Australia	6.264	4.864	6.524	7.883	13.347	14.824	7.453
Austria	16.334	12.878	12.612	30.415	13.966	35.136	30.385
Belgium	12.233	16.183	25.146	16.619	10.459	13.424	10.125
Canada	15.812	8.873	9.017	8.853	8.978	9.533	20.513
Chile	24.203	30.651	26.318	34.293	38.020	21.524	23.328
Colombia	15.386	13.690	13.299	16.072			
Denmark	8.131	8.619	13.517	13.272	11.959	10.158	10.018
Ecuador	16.958	21.766	19.651	30.866	37.432	31.835	72.742
Finland	15.425	14.323	11.834	12.624	12.371	13.530	13.949
France	8.789	11.301	11.148	14.664	6.929	6.983	10.793
West Germany	10.977	9.756	18.718	8.508	7.797	11.882	8.464
Greece	11.909	14.713	20.910	14.648	15.301	12.872	14.321
Honk Kong	31.115	14.900	26.255	11.769	15.653	19.582	15.887
Hungary	14.991	16.149	16.685	17.883	90.128	100.481	102.054
India	23.047	12.379	16.731	18.238	18.493	27.172	13.718
Indonesia	14.200	15.055	25.710	25.213	33.843	35.903	30.012
Iran	22.953	19.776	19.677	20.407	19.296	19.465	22.025
Ireland	13.041	11.053	10.592	19.275	12.863	10.116	19.159
Israel	10.251	7.960	8.588	9.217	17.094	10.339	7.018
Italy	10.527	11.682	11.037	7.824	13.614	9.748	7.813
Japan	6.040	6.828	8.624	9.166	8.948	10.238	11.718
Jordan	43.197	37.799	33.967	36.952	29.196	22.294	29.247
Korea	17.386	15.175	14.196	16.626	15.591	11.146	10.570
Malaysia	12.902	25.304	18.923	16.334	31.661	20.326	19.125
Malta	32.835	20.106	18.586	16.285	20.058	15.684	19.970
Netherlands	10.704	7.778	20.170	20.118	9.872	10.693	11.801
New Zealand	25.226	10.873	11.728	8.840	10.640	8.110	9.331
Norway	11.647	18.993	20.760	26.451	10.481	12.332	10.504
Panama	66.774	39.170	28.475	25.678	26.612	36.760	39.027
Portugal	18.556	15.415	19.110	18.141	15.646	24.376	29.217
Singapore	14.356	10.991	15.632	16.760	18.616	15.440	13.076
Spain	25.101	10.679	13.283	11.370	10.829	8.390	9.174
Sweden	11.258	11.260	15.109	11.747	13.438	12.060	9.972
Turkey	20.027	19.781	19.160	16.422	30.648	30.790	19.555
UK	9.577	8.170	7.606	8.972	9.563	7.111	8.910
US	6.845	6.524	6.322	7.969	6.156	7.542	6.017
Zimbabwe	10.841	9.977	12.022	14.169	12.225	14.984	16.041
Av. Dv & Em	***17.455***	***14.903***	***16.423***	***16.771***	***18.826***	***18.966***	***19.806***
Av. Dv	***12.682***	***10.896***	***13.545***	***13.788***	***11.767***	***12.493***	***12.715***
Av. Em	***24.454***	***20.779***	***20.644***	***21.147***	***27.924***	***27.196***	***28.887***

Table 4: Gini Coefficient using sectoral employment shares

Countries	REC-3	REC-2	REC-1	REC	REC+1	REC+2	REC+3
Australia	0.50382	0.50667	0.50488	0.50425	0.50173	0.50786	0.51206
Austria	0.47391	0.47282	0.46994	0.47288	0.47188	0.46864	0.47148
Belgium	0.50541	0.50819	0.50727	0.48678	0.46537	0.44896	0.44738
Canada	0.44626	0.44940	0.44858	0.44872	0.45053	0.45110	0.45718
Denmark	0.51490	0.51645	0.51947	0.52346	0.52475	0.53259	0.53567
Finland	0.51073	0.51490	0.51756	0.51900	0.52050	0.52049	0.52107
France	0.44110	0.44416	0.44656	0.44944	0.44976	0.45039	0.44690
West Germany	0.50013	0.50072	0.50577	0.50980	0.51296	0.51483	0.51854
Greece	0.50384	0.50601	0.50719	0.50182	0.50053	0.50278	0.50142
Ireland	0.48975	0.49445	0.49971	0.50133	0.50800	0.51485	0.51285
Israel	0.45364	0.46061	0.46354	0.46857	0.47863	0.50242	0.50604
Italy	0.46835	0.46814	0.46524	0.46694	0.46555	0.46626	0.46816
Japan	0.52240	0.52362	0.52755	0.52788	0.52909	0.53171	0.53229
Netherlands	0.50999	0.51250	0.50217	0.49253	0.49602	0.49970	0.50996
New Zealand	0.54326	0.54461	0.54514	0.54566	0.54962	0.55060	0.55100
Norway	0.56466	0.56309	0.56446	0.56491	0.57509	0.57868	0.58009
Portugal	0.51534	0.51629	0.51583	0.51312	0.51259	0.51173	0.51653
Singapore	0.62451	0.63084	0.63147	0.63028	0.62969	0.63689	0.64785
Spain	0.43851	0.44122	0.44375	0.43671	0.44036	0.44363	0.44276
Sweden	0.57463	0.57758	0.57943	0.58281	0.58422	0.58550	0.58759
UK	0.49722	0.49748	0.50046	0.50229	0.50283	0.49771	0.49982
US	0.48443	0.48771	0.49062	0.49154	0.49071	0.49268	0.49538
Av. Gini DV	***0.50395***	***0.50625***	***0.50712***	***0.50640***	***0.50729***	***0.50955***	***0.51191***
Chile	0.50243	0.49154	0.50281	0.50539	0.50739	0.51548	0.51528
Colombia	0.51504	0.51943	0.52280	0.54017			
Ecuador	0.44211	0.43796	0.44340	0.44198	0.43495	0.43367	0.43789
Honk Kong	0.50266	0.48701	0.47425	0.46330	0.46122	0.46541	0.48242
Hungary	0.46785	0.46342	0.46075	0.45837	0.45718	0.45988	0.45959
India	0.64926	0.64318	0.63930	0.63830	0.64247	0.64371	0.64060
Indonesia	0.48020	0.47682	0.46539	0.46226	0.48015	0.48208	0.45064
Iran	0.57697	0.57132	0.56549	0.56008	0.55618	0.55683	0.55687
Jordan	0.43109	0.43047	0.42031	0.42837	0.44232	0.44580	0.44841
Korea	0.51313	0.50966	0.51259	0.50836	0.51335	0.51243	0.51535
Malaysia	0.55120	0.55656	0.55221	0.54922	0.56183	0.54146	0.54049
Malta	0.53020	0.52275	0.51681	0.52268	0.51925	0.52856	0.51113
Panama	0.60192	0.60123	0.61167	0.61613	0.62310	0.63075	0.63892
Turkey	0.55676	0.55657	0.55647	0.55902	0.55818	0.55386	0.55282
Zimbabwe	0.47755	0.47424	0.47965	0.49730	0.48034	0.48005	0.47767
Av. Gini EM	***0.51989***	***0.51614***	***0.51493***	***0.51673***	***0.51699***	***0.51786***	***0.51629***

Table 5: Gini Coefficient using sectoral VA shares

Countries	REC-3	REC-2	REC-1	REC	REC+1	REC+2	REC+3
Australia	0.46232	0.46608	0.47363	0.47741	0.50087	0.50044	0.49596
Austria	0.42426	0.43057	0.42799	0.42255	0.43637	0.42690	0.42094
Belgium	0.44847	0.44834	0.44677	0.44506	0.43842	0.45121	0.46367
Canada	0.46829	0.47134	0.47062	0.46905	0.46550	0.46408	0.46098
Denmark	0.51691	0.51369	0.52061	0.53786	0.53785	0.53571	0.53082
Finland	0.51541	0.50756	0.51185	0.51902	0.53214	0.55240	0.56160
France	0.42668	0.42796	0.41477	0.41945	0.42514	0.43079	0.43614
West Germany	0.46115	0.46587	0.48053	0.48467	0.48536	0.48847	0.49119
Greece	0.47939	0.48178	0.49568	0.49623	0.49957	0.49950	0.49625
Ireland	0.54449	0.55579	0.56902	0.58267	0.60322	0.61904	0.62913
Israel	0.42574	0.42432	0.43156	0.44240	0.44912	0.43175	0.43002
Italy	0.42198	0.41726	0.41873	0.42215	0.42460	0.43043	0.42740
Japan	0.50108	0.50612	0.50923	0.51880	0.52828	0.53203	0.53179
Netherlands	0.49709	0.50167	0.50031	0.49600	0.49950	0.49962	0.49230
New Zealand	0.44491	0.44383	0.44352	0.45237	0.45386	0.45710	0.46146
Norway	0.50879	0.51257	0.51507	0.49858	0.50149	0.48736	0.48063
Portugal	0.44174	0.43972	0.43958	0.43359	0.43077	0.43070	0.41555
Singapore	0.67558	0.69091	0.71029	0.69571	0.69495	0.68751	0.68796
Spain	0.43273	0.42293	0.43012	0.43455	0.42502	0.42371	0.42391
Sweden	0.56974	0.56819	0.56442	0.56881	0.57008	0.57396	0.57667
UK	0.43677	0.43732	0.44367	0.44982	0.45192	0.45237	0.44827
US	0.46228	0.46690	0.46640	0.47285	0.47085	0.47525	0.47652
Av. Gini DV	***0.48026***	***0.48185***	***0.48565***	***0.48816***	***0.49204***	***0.49320***	***0.49269***
Chile	0.53426	0.51514	0.52638	0.55159	0.54869	0.55504	0.56115
Colombia	0.55224	0.53203	0.54842	0.56783			
Ecuador	0.54217	0.54290	0.51760	0.54374	0.55225	0.53288	0.53859
Honk Kong	0.42448	0.40425	0.39587	0.40138	0.44422	0.44699	0.43767
Hungary	0.43280	0.43488	0.43814	0.44147	0.45148	0.45869	0.46842
India	0.51819	0.51826	0.53066	0.53416	0.54651	0.53772	0.52826
Indonesia	0.44330	0.43947	0.47211	0.46034	0.42988	0.43930	0.41678
Iran	0.51771	0.51501	0.51546	0.51539	0.51732	0.51902	0.51646
Jordan	0.36952	0.37858	0.38535	0.39382	0.39437	0.39353	0.40690
Korea	0.44051	0.44717	0.45737	0.47424	0.49680	0.49973	0.49648
Malaysia	0.48627	0.50065	0.51955	0.52405	0.54065	0.55190	0.53421
Malta	0.52396	0.50074	0.52056	0.52103	0.52207	0.54433	0.53778
Panama	0.60482	0.59246	0.59817	0.62167	0.63404	0.62347	0.61795
Turkey	0.47058	0.46091	0.46999	0.47698	0.48733	0.49863	0.49406
Zimbabwe	0.46824	0.47652	0.48869	0.49776	0.49773	0.49708	0.48729
Av. Gini EM	***0.48860***	***0.48393***	***0.49229***	***0.50170***	***0.50452***	***0.50702***	***0.50300***

Table 6: HHI index using sectoral employment shares

Countries	REC-3	REC-2	REC-1	REC	REC+1	REC+2	REC+3
Australia	0.03231	0.03265	0.03245	0.03319	0.03360	0.04534	0.04573
Austria	0.02621	0.02610	0.02568	0.02608	0.02602	0.02573	0.02620
Belgium	0.08023	0.08062	0.08065	0.06097	0.04731	0.03970	0.03930
Canada	0.02287	0.02315	0.02299	0.02324	0.02388	0.02391	0.02467
Denmark	0.03789	0.03833	0.03941	0.04076	0.04099	0.04295	0.04384
Finland	0.03369	0.03455	0.03536	0.03579	0.03610	0.03677	0.03758
France	0.02696	0.02751	0.02795	0.02851	0.02874	0.02895	0.02857
West Germany	0.03701	0.03739	0.03878	0.03963	0.04062	0.04075	0.04183
Greece	0.04105	0.04105	0.04127	0.04074	0.04057	0.04076	0.04013
Ireland	0.04319	0.04374	0.04362	0.04384	0.04472	0.04463	0.04318
Israel	0.03269	0.03400	0.03476	0.03613	0.03858	0.04439	0.04567
Italy	0.02827	0.02818	0.02678	0.02714	0.02688	0.02687	0.02737
Japan	0.03754	0.03793	0.03881	0.03909	0.03943	0.04007	0.04040
Netherlands	0.03926	0.03997	0.03780	0.03572	0.03675	0.03779	0.03985
New Zealand	0.05598	0.05685	0.05826	0.05835	0.06145	0.06200	0.06260
Norway	0.04312	0.04282	0.04339	0.04365	0.04627	0.04692	0.04834
Portugal	0.04789	0.04767	0.04682	0.04590	0.04569	0.04541	0.04672
Singapore	0.09061	0.09463	0.09667	0.09428	0.09547	0.11103	0.12269
Spain	0.02379	0.02439	0.02496	0.02376	0.02478	0.02527	0.02506
Sweden	0.04432	0.04491	0.04506	0.04560	0.04578	0.04578	0.04602
UK	0.03189	0.03197	0.03265	0.03317	0.03316	0.03201	0.03236
US	0.02811	0.02876	0.02935	0.02941	0.02916	0.02947	0.02994
Av. HHI DV	***0.04022***	***0.04078***	***0.04107***	***0.04022***	***0.04027***	***0.04166***	***0.04264***
Chile	0.03952	0.03729	0.03988	0.04136	0.04356	0.04800	0.04828
Colombia	0.04255	0.04404	0.04579	0.05023			
Ecuador	0.06078	0.05993	0.06545	0.06578	0.06079	0.06062	0.06520
Honk Kong	0.06233	0.05489	0.04977	0.04716	0.04562	0.04695	0.05305
Hungary	0.03164	0.03200	0.03315	0.03363	0.03413	0.03518	0.03518
India	0.09127	0.08897	0.08636	0.08474	0.08453	0.08515	0.08421
Indonesia	0.03665	0.03706	0.03543	0.03494	0.03730	0.03783	0.03315
Iran	0.08054	0.07648	0.07313	0.07156	0.07029	0.06967	0.06924
Jordan	0.04274	0.04328	0.04015	0.04239	0.04577	0.04659	0.04600
Korea	0.04288	0.04179	0.04121	0.04084	0.04161	0.04119	0.04024
Malaysia	0.06181	0.06750	0.06409	0.06565	0.07163	0.05788	0.05462
Malta	0.08391	0.08107	0.07019	0.07731	0.07585	0.07904	0.07056
Panama	0.10911	0.10586	0.11157	0.11689	0.13196	0.13369	0.12684
Turkey	0.05484	0.05395	0.05376	0.05519	0.05597	0.05616	0.05701
Zimbabwe	0.03392	0.03374	0.03532	0.04356	0.03611	0.03557	0.03541
Av. HHI EM	***0.05830***	***0.05719***	***0.05635***	***0.05808***	***0.05965***	***0.05954***	***0.05850***

Table 7: HHI index using sectoral VA shares

Countries	REC-3	REC-2	REC-1	REC	REC+1	REC+2	REC+3
Australia	0.02645	0.02686	0.02819	0.02994	0.04865	0.04680	0.04539
Austria	0.02022	0.02085	0.02040	0.02002	0.02174	0.02054	0.01992
Belgium	0.04208	0.04138	0.04147	0.04231	0.03879	0.04273	0.04490
Canada	0.03162	0.03160	0.03144	0.03107	0.03032	0.02968	0.02856
Denmark	0.03880	0.03811	0.04030	0.04477	0.04476	0.04419	0.04374
Finland	0.04458	0.04192	0.04221	0.04386	0.04816	0.05363	0.05430
France	0.02609	0.02630	0.02360	0.02474	0.02720	0.02789	0.02782
West Germany	0.02979	0.03175	0.03398	0.03491	0.03475	0.03396	0.03613
Greece	0.03243	0.03352	0.03564	0.03663	0.03731	0.03839	0.03708
Ireland	0.05067	0.05180	0.05546	0.05865	0.06466	0.06833	0.07057
Israel	0.03533	0.03553	0.03760	0.04062	0.03925	0.02707	0.02665
Italy	0.02157	0.02067	0.02126	0.02183	0.02229	0.02361	0.02358
Japan	0.03334	0.03446	0.03512	0.03665	0.03964	0.03995	0.03921
Netherlands	0.03689	0.03866	0.03851	0.03754	0.03818	0.03744	0.03566
New Zealand	0.03165	0.03194	0.03339	0.03661	0.03758	0.03826	0.04034
Norway	0.03109	0.03175	0.03254	0.02845	0.02845	0.02665	0.02569
Portugal	0.02558	0.02436	0.02325	0.02217	0.02293	0.02355	0.02099
Singapore	0.12835	0.14189	0.15014	0.12802	0.12222	0.12781	0.12215
Spain	0.02355	0.02206	0.02395	0.02429	0.02261	0.02203	0.02226
Sweden	0.04454	0.04443	0.04365	0.04421	0.04337	0.04338	0.04365
UK	0.02458	0.02467	0.02546	0.02575	0.02543	0.02557	0.02483
US	0.02882	0.02957	0.02881	0.02922	0.02862	0.02911	0.02948
Av. HHI DV	***0.03673***	***0.03746***	***0.03847***	***0.03829***	***0.03941***	***0.03957***	***0.03922***
Chile	0.04349	0.03971	0.04364	0.05060	0.04884	0.05201	0.05381
Colombia	0.04968	0.04433	0.04744	0.05398			
Ecuador	0.10049	0.10050	0.08091	0.10252	0.11957	0.10366	0.10318
Honk Kong	0.03783	0.03307	0.03220	0.03345	0.04273	0.04375	0.04290
Hungary	0.02265	0.02400	0.02802	0.03026	0.03346	0.03452	0.03424
India	0.03538	0.03707	0.03963	0.04393	0.04816	0.04270	0.03840
Indonesia	0.02731	0.02623	0.03437	0.03058	0.02474	0.02537	0.02344
Iran	0.04863	0.04671	0.04682	0.04700	0.04830	0.04932	0.04820
Jordan	0.02302	0.02459	0.02652	0.02961	0.02996	0.02873	0.03156
Korea	0.03033	0.03148	0.03278	0.04108	0.04467	0.04415	0.04701
Malaysia	0.05278	0.06113	0.07127	0.07668	0.08590	0.09531	0.07439
Malta	0.07348	0.05285	0.05443	0.05122	0.05334	0.05824	0.05225
Panama	0.10539	0.09673	0.09437	0.11332	0.12817	0.11871	0.11063
Turkey	0.02727	0.02673	0.02789	0.02878	0.03096	0.03171	0.03001
Zimbabwe	0.03026	0.03235	0.03492	0.03697	0.03723	0.03722	0.03501
Av. HHI EM	***0.04720***	***0.04517***	***0.04635***	***0.05133***	***0.05543***	***0.05467***	***0.05179***

Figure 1: Standard Deviation of VA growth across industries

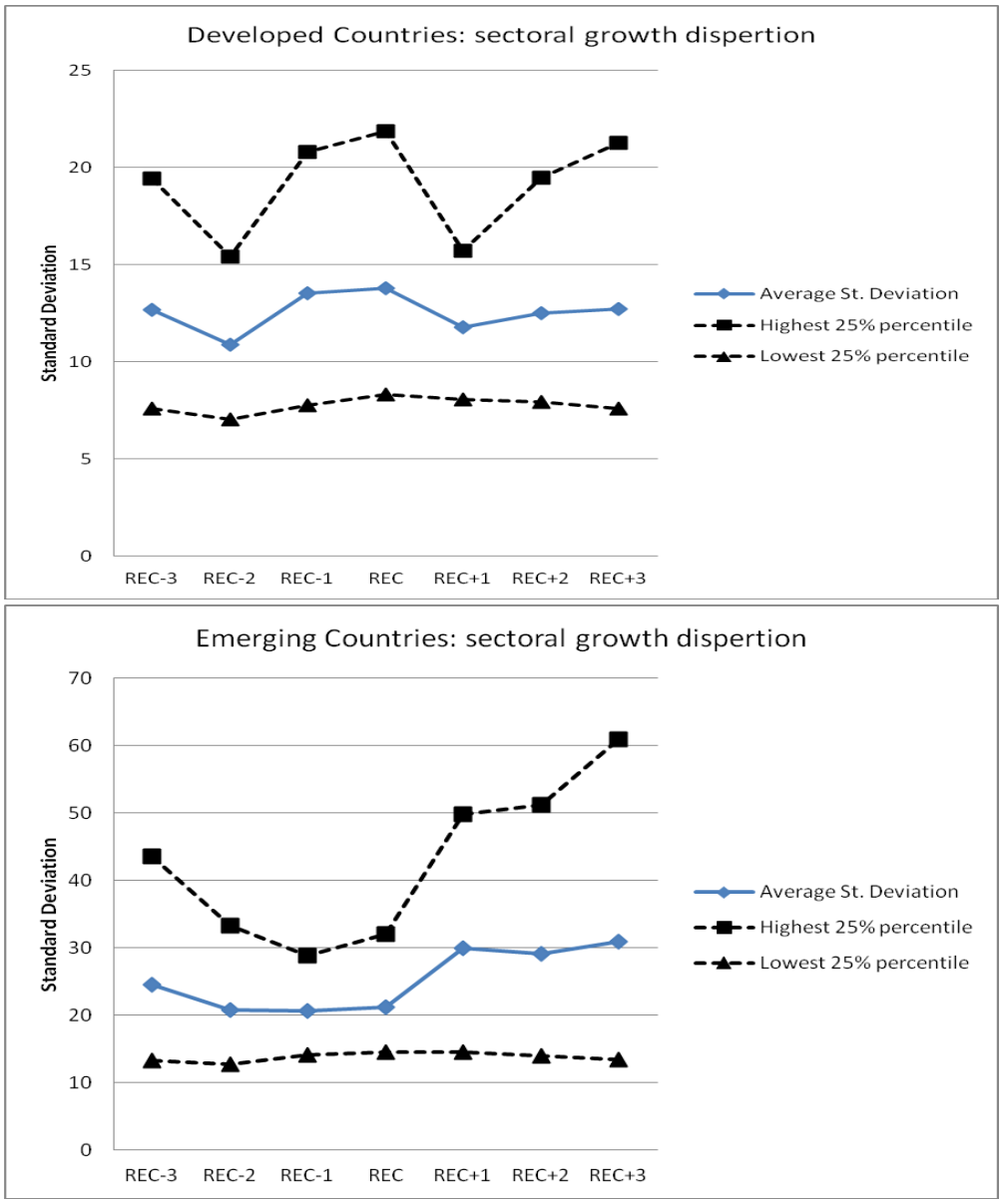


Figure 1: Average VA Growth per level of productivity for Developed and Emerging Countries

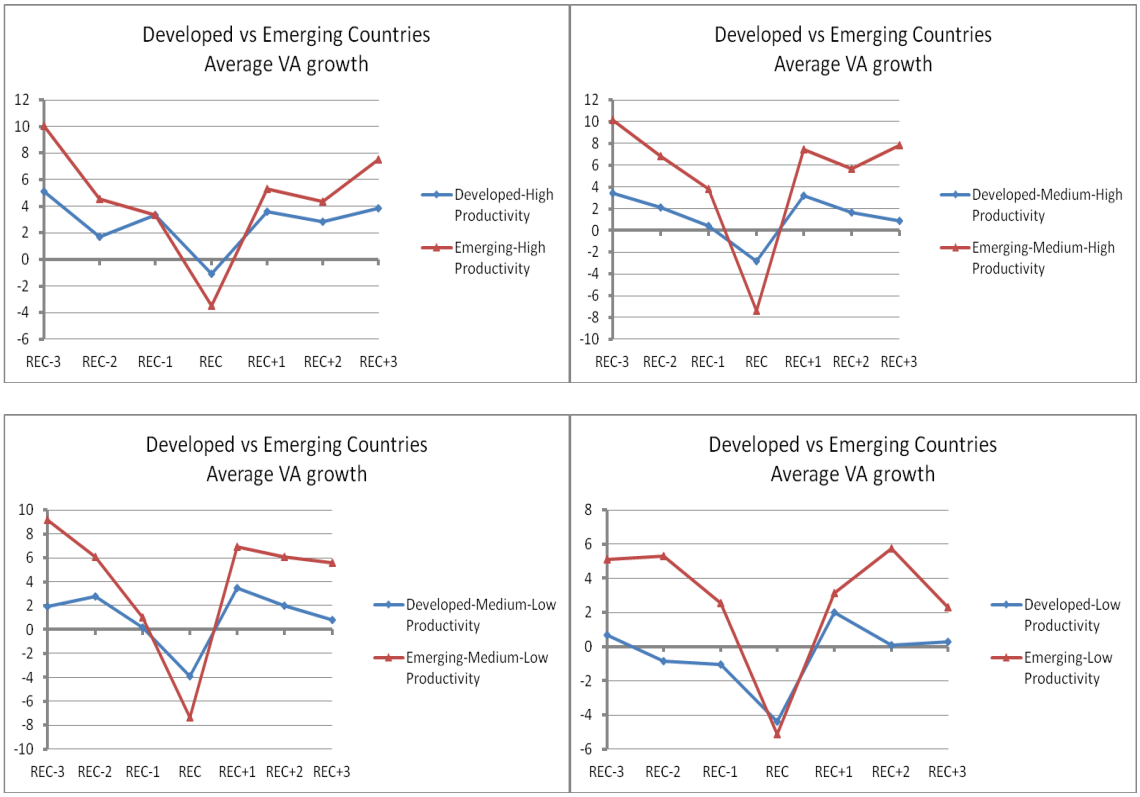


Figure 2: Average Employment Growth per level of productivity for Developed and Emerging Countries

Figure 3: Average Productivity Growth per level of productivity for Developed and Emerging Countries

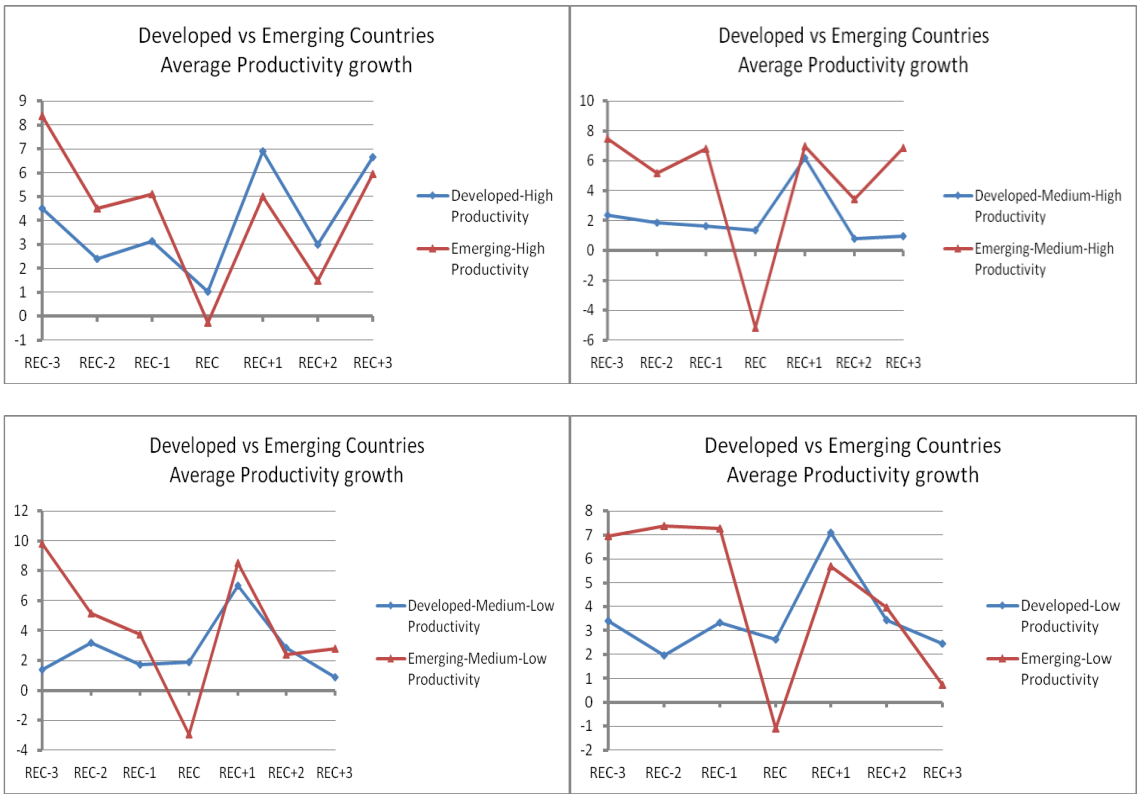


Figure 4: Average Productivity Level per level of productivity for Developed and Emerging Countries

Figure 5: Average VA Share per level of productivity for Developed and Emerging Countries

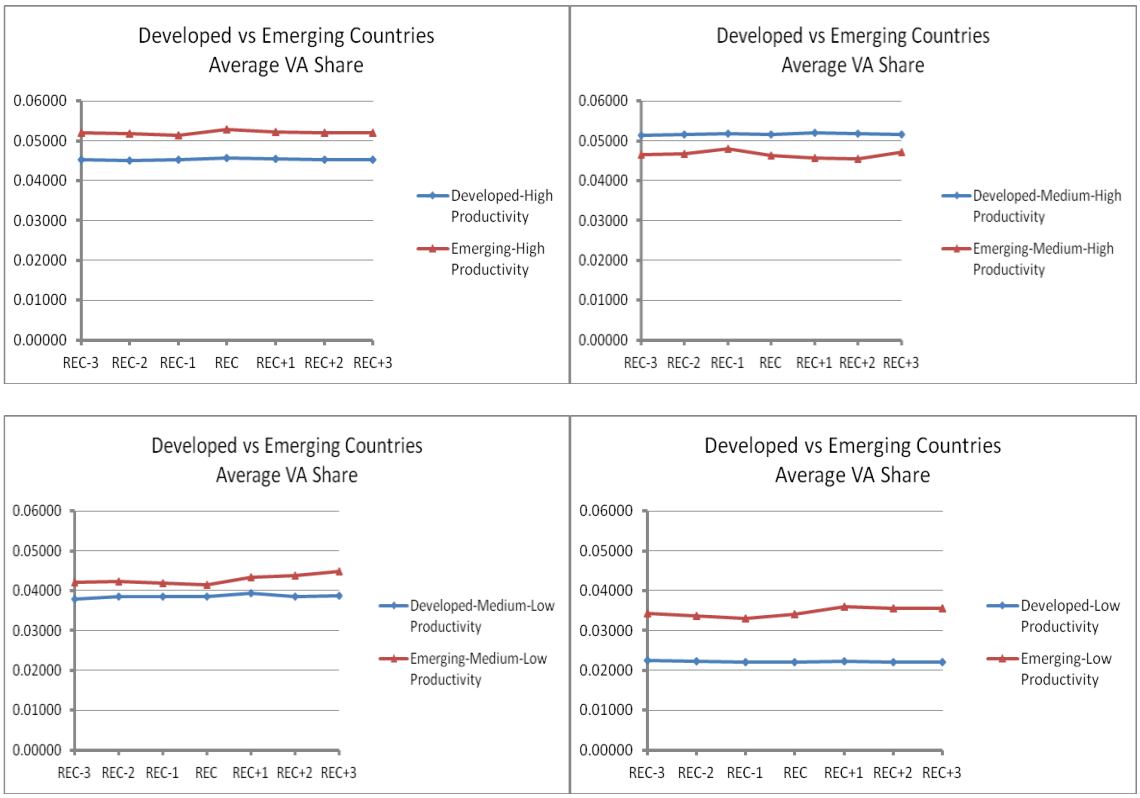


Figure 6: Average Employment Share per level of productivity for Developed and Emerging Countries

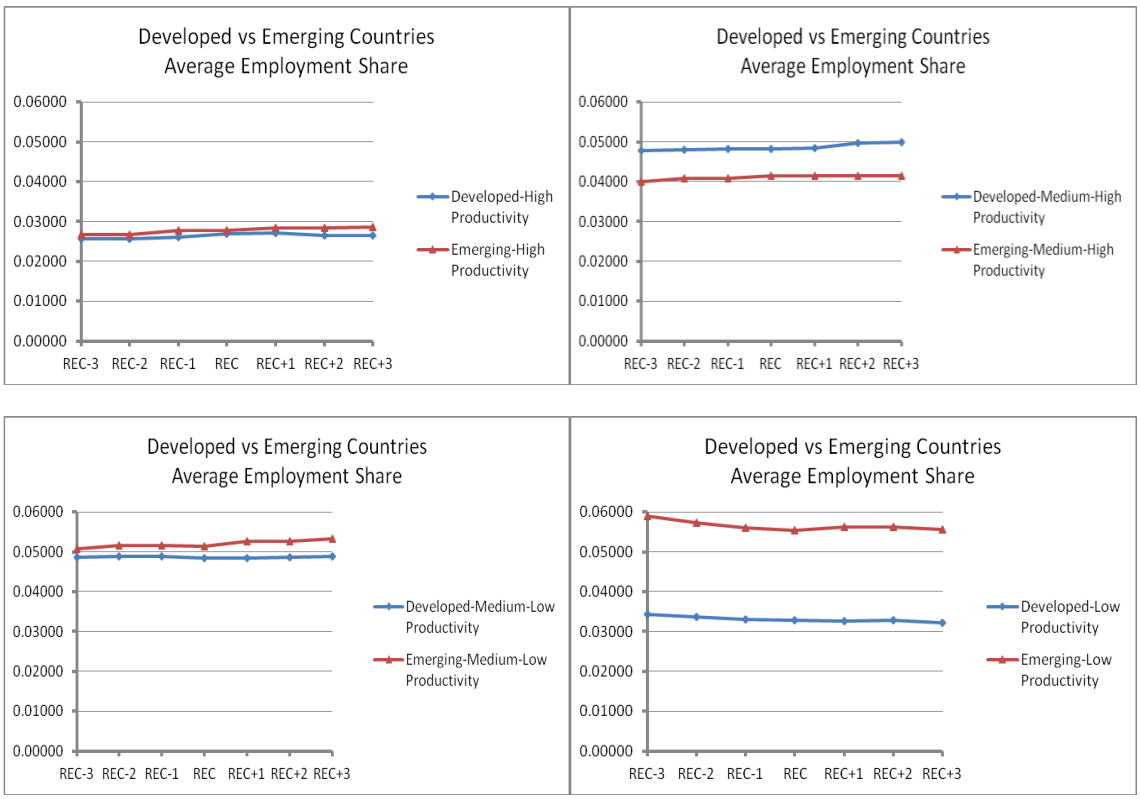


Figure 7: Average VA growth per level of external financial dependence for Developed and Emerging Countries

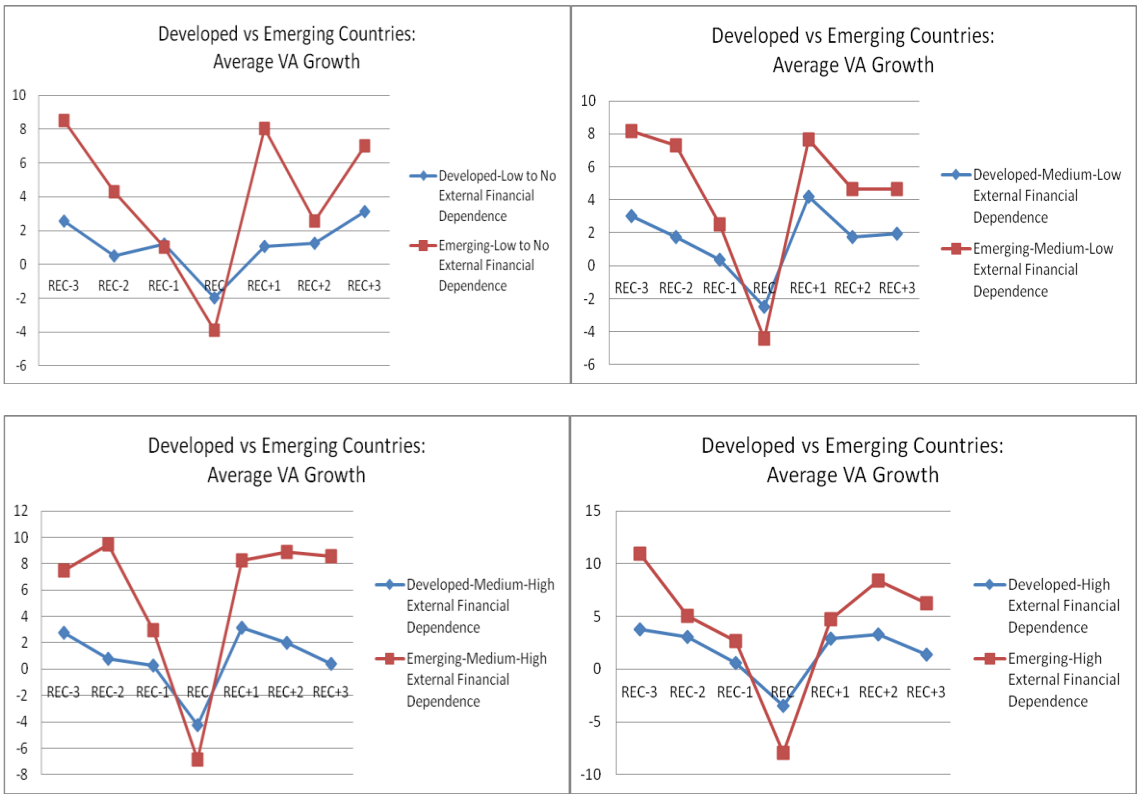


Figure 8: Average Employment growth per level of external financial dependence for Developed and Emerging Countries

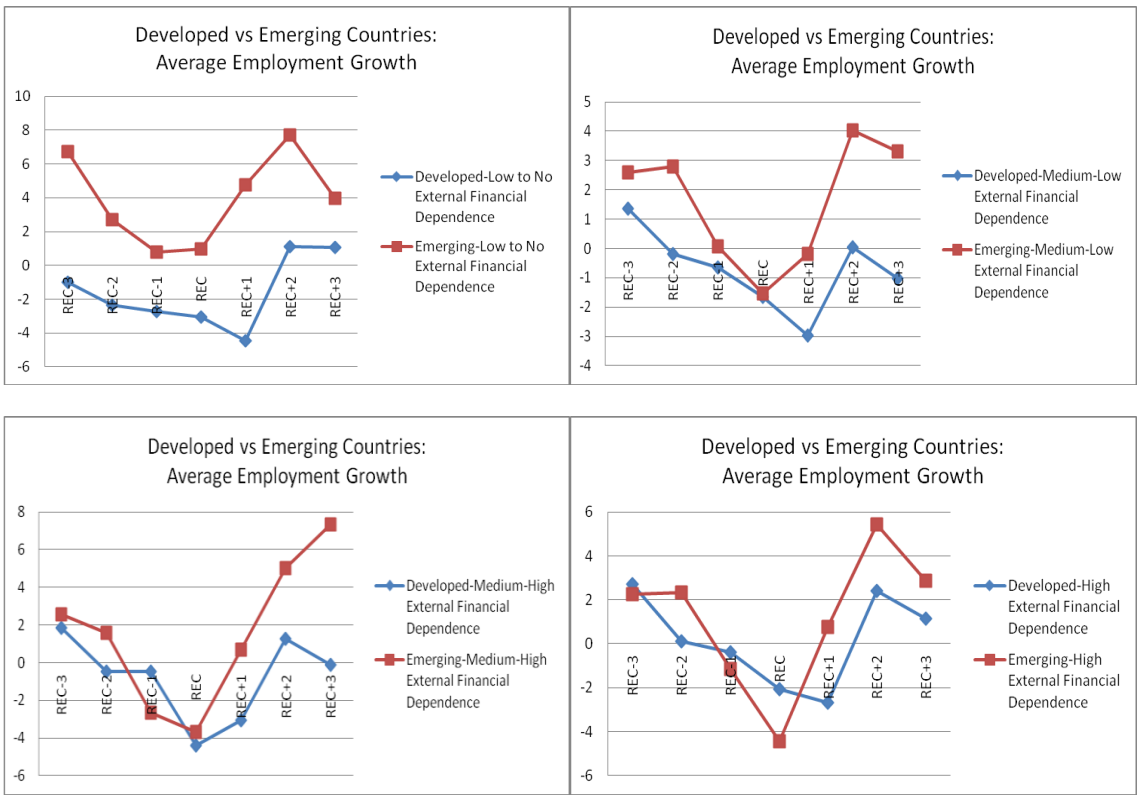


Figure 9: Average Productivity growth per level of external financial dependence for Developed and Emerging Countries

Figure 10: Average Productivity Level per level of external financial dependence for Developed and Emerging Countries

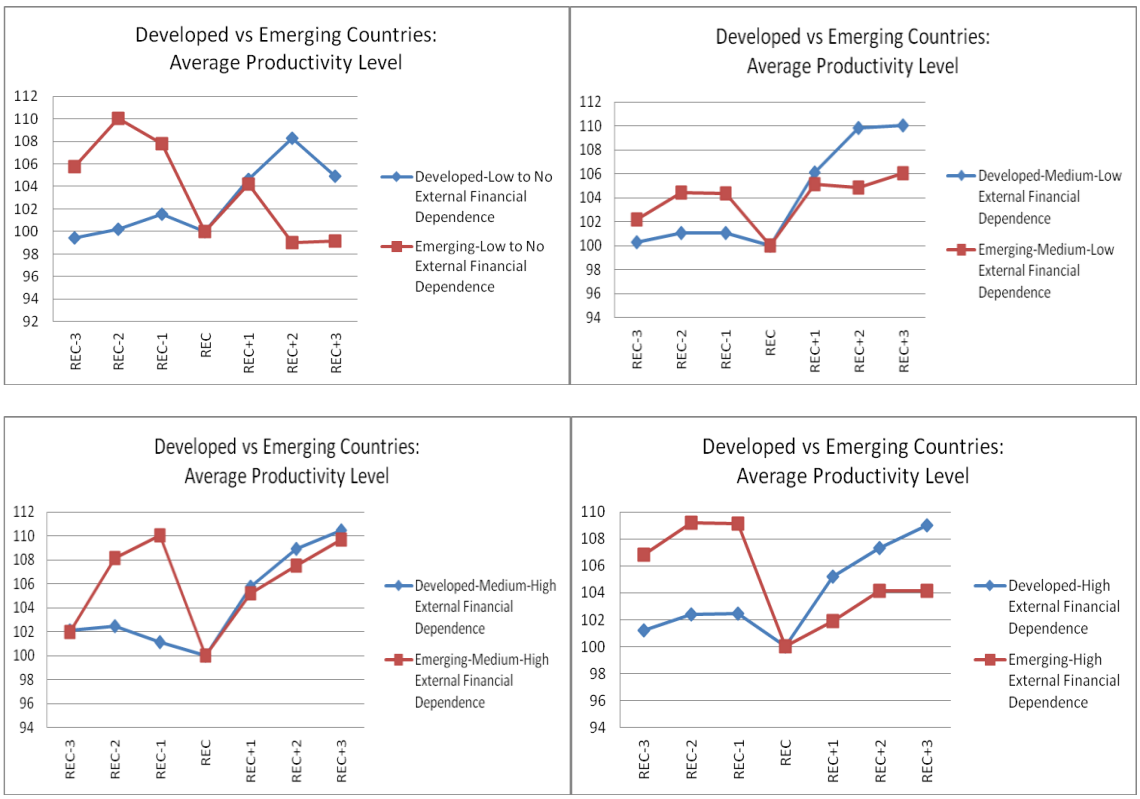


Figure 11: Average VA Share per level of external financial dependence for Developed and Emerging Countries

Figure 12: Average Employment Share per level of external financial dependence for Developed and Emerging Countries

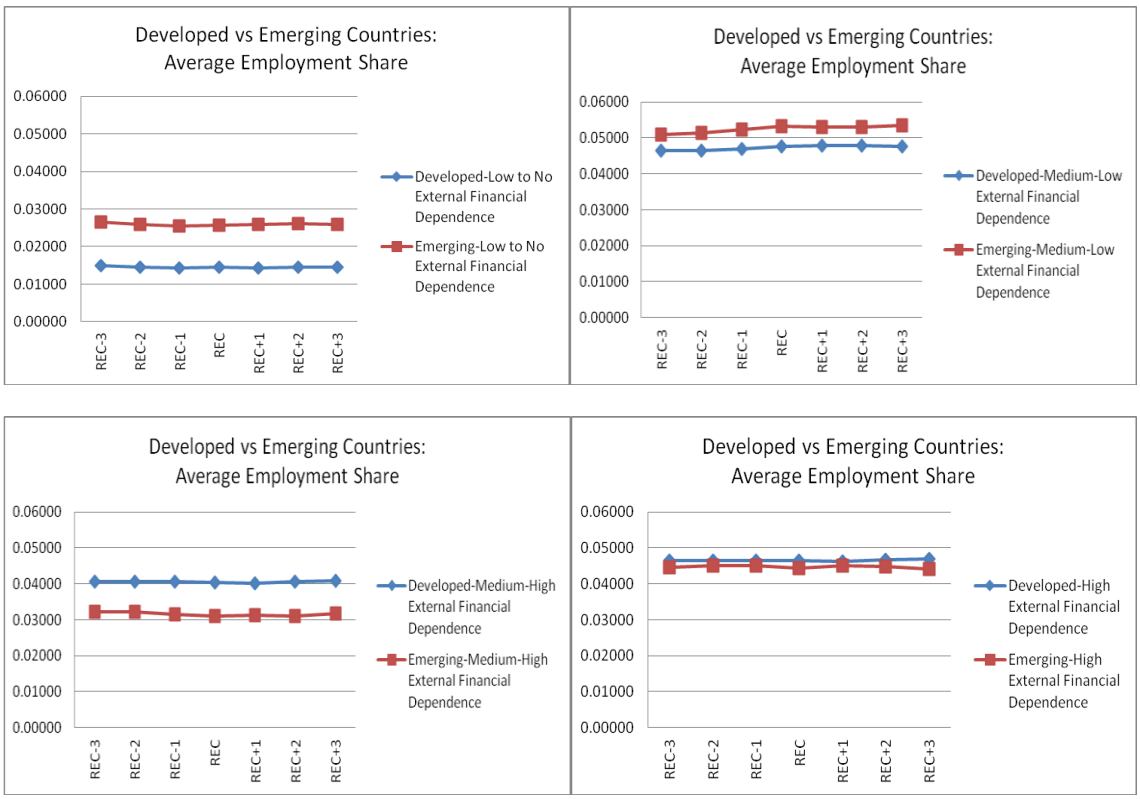


Figure 13: Average VA growth per level of productivity, Normal versus Financial Recessions

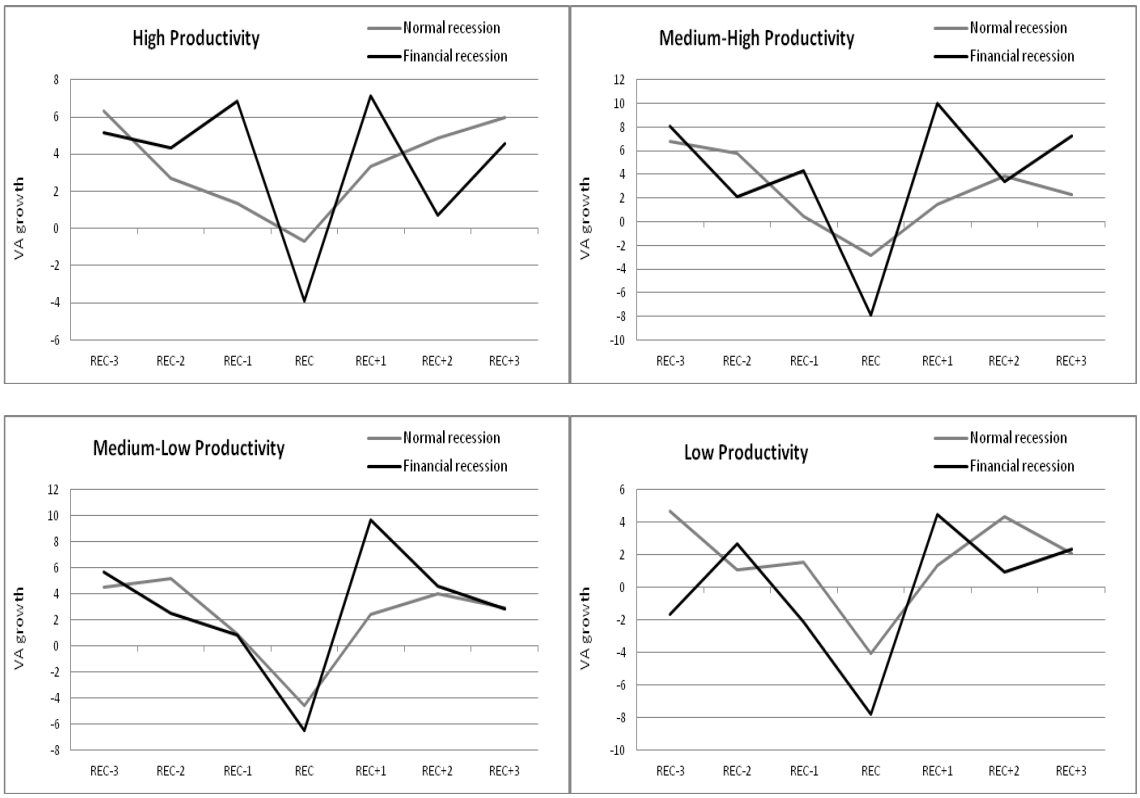


Figure 14: Average Employment growth per level of productivity, Normal versus Financial Recessions

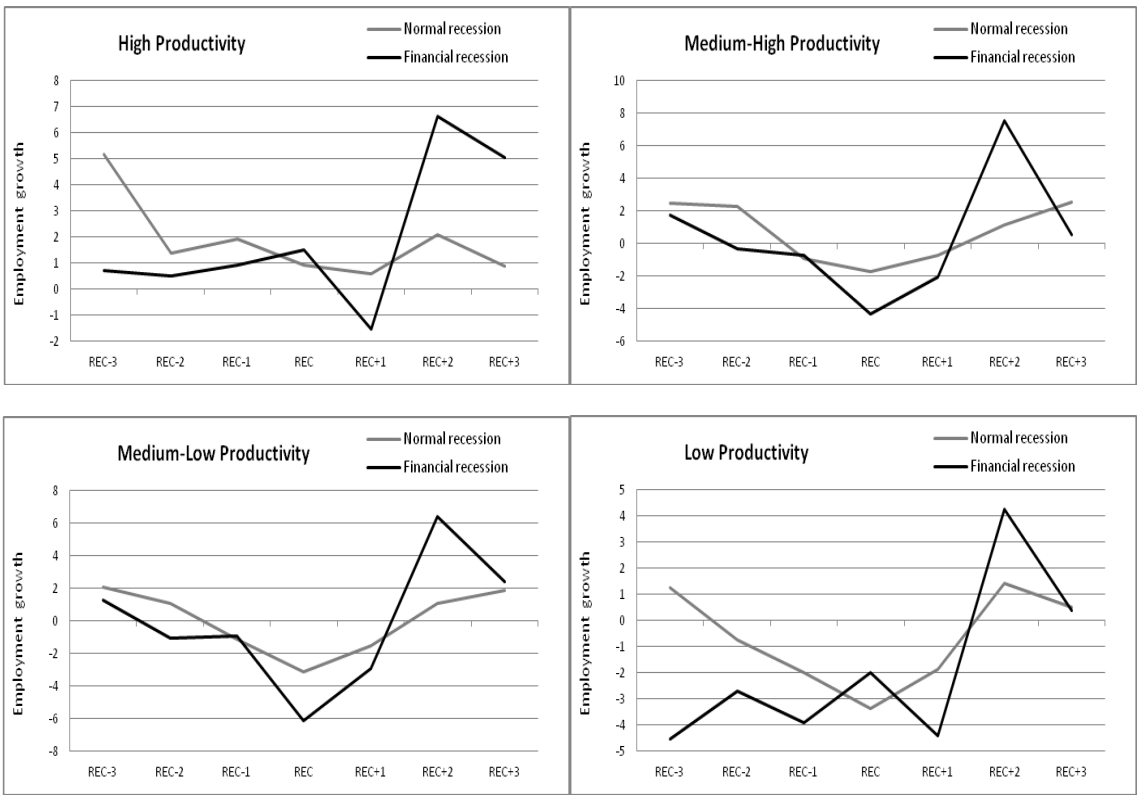


Figure 15: Average Productivity growth per level of productivity, Normal versus Financial Recessions

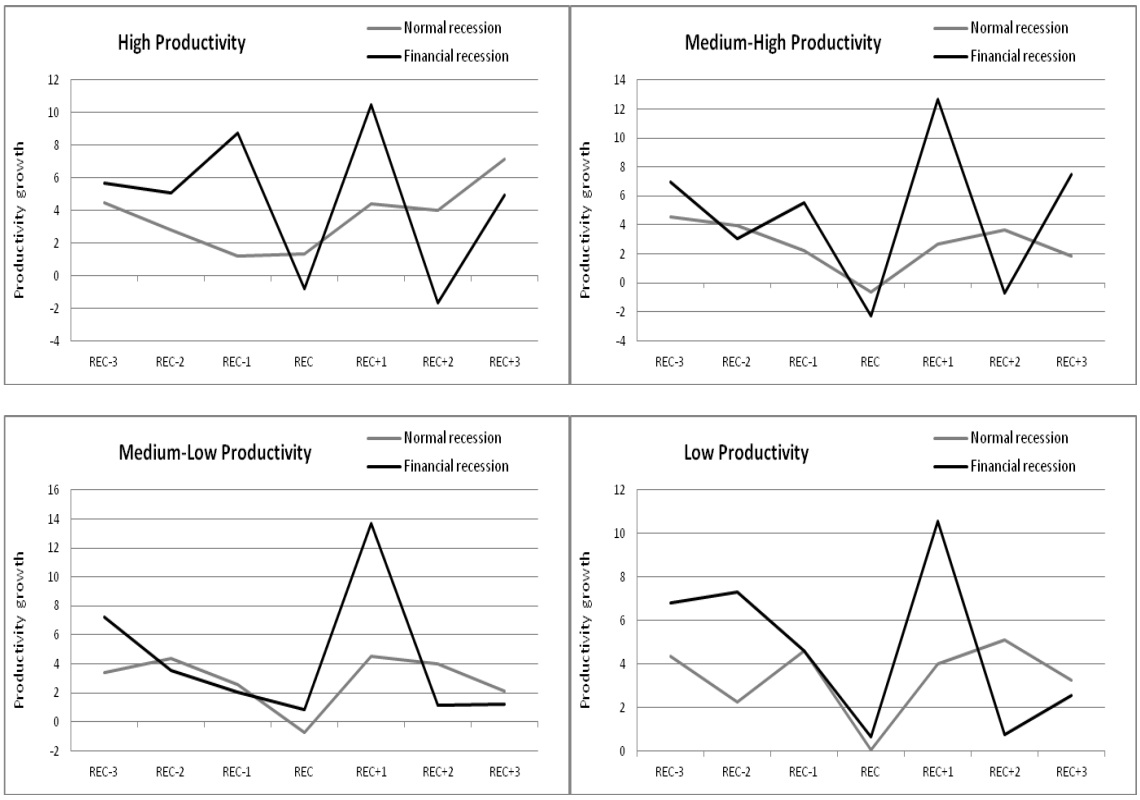


Figure 16: Average Productivity level per level of productivity, Normal versus Financial Recessions

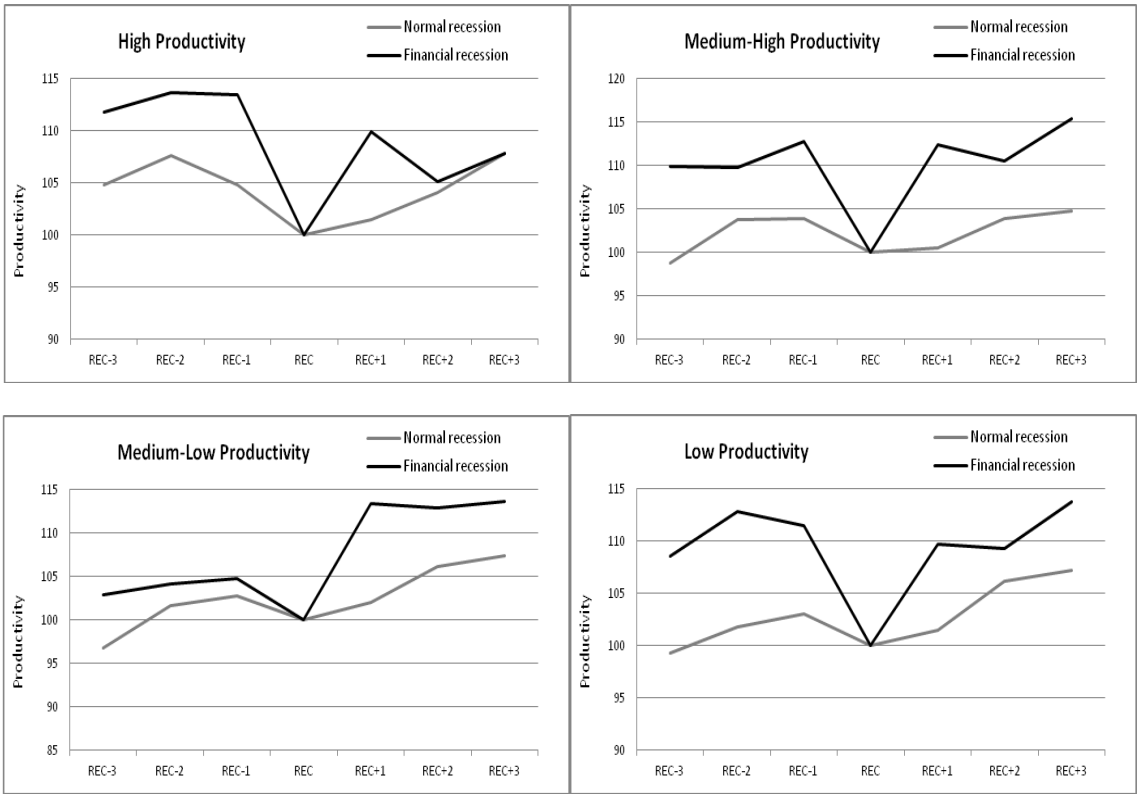


Figure 17: Average VA share per level of productivity, Normal versus Financial Recessions

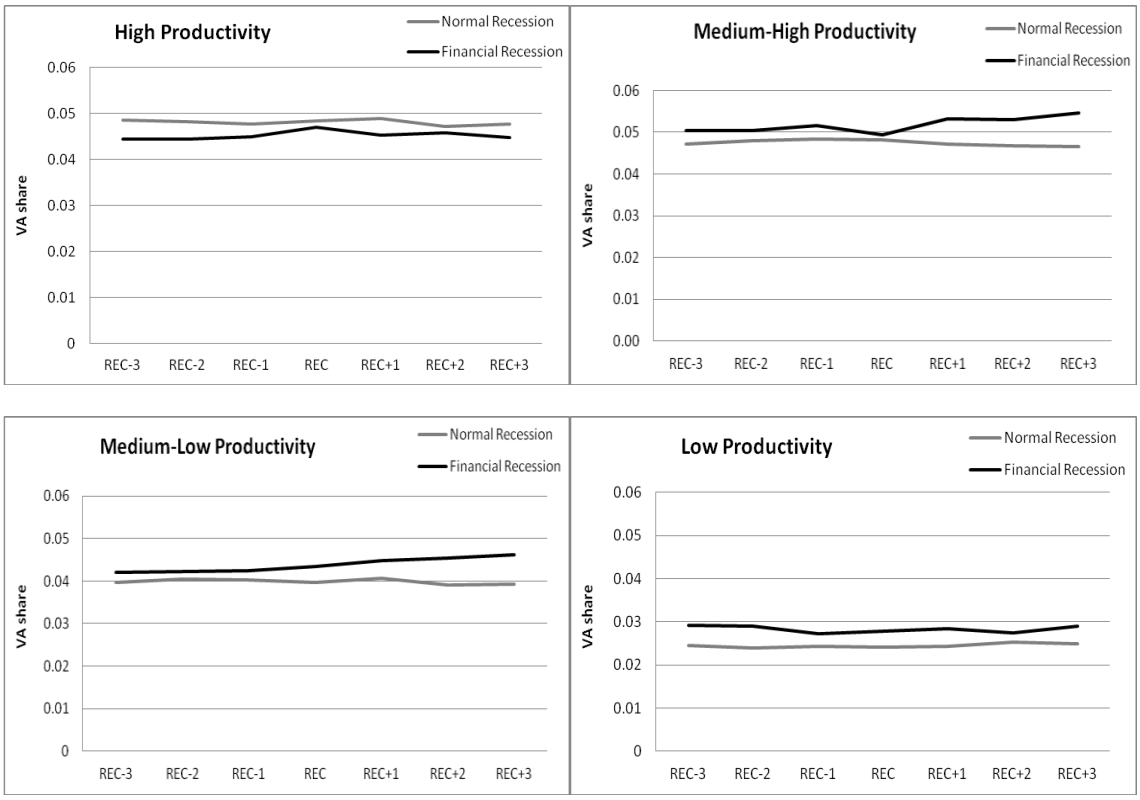


Figure 18: Average Employment share per level of productivity, Normal versus Financial Recessions

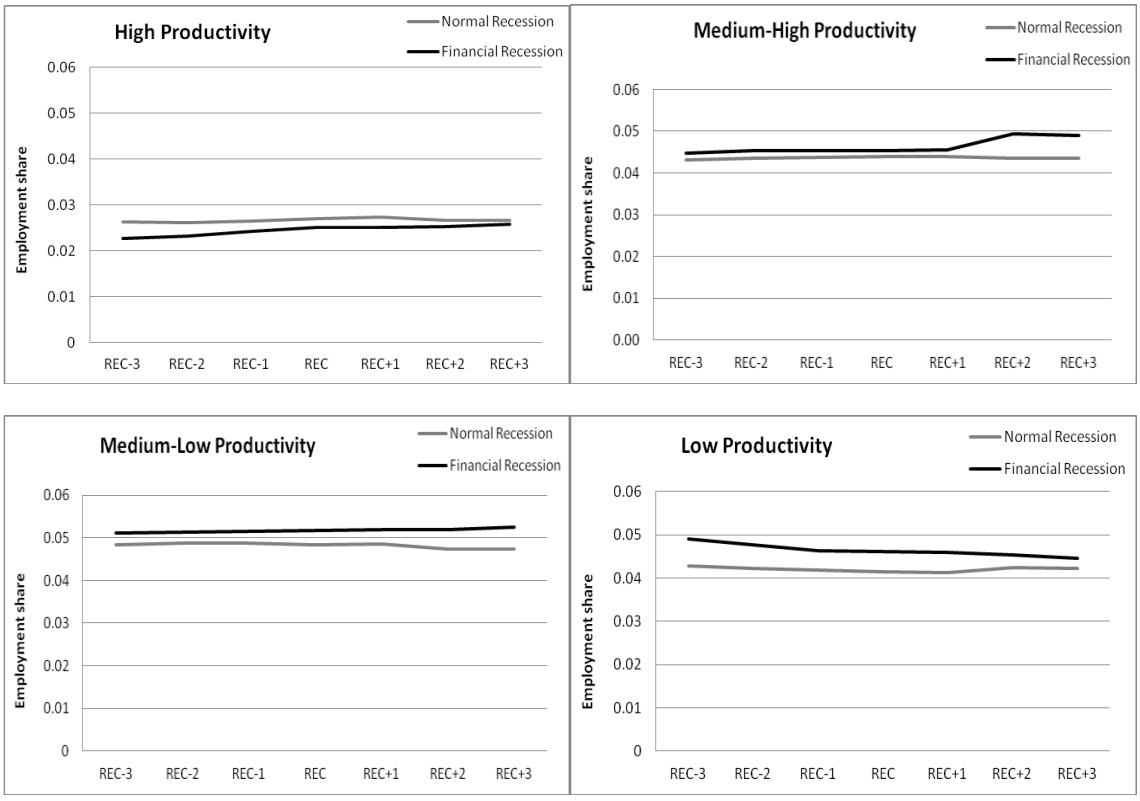


Figure 19: Average VA growth per level of external financial dependence, Normal versus Financial Recessions

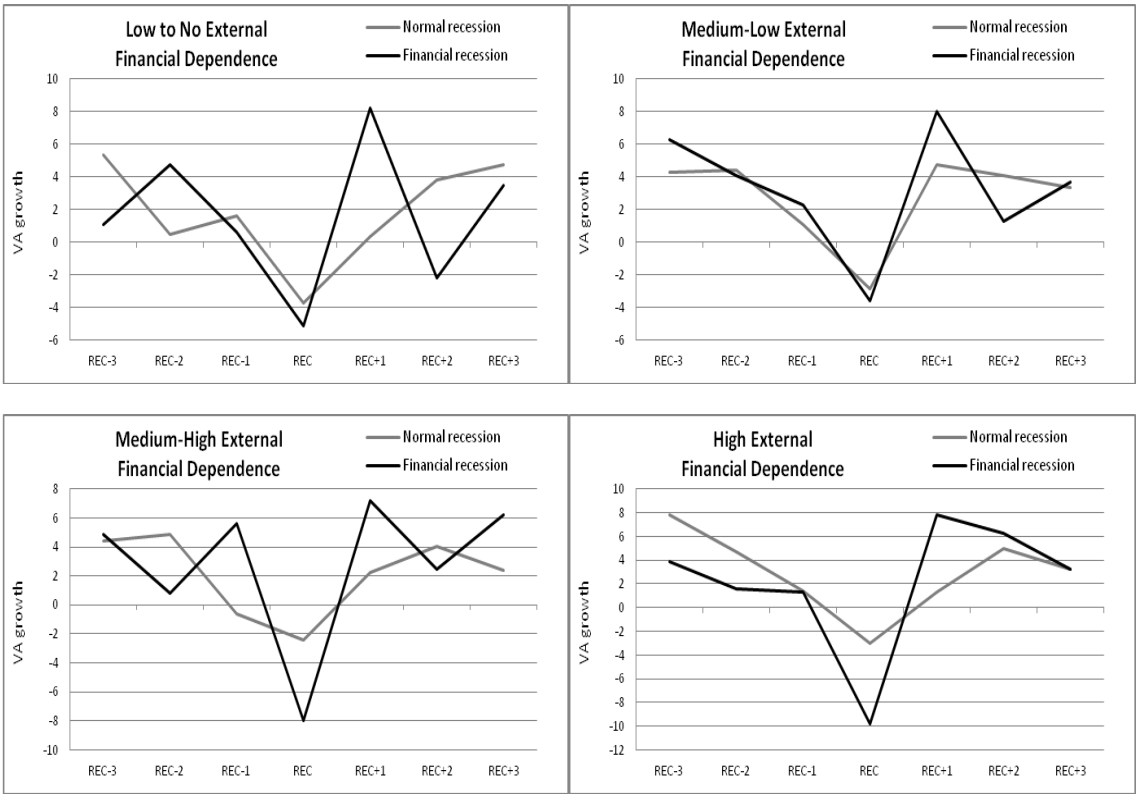


Figure 20: Average Employment growth per level of external financial dependence, Normal versus Financial Recessions

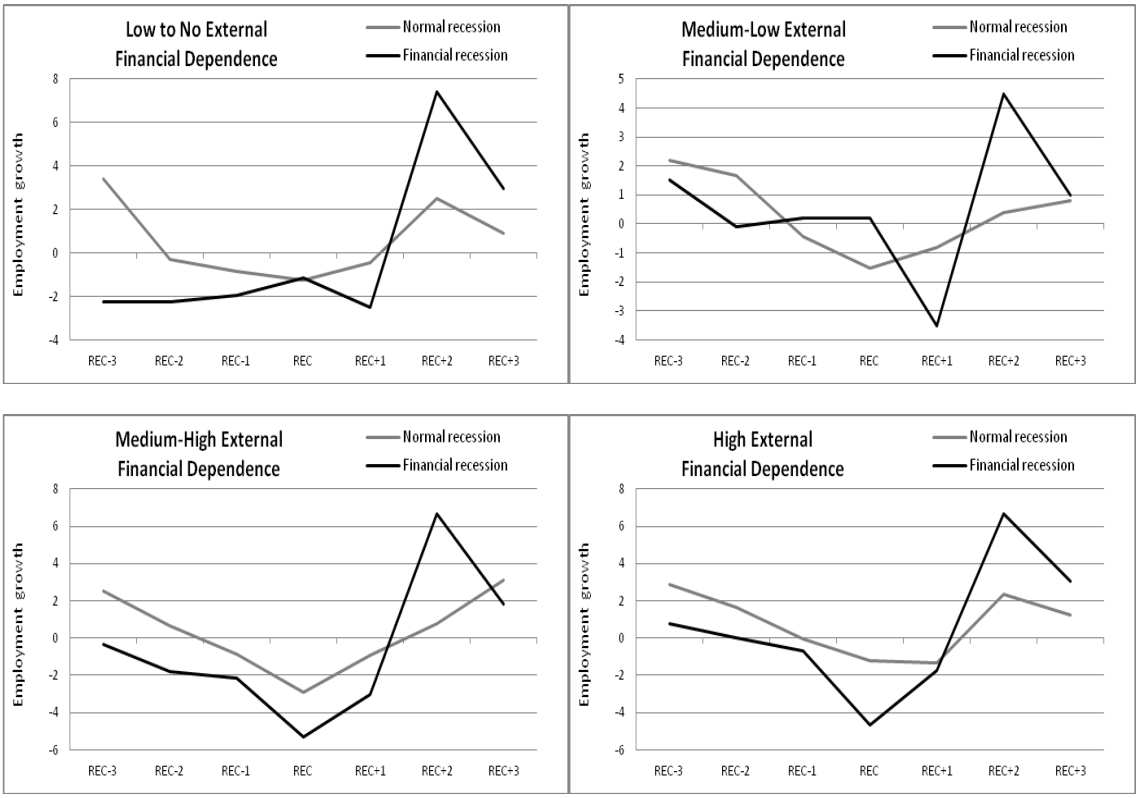


Figure 21: Average Productivity growth per level of external financial dependence, Normal versus Financial Recessions

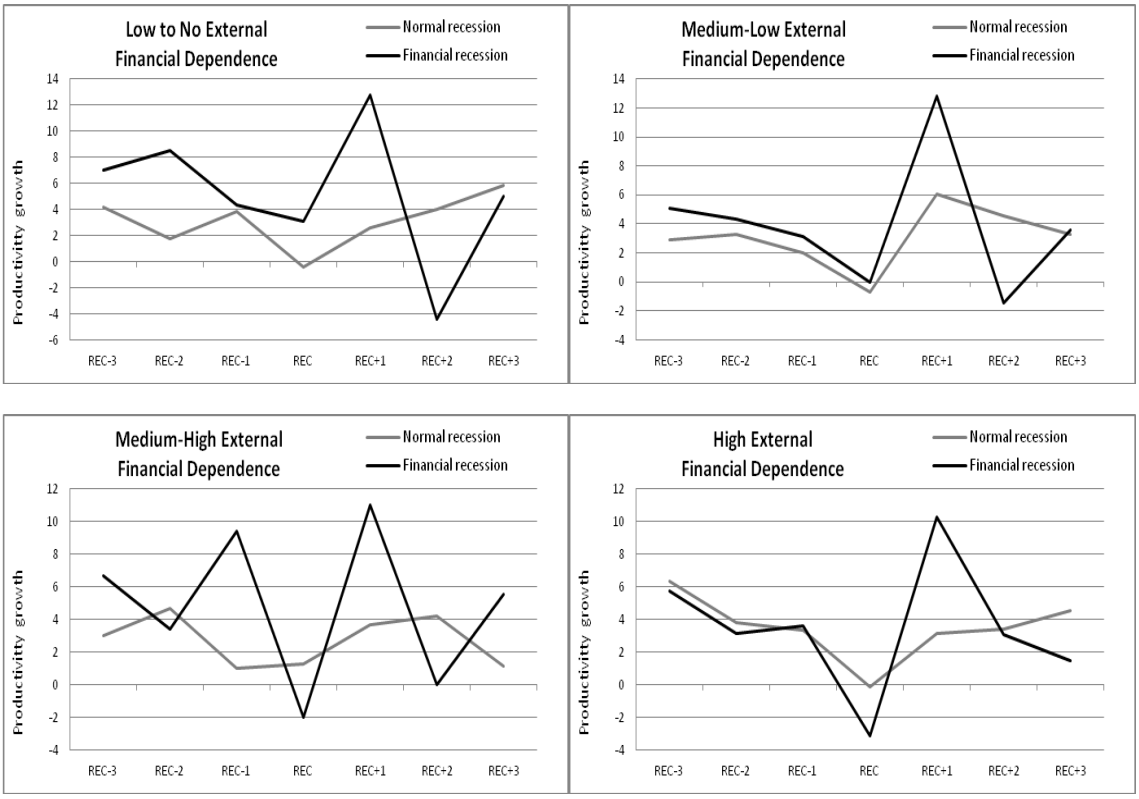


Figure 22: Average Productivity level per level of external financial dependence, Normal versus Financial Recessions

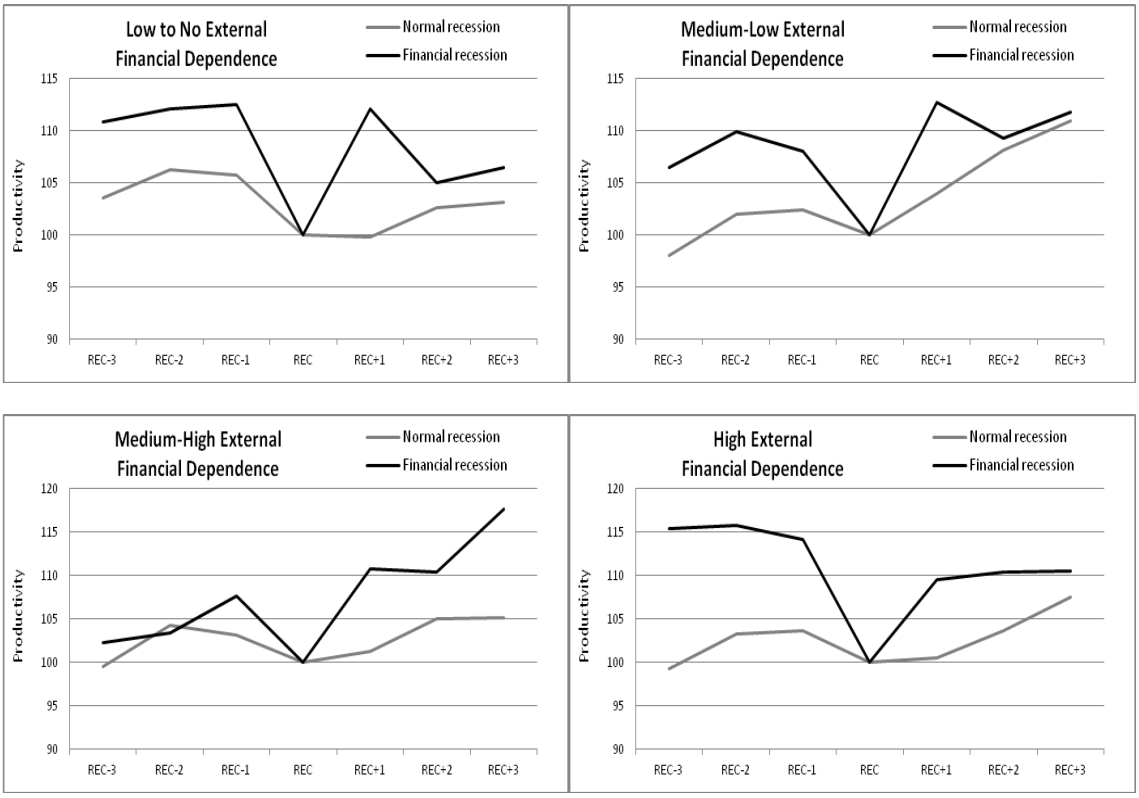


Figure 23: Average VA share per level of external financial dependence, Normal versus Financial Recessions

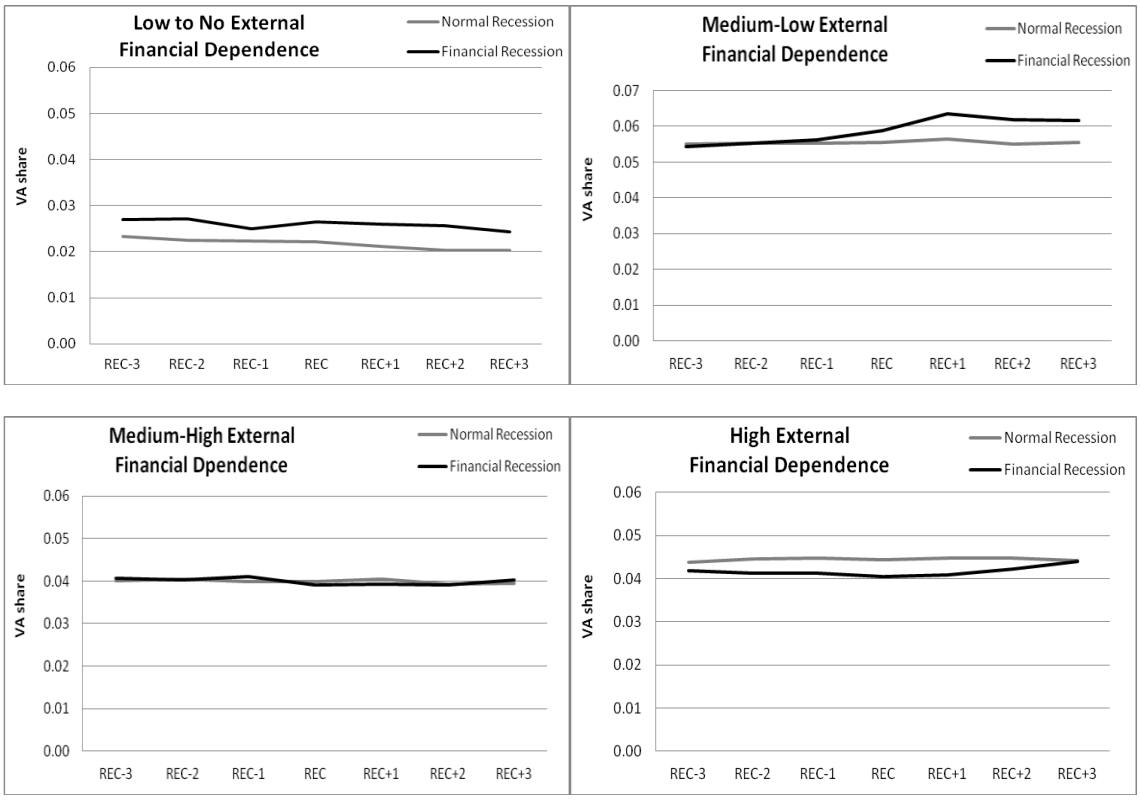


Figure 24: Average Employment share per level of external financial dependence, Normal versus Financial Recessions

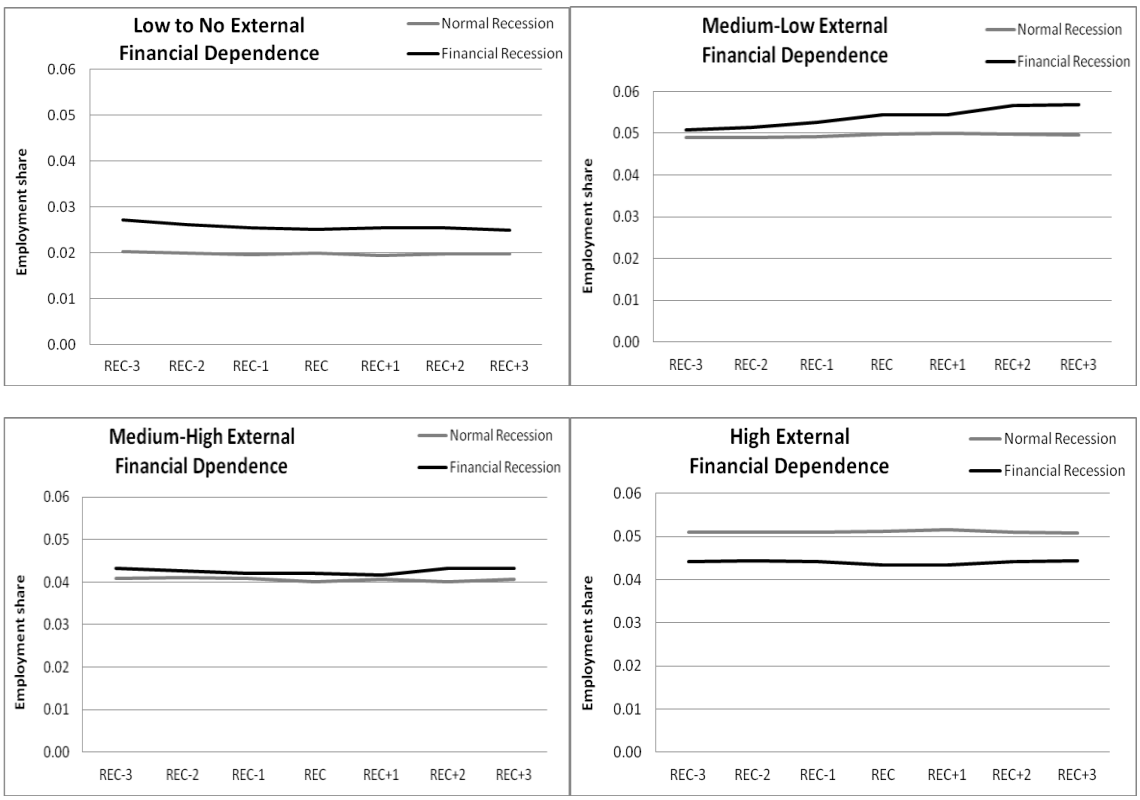


Figure 25: Financial Recessions, average VA growth per level of productivity for Developed and Emerging Countries

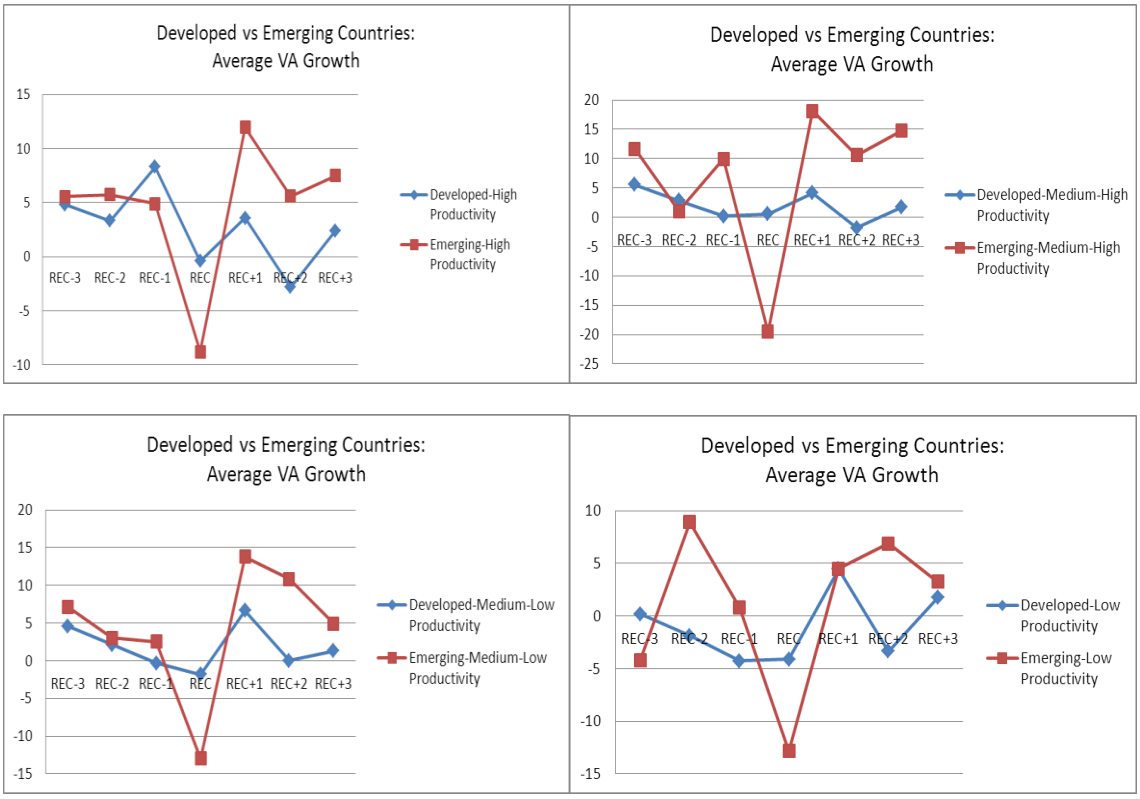


Figure 26: Financial Recessions, average Employment growth per level of productivity for Developed and Emerging Countries

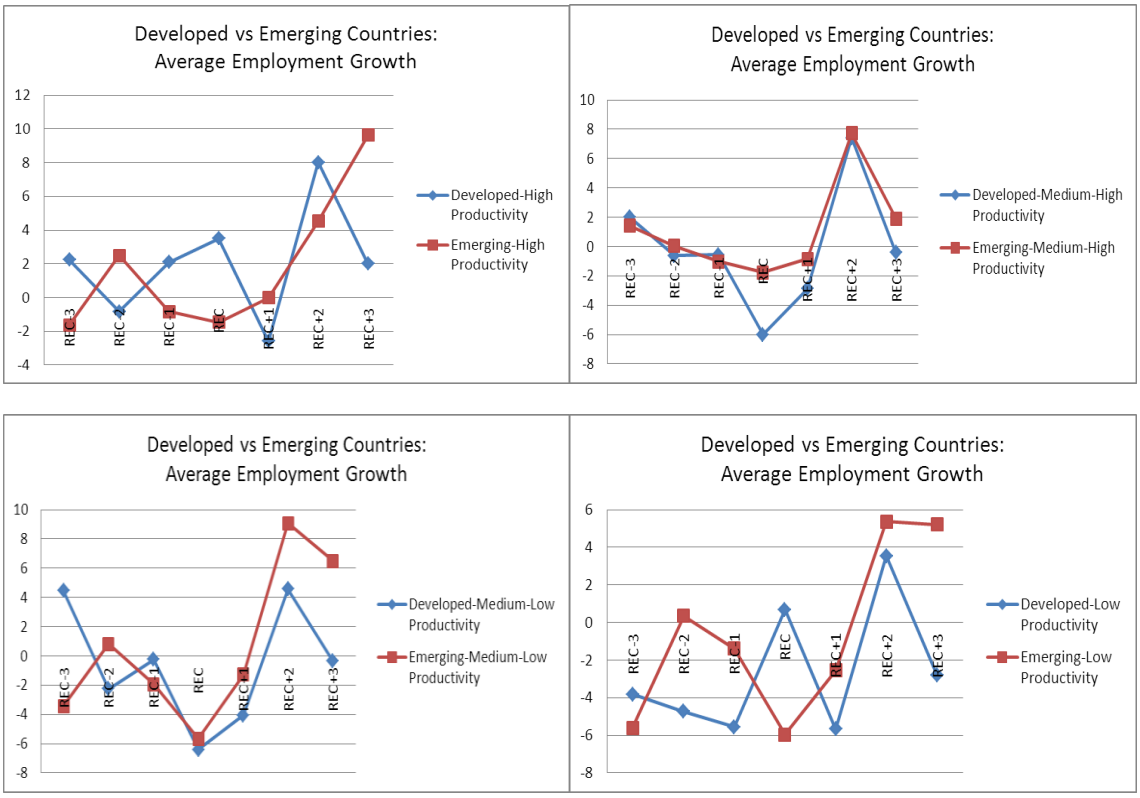


Figure 27: Financial Recessions, average Productivity growth per level of productivity for Developed and Emerging Countries

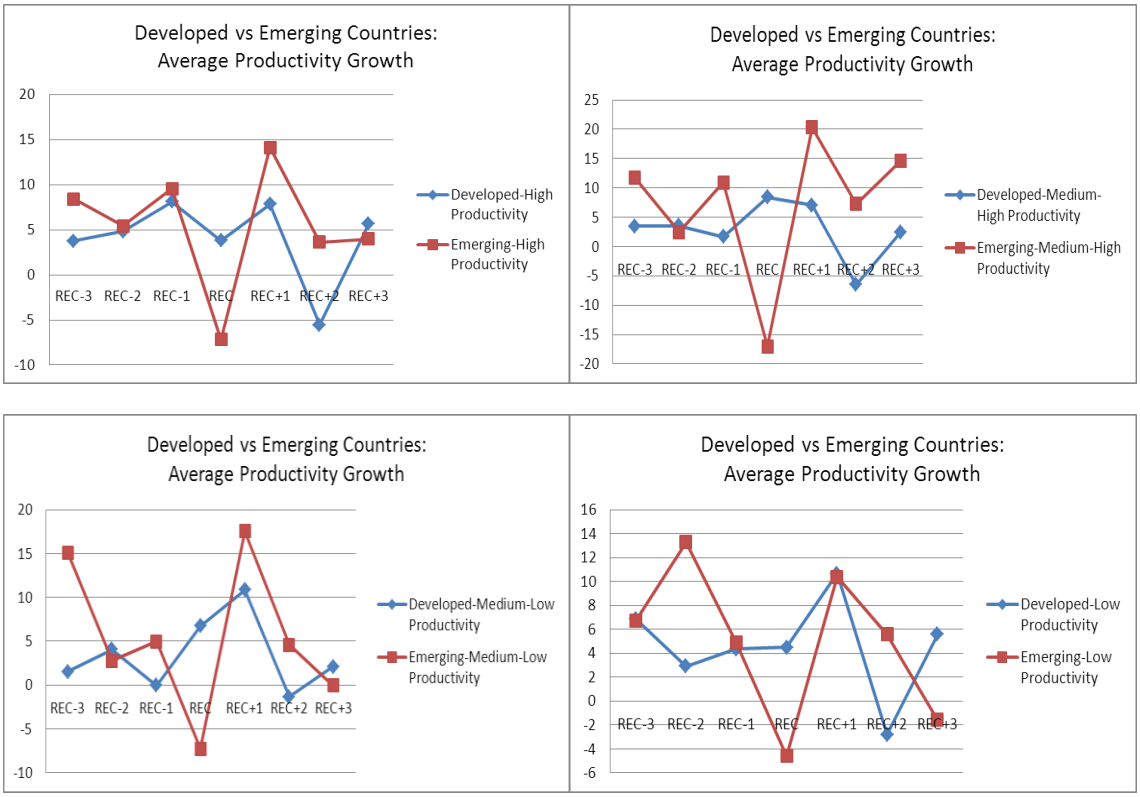


Figure 28: Financial Recessions, average Productivity level per level of productivity for Developed and Emerging Countries

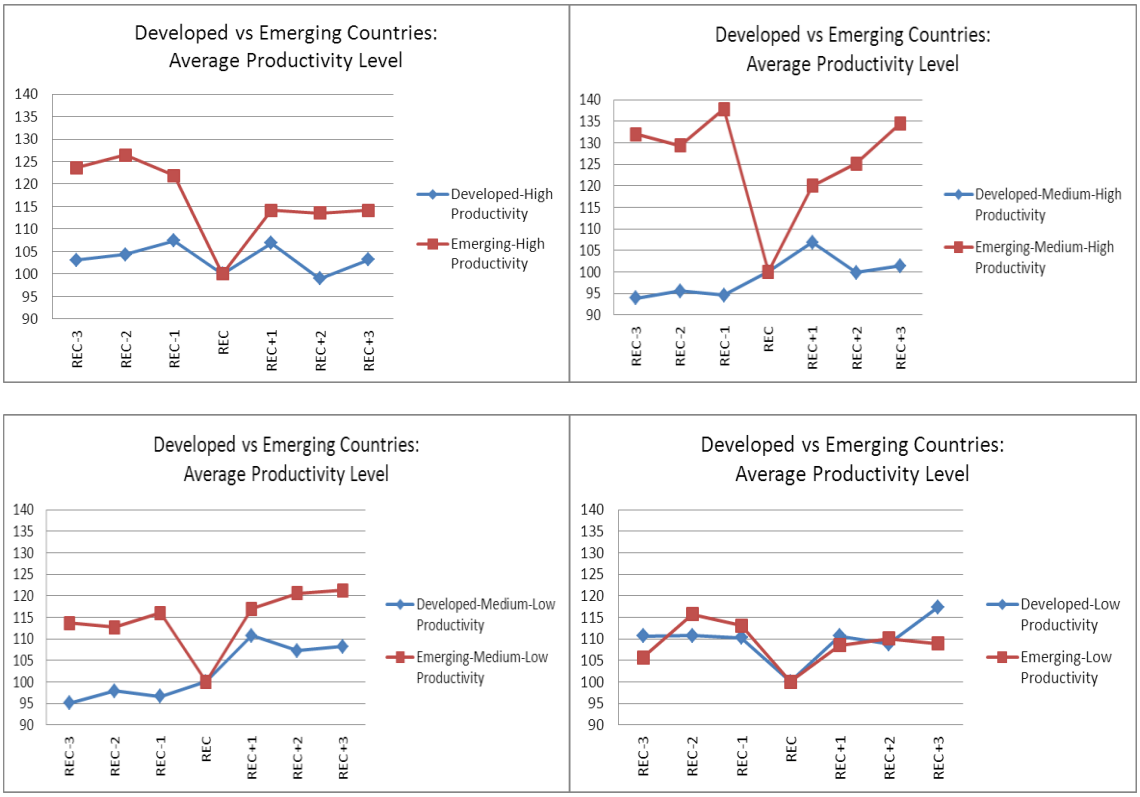


Figure 29: Financial Recessions, average VA share per level of productivity for Developed and Emerging Countries

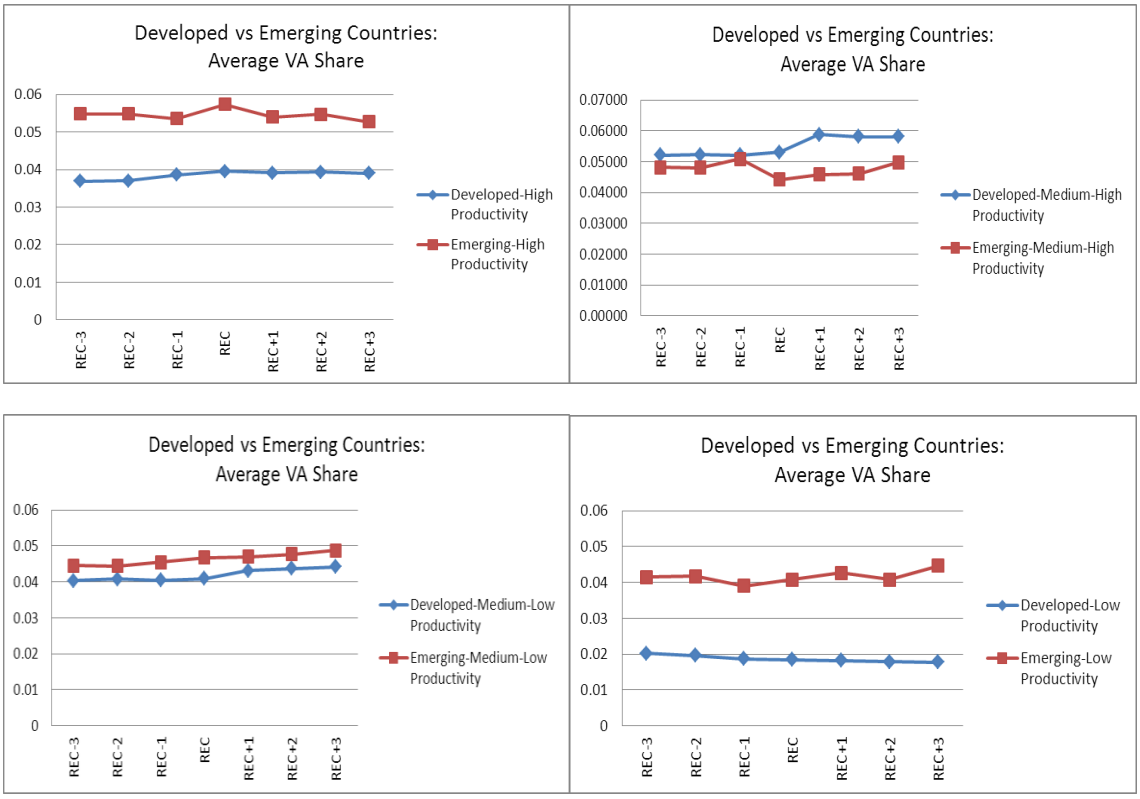


Figure 30: Financial Recessions, average Employment share per level of productivity for Developed and Emerging Countries

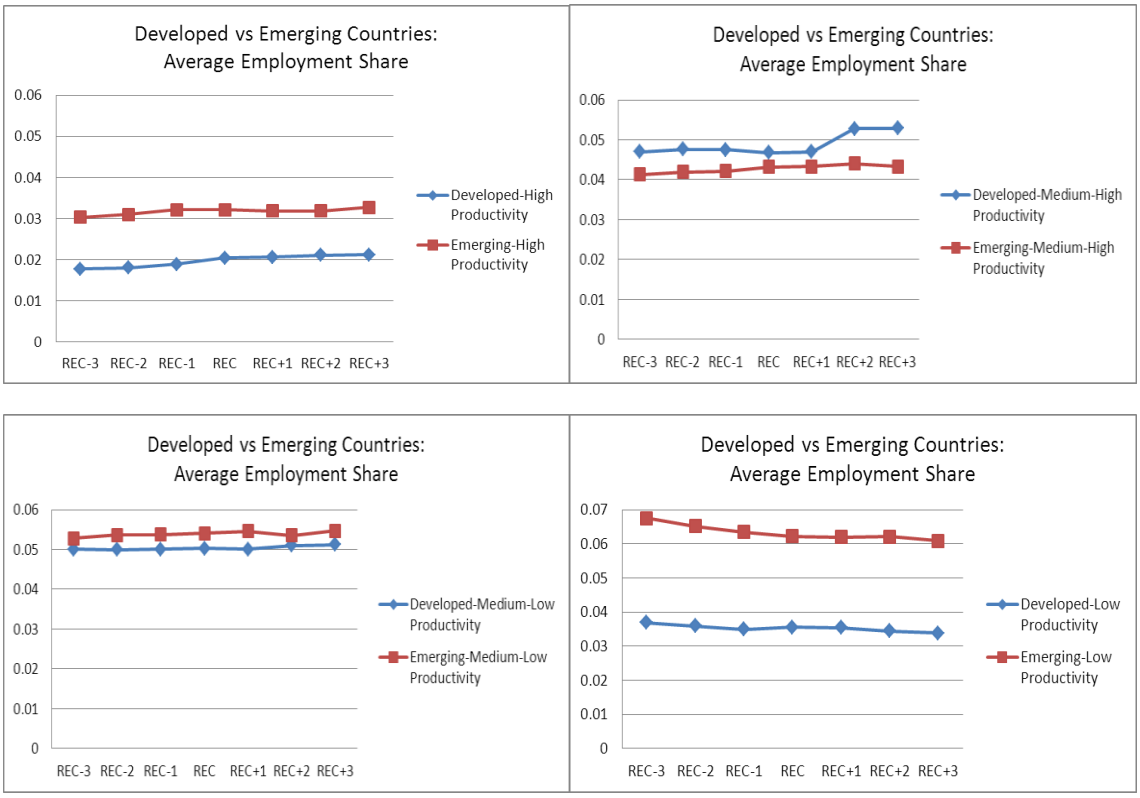


Figure 31: Financial Recessions, average VA growth per level of external financial dependence for Developed and Emerging Countries

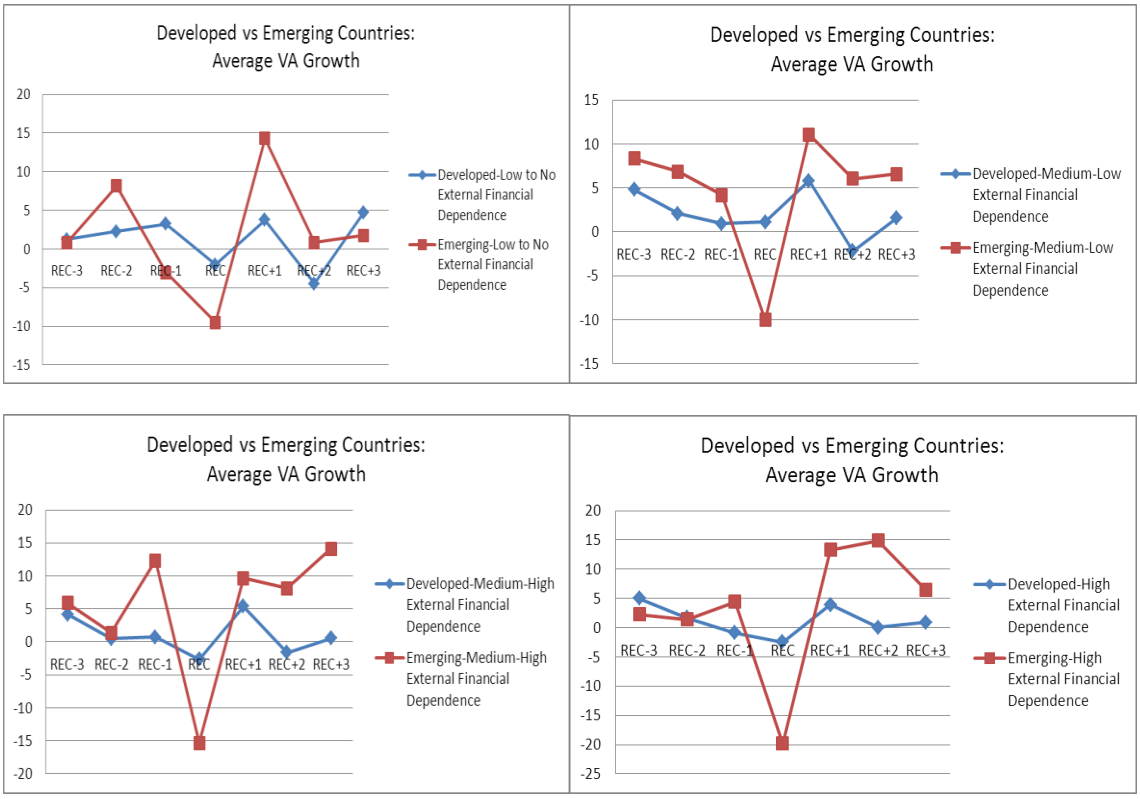


Figure 32: Financial Recessions, average Employment growth per level of external financial dependence for Developed and Emerging Countries

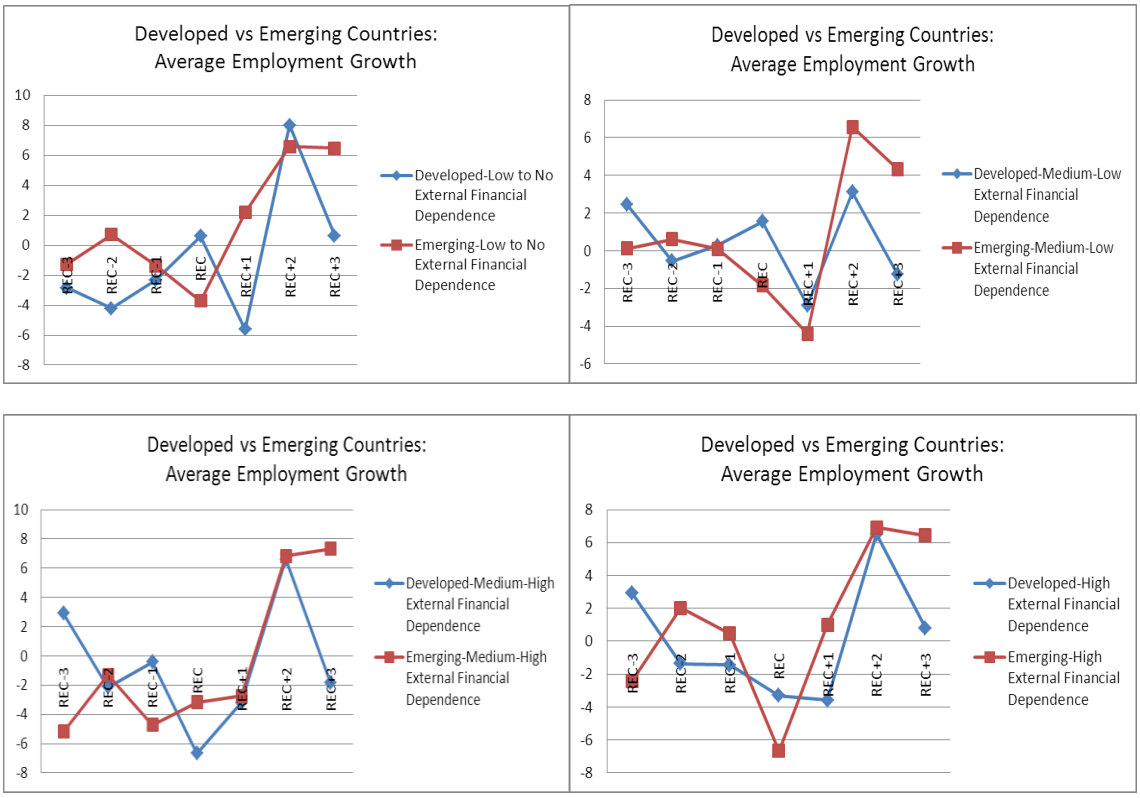


Figure 33: Financial Recessions, average Productivity growth per level of external financial dependence for Developed and Emerging Countries

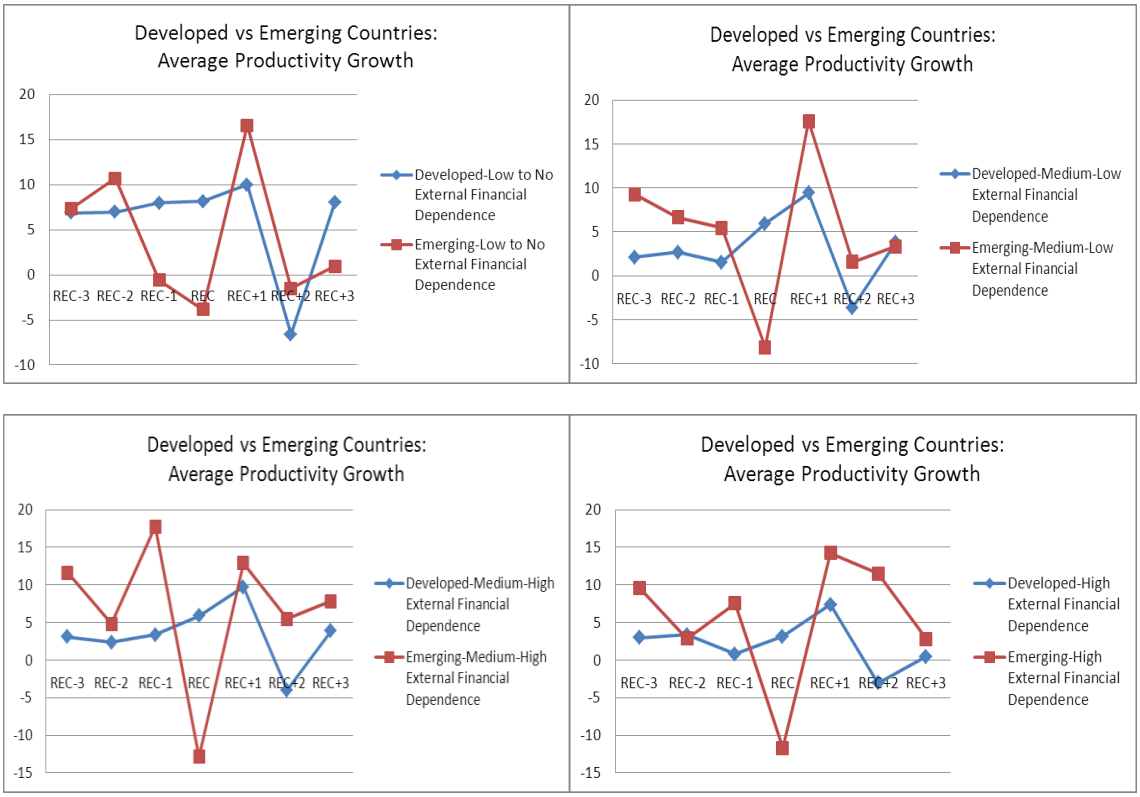


Figure 34: Financial Recessions, average Productivity level per level of external financial dependence for Developed and Emerging Countries

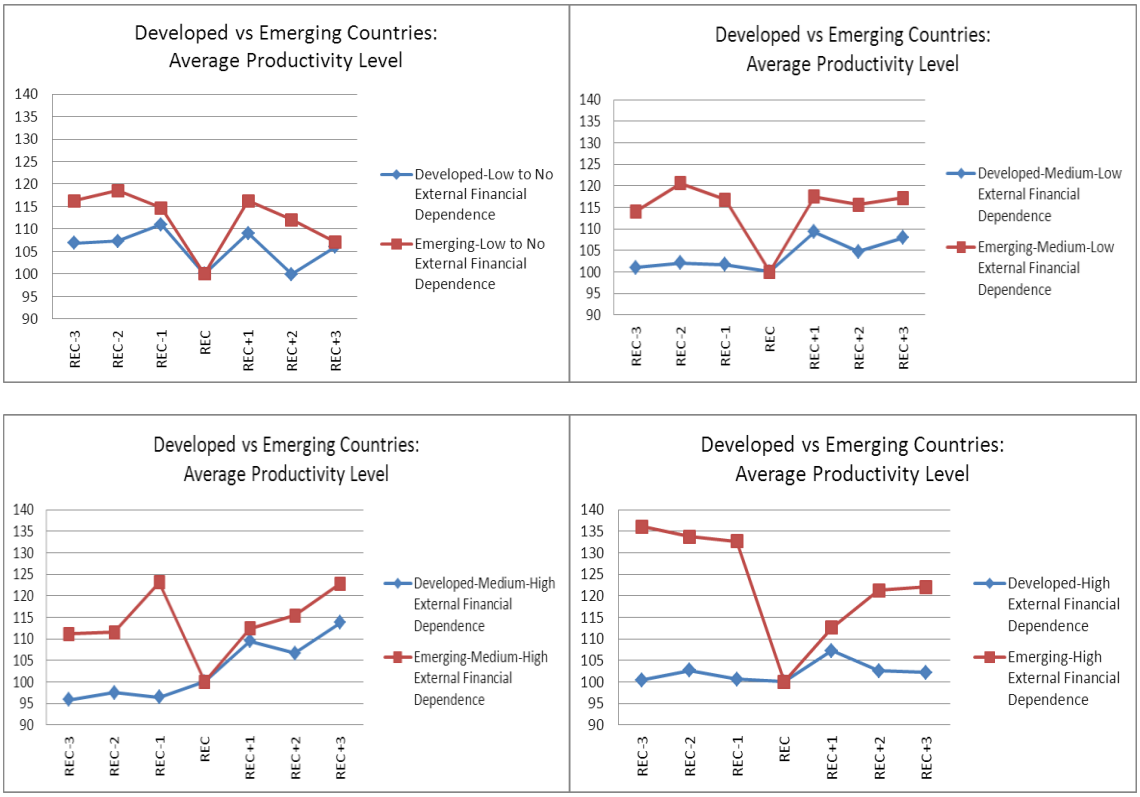


Figure 35: Financial Recessions, average VA share per level of external financial dependence for Developed and Emerging Countries

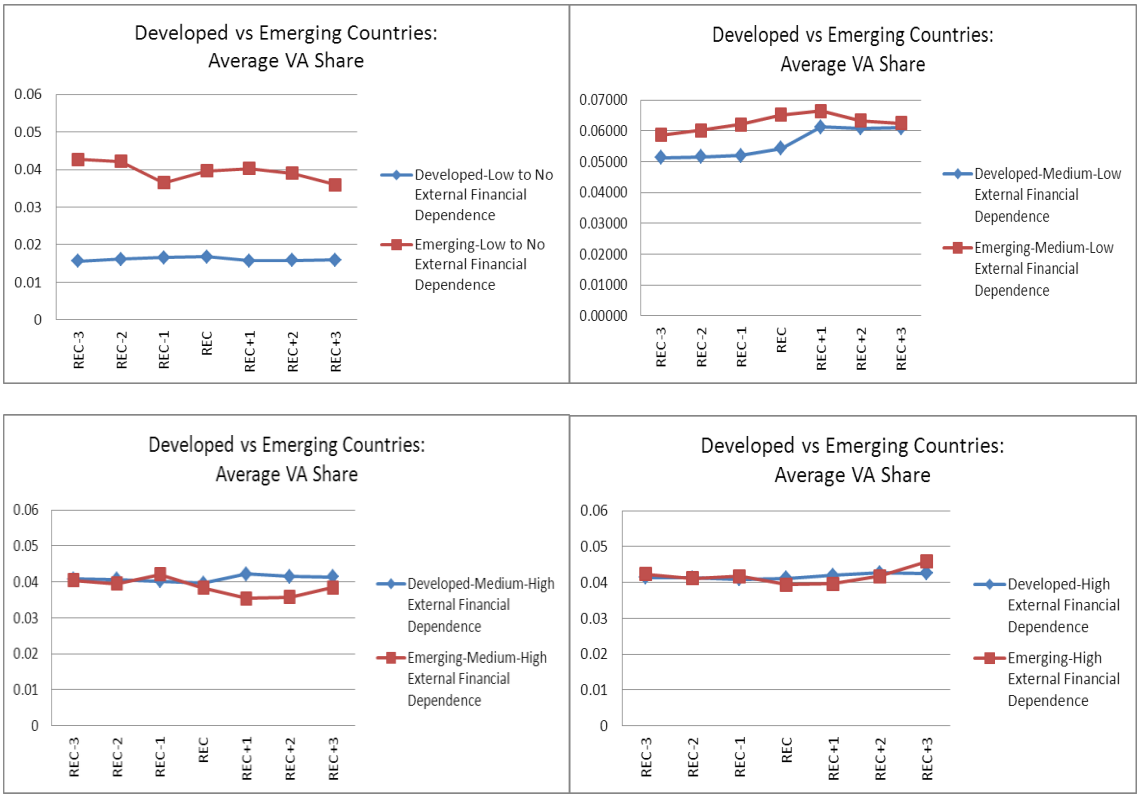


Figure 36: Financial Recessions, average Employment share per level of external financial dependence for Developed and Emerging Countries

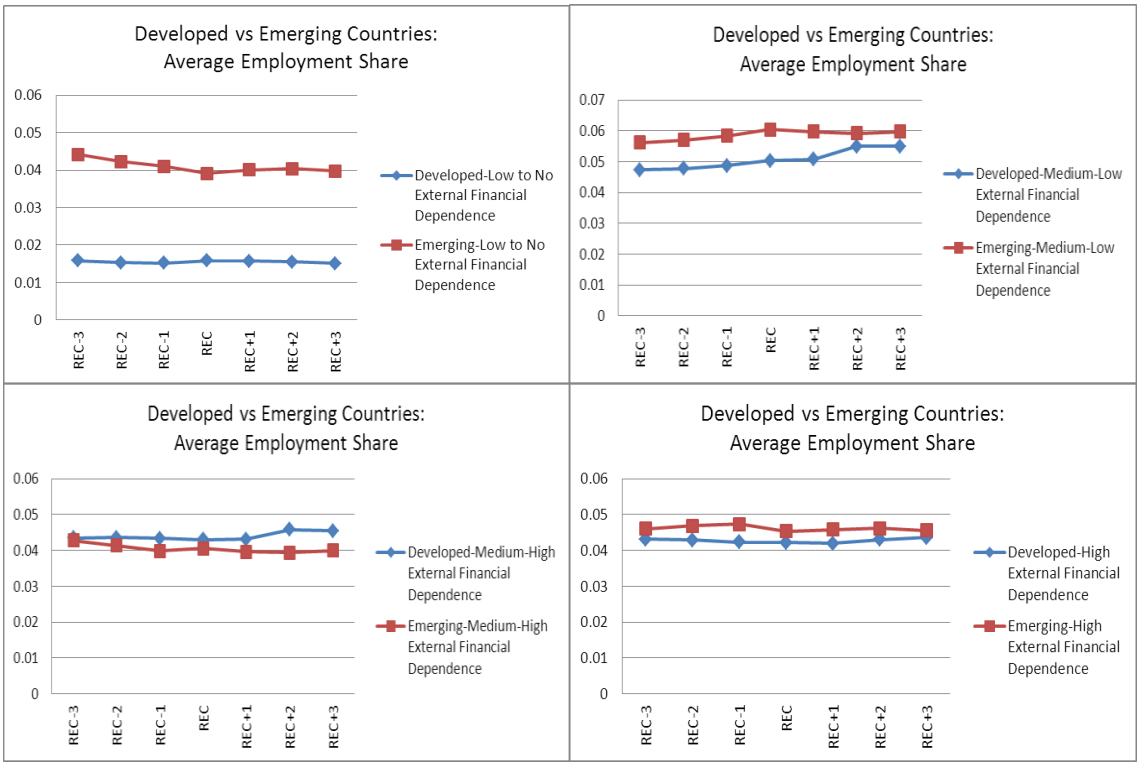
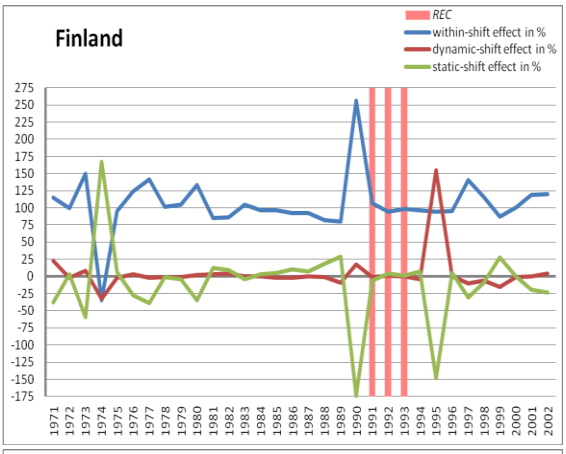
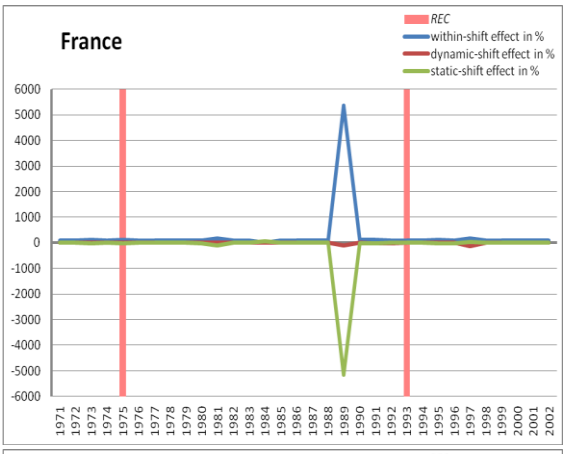


Figure 37: Decomposition of labour productivity growth for all countries


Finland
REC
within-shift effect in %
dynamic-shift effect in %
static-shift effect in %


France
REC
within-shift effect in %
dynamic-shift effect in %
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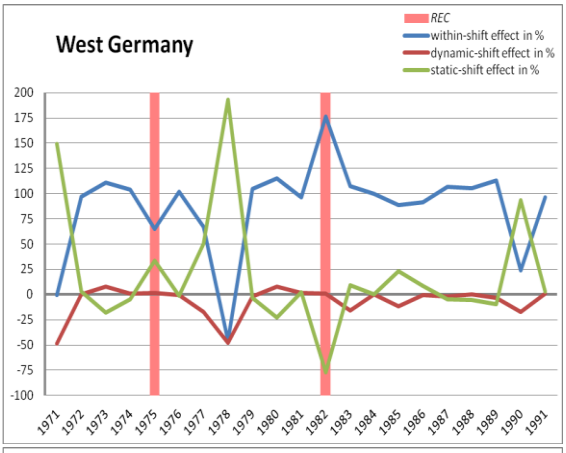
West Germany
REC
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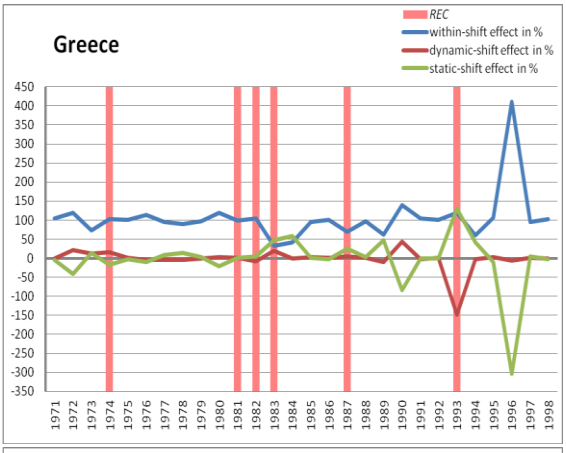
Greece
REC
within-shift effect in %
dynamic-shift effect in %
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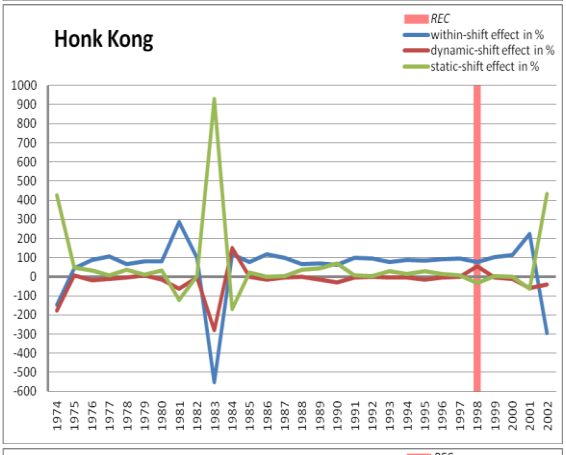
Honk Kong
REC
within-shift effect in %
dynamic-shift effect in %
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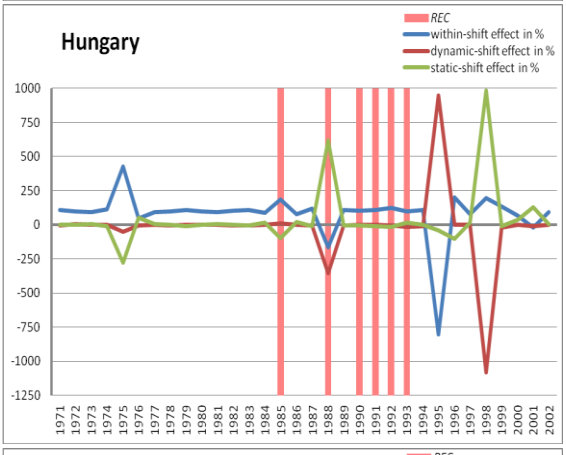
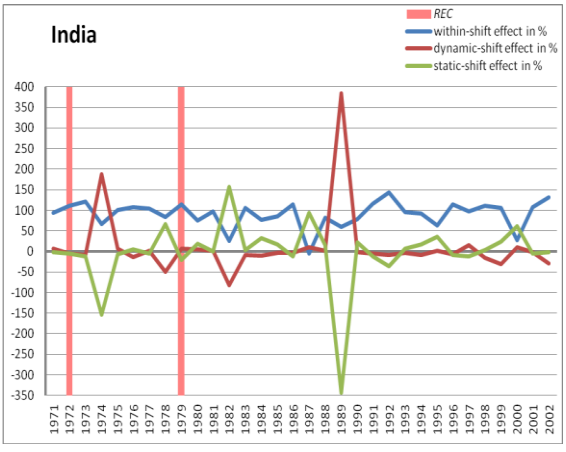

Hungary
REC
within-shift effect in %
dynamic-shift effect in %
static-shift effect in %


India
REC
within-shift effect in %
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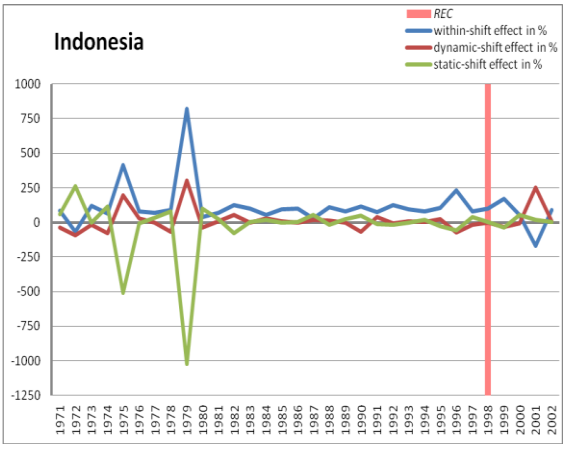
static-shift effect in %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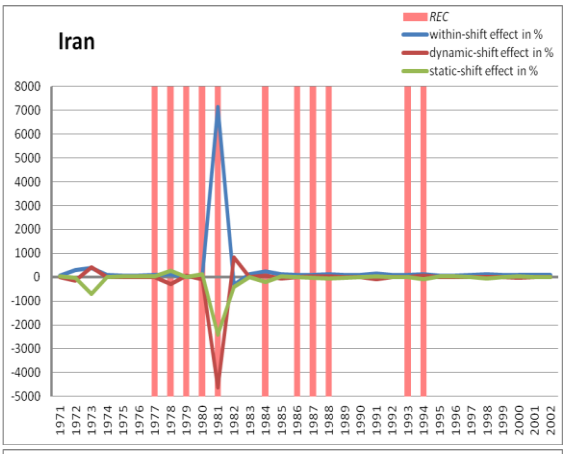
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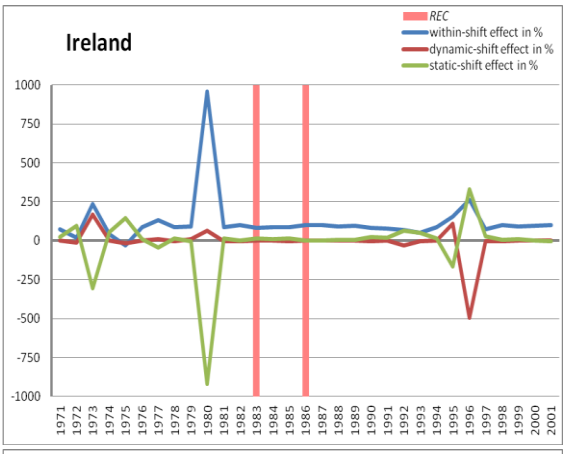
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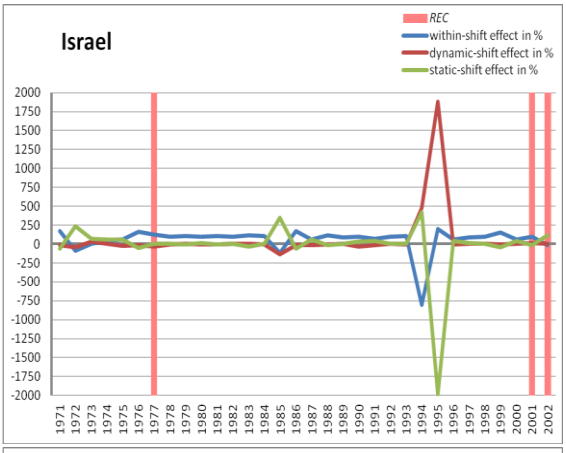
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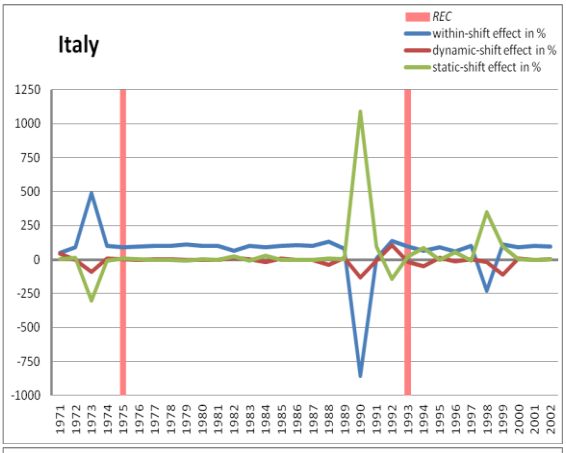
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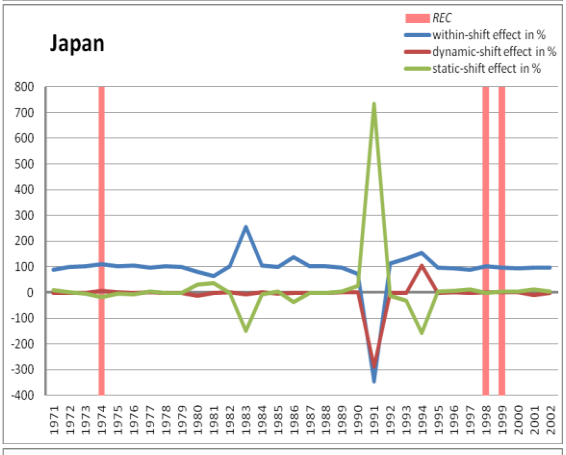
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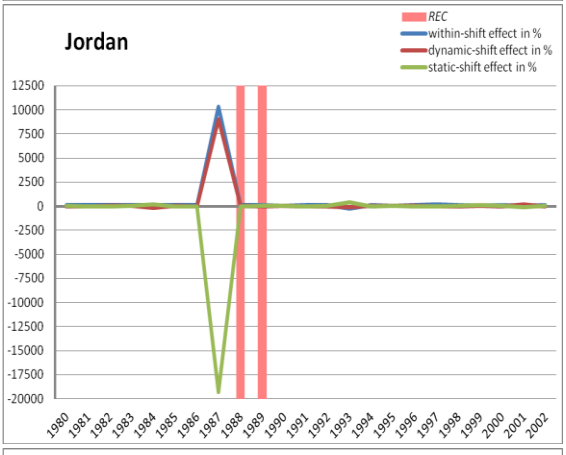
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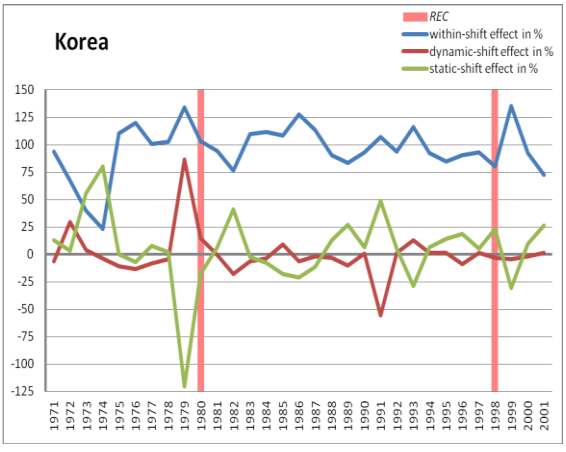
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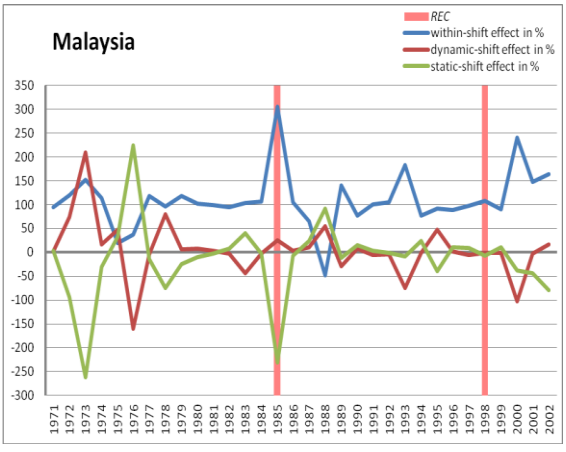
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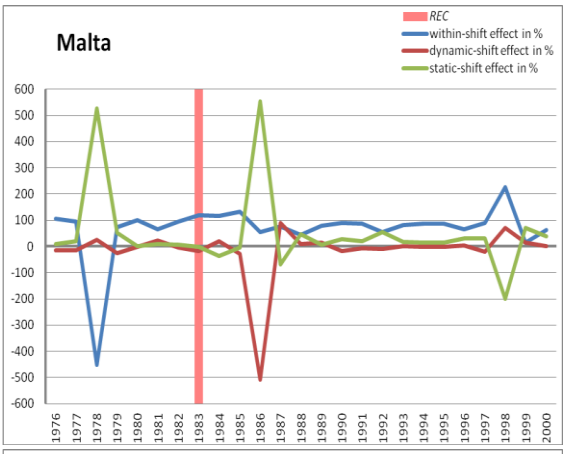
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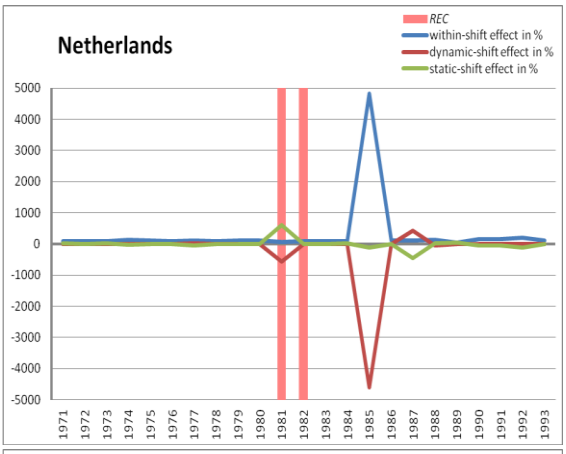
Netherlands
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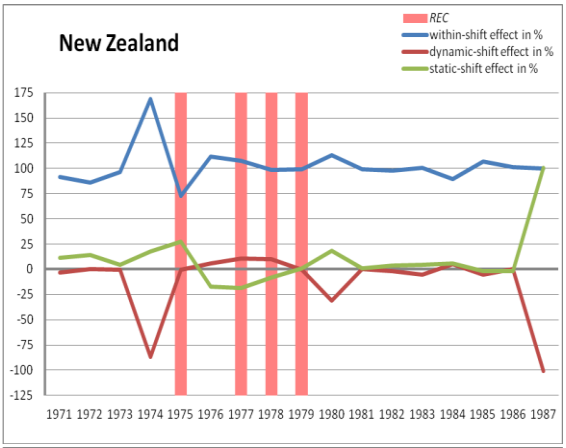
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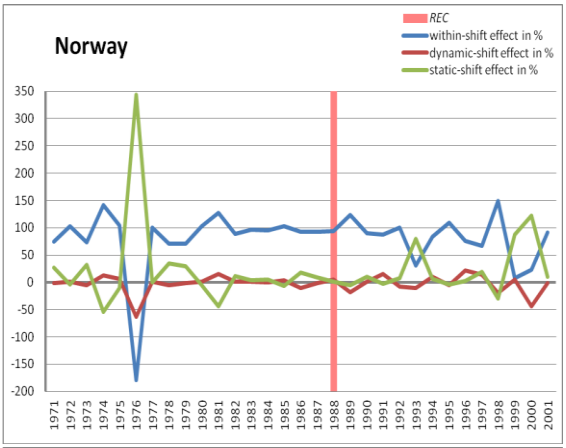
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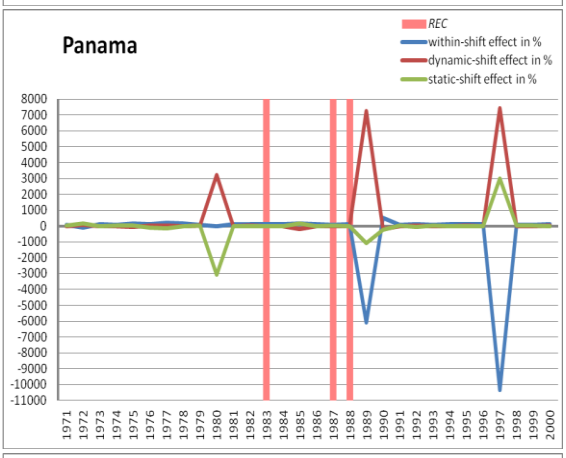
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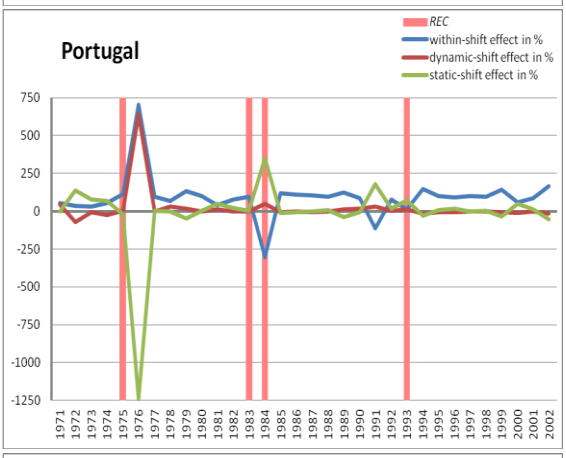
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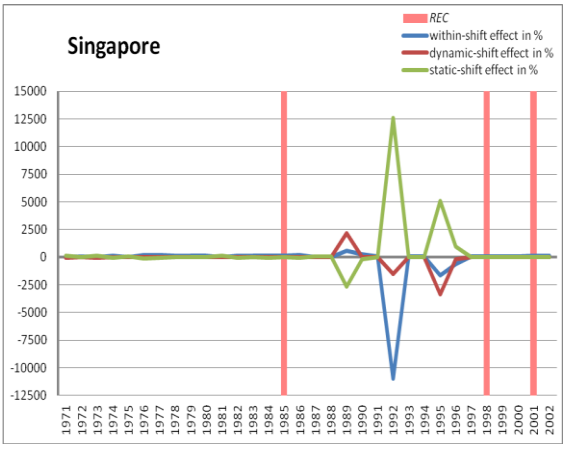
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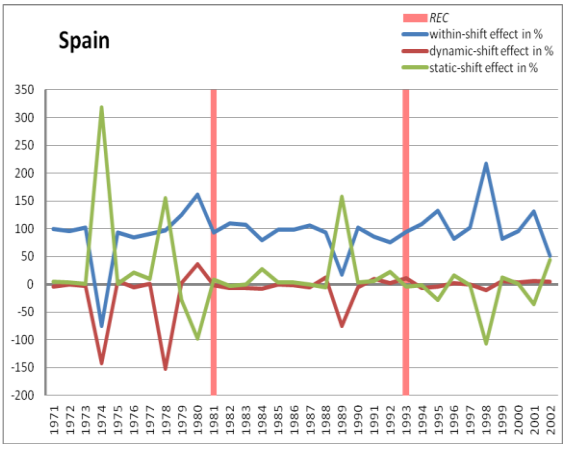
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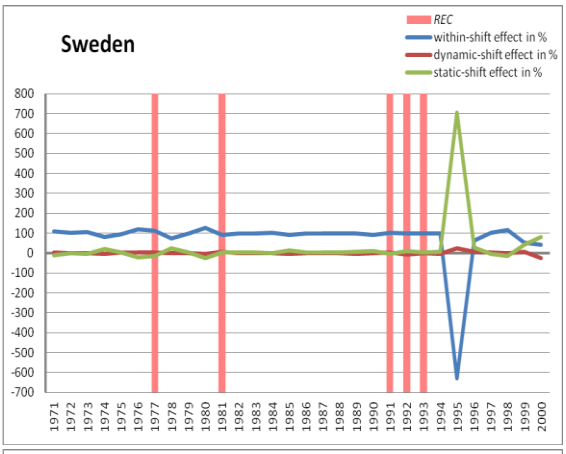
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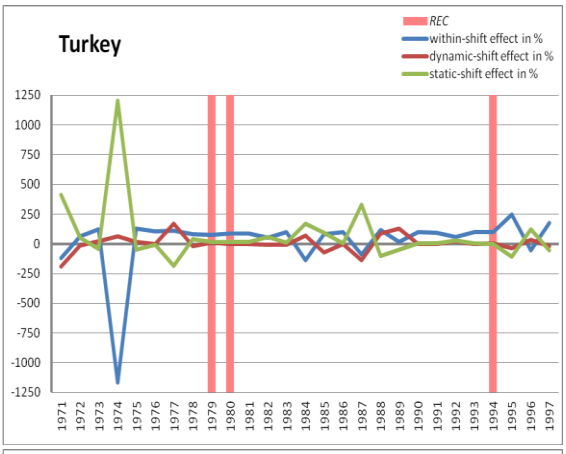
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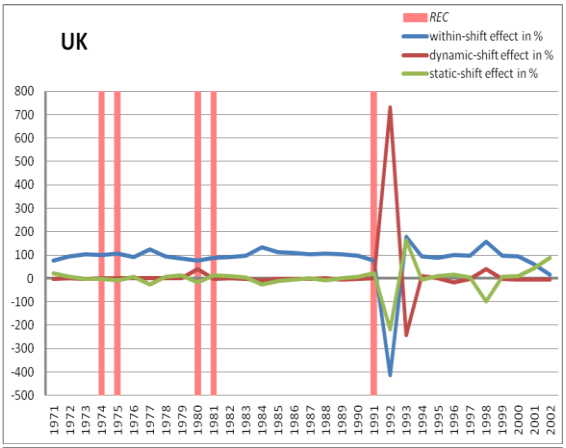
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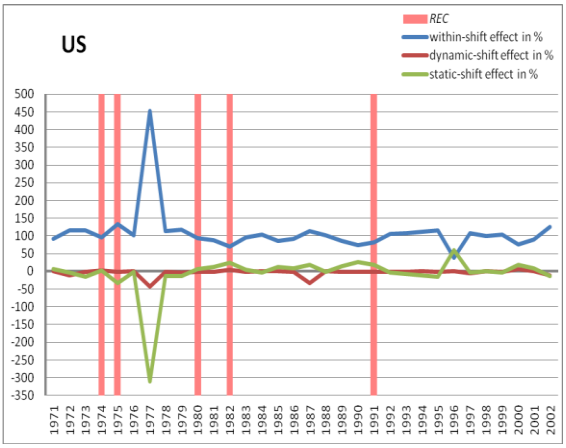
US
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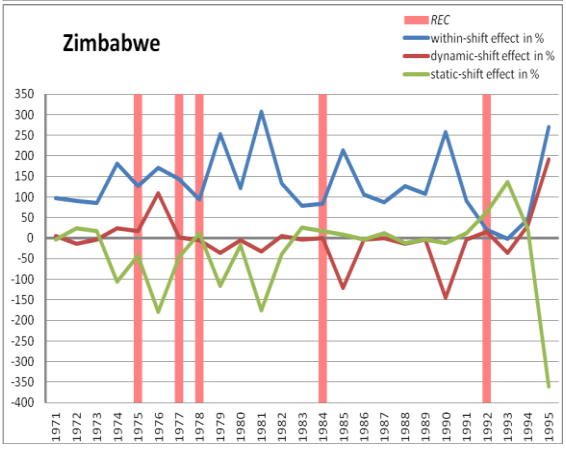
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Appendix A: List of industries

ISIC	INDUSTRIES
311	Food products
313	Beverages
314	Tobacco
321	Textiles
322	Wearing apparel, except footwear
323	Leather products
324	Footwear, except rubber or plastic
331	Wood products, except furniture
332	Furniture, except metal
341	Paper and products
342	Printing and publishing
351	Industrial chemicals
352	Other chemicals
353	Petroleum refineries
354	Misc. petroleum and coal products
355	Rubber products
356	Plastic products
361	Pottery, china, earthenware
362	Glass and products
369	Other non-metallic mineral products
371	Iron and steel
372	Non-ferrous metals
381	Fabricated metal products
382	Machinery, except electrical
383	Machinery, electric
384	Transport equipment
385	Professional & scientific equipment
390	Other manufactured products

Appendix B: Externally identified financial recessions

Country	Year of Financial Recession
Australia	1991
Denmark	1988
Ecuador	1999
Finland	1991-93
Greece	1993
Honk-Kong	1998
Hungary	1991-93
Indonesia	1998
Israel	1977
Italy	1993
Jordan	1989
Malaysia	1985
Norway	1988
Panama	1988
Spain	1981
Sweden	1991-93
Turkey	1994
UK	1974-75, 1991
US	1991