Factor Shares and Business Cycles in Emerging Markets

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Abstract

This paper investigates how differences in factor shares across countries contribute to the differences in business cycle properties between emerging market economies (EMEs) and developed economies (DEs). Using empirical data and standard international macroeconomic models, the paper shows that capital shares are strongly correlated with key moments such as the cyclicality of the trade balance and volatility of output. The findings suggest that differences in labor and capital income shares, observable across countries, play a central role in shaping macroeconomic dynamics.

1 Introduction

One of the key questions in international macroeconomics is why are the business cycles properties different between emerging market economies (EMEs) and developed economies (DEs). Several key moments of business cycles data are significantly different between the two groups of countries. Emerging market economies are characterized by higher volatility of output and higher relative volatility of consumption with respect to output. As pointed out by Aguiar and Gopinath (2007), one of the key characteristics of the business cycles properties in the emerging market economies is the negative correlation between trade balance and output compared to developed economies. It is precisely the relationship between trade balance and output that has been the subject of most of the studies on economic fluctuations in emerging market economies. This object of interest is clearly related to the current account of a country, which has been the center of the study of numerous researchers in the past few decades. Namely, there are a few phenomena related to the trade balance that have sparked interest in the research community such as sudden stops, the balance of payment crises, and trade balance reversals, all of them mostly happening in EMEs.

So far there has been little work that tries to explain these differences using characteristics of countries that are observable. Koren and Tenreyro (2007) use data on sectoral diversification of manufacturing industries and argue that it is a less diversified structure of the economy that is responsible for higher volatility of output. My approach differs as it tries to explain the countercyclicality of trade balance as a moment that is informative of the nature of business cycle differences. Recently, Drechsel and Tenreyro (2018) argue that the causes of differences in the aforementioned properties are to be found in the fact that EMEs are net commodity exporters. They argue that the price of commodities is negatively related to the interest rate premium that a country pays. In their model, these two characteristics can explain a large part of fluctuations in consumption and investment. In my paper, I focus on studying how differences in observed characteristics — factor shares — alone can explain the differences in the properties of business cycles using the standard models in international macroeconomics. Tretvoll et al. (2017) study business cycles in a framework with two sectors. EMEs are characterized by a larger share of commodities production in total GDP. In their model, this yields a higher volatility of GDP and net exports.

This paper studies differences in business cycle properties through the lens of factor shares, the share of income given to the respective factor. Surprisingly, the literature on business cycles has not investigated the effect of factor shares differences on the properties of aggregate fluctuations. The reason for this could be that since Kaldor (1957) factor shares were thought to be constant through time. However, this does not mean that the variation in factor shares across countries does not exist. In this paper, I use data from two different sources on the labor share of income. I show that over the whole period we study, EMEs exhibit a lower labor share of income. Next, I show that it is those countries that have a lower labor share of income that exhibit a strongly countercyclical trade balance.

The main contribution of this paper is a plausible explanation for the countercyclicality of the trade balance we observe in the data. As previously argued in the literature (Aguiar and Gopinath, 2007), this moment is key to understanding the differences in business cycles between the two groups of countries. My explanation for the countercyclicality of the trade balance relies on a variable that is observable in the data and does not generate an undesirable response of the trade balance. Namely, the main problem with permanent shocks as a mechanism for the countercyclicality of trade balance is the fact that it generates a trade balance which has autocorrelation close to unity. Also, the volatility of trade balance generated in this model can be 10 times larger than the one that we see in the data. As argued by Garcia-Cicco et al. (2010), a plausible explanation for the countercyclicality of the trade balance can not generate such a highly autocorrelated and volatile trade balance at the same time. My explanation for the countercyclicality of trade balance does not create any of the previous undesirable properties.

Our next step is to investigate how varying factor shares affect the response of main aggregates in two standard international macroeconomics models. First, using the present-value model of the current account I show that an unanticipated shock to an economy leads to a bigger increase in investments in the economy with lower labor share and higher capital share. Higher investment response translates into a higher permanent income response. The combined larger response of consumption and investment leads to a more countercyclical trade balance.

The intuition for the previous result is the following. Consider a firm which makes an investment decision and chooses its level of capital to maximize profits. If this firm finds out its productivity in the next period is higher compared to the current period, it will increase its next period capital. The firm pays interest rate r on capital. The higher the share of capital, the less concave the production is in capital and the higher is the increase of optimal capital in response to an increase in productivity. Of course, since an additional unit of capital is more productive, this also has an effect on the response of owners' wealth. Since more is produced in response to a positive shock, wealth increases by a larger amount. This also means that consumption responds more when the capital share is higher. The current account of this economy is roughly equal to the difference between savings and investment. One can see that once the economy with a higher capital share starts growing, its current account will deteriorate more.

Our previous intuition holds in a model with no labor and a constant interest rate. To further investigate how factor shares affect business cycle moments I use a small open economy model, as in Aguiar and Gopinath (2007), but in our case abstracting from permanent shocks. I find that the model does well quantitatively in terms of the correlation between trade balance and output, and the relative standard deviation of consumption. However, the volatility of output decreases when I increase the capital share. This happens because the stock of capital increases in the steady-state. An increase in the factor of production which is less volatile leads to a decrease in the volatility of output.

Finally, I try to examine the possible explanations for the differences in the volatility of output. A simple model used in this paper does not generate an increase in output volatility when I increase the capital share of income. This paper argues that one can explain the volatility of output with the diversification argument, as in Koren and Tenreyro (2007). My contribution is to use the input-output matrix of the whole economy. Koren and Tenreyro (2007) investigate how sectoral diversification affects output volatility. They use sectoral shares provided by the UNIDO, which enables them to obtain the shares of manufacturing sectors. I find that both when using the shares of manufacturing sectors and the shares of all sectors in the economy the result remains unchanged.

The approach of using DSGE models to study the differences in business cycles properties has been previously employed in several studies. Neumeyer and Perri (2005) study the properties of business cycles using the RBC framework, introducing the interest rate shocks to the analysis. They show that the desired properties can be generated by introducing the shocks to the interest rate at which the country borrows at the international markets. This further translates into these countries having higher volatility, as well as a more countercyclical trade balance.

Boz et al. (2011) study the economy where the agents in the emerging markets are facing a higher degree of uncertainty when formulating expectations. Agents in their model are slower to distinguish between a transitory and a permanent component of the business cycle. Their model is able to generate the desired properties of business cycles, but in addition, yields a more realistic response of the labor supply and output in response to the trend shocks.

Garcia-Cicco et al. (2010) investigate whether the RBC model extended with permanent shocks is a useful framework to study the business cycles in EMEs. Their approach is to take a longer time series of the main economic aggregates, which allows them to estimate the properties of the technological process in a more convincing way. Their sample is more than a century-long, from 1900 to 2005. However, their sample of countries is rather limited – Argentina and Mexico. Their main finding is that permanent technological shocks fail at several dimensions in explaining the differences in business cycle properties. First, in the model, the trade balance follows a near-random walk, while in the data, the autocorrelation is less than 0.6. Secondly, the volatility of the trade balance in this model is 20 times higher than the one in data. My approach doesn't suffer from the previous flaws.

One of the first papers that try to resolve the puzzle of higher capital shares in poor countries is Gollin (2002) who argues that rich countries measure higher capital share because the usual approach underestimates labor income in small firms. Bernanke and Gürkaynak (2002) include a larger sample of countries in their study and find the same conclusion as Gollin (2002).

Capital shares also play an important role in the study by Caselli and Feyrer (2007) who study whether the marginal product of capital differs across countries. The question they pose is whether international credit frictions prevent flows from rich to poor countries. They perform adjustments on the standard measures of marginal product of capital and arrive at the conclusion that the capital shares do not differ in a systematic way across rich and poor countries.

However, recently there have been studies documenting that capital shares systematically differ across countries. More precisely, these studies claim that richer countries have lower capital shares compared to poor countries. Izyumov and Vahaly (2015) argue that most of the results on the variation of capital share across countries differ due to assumptions on the labor income of unincorporated enterprises. These enterprises are much more important in developing countries and the assumption on how their GDP is split shapes the results on factor shares. Rodríguez and Ortega (2006) revisit the previous findings on capital share variation using the dataset provided by UNIDO, which are designed to accurately measure production, value-added, employment and wages in the corporate manufacturing sector. Their argument is that using this dataset avoids the problem of self-employment biasing results, as is the case in previous studies. Our results carry over to the capital share measure used by Rodríguez and Ortega (2006) and suggest that capital share plays an important role in determining the differences in business cycle properties among EMEs and DEs.

The layout of the paper is as follows. Section 2 introduces data that is used in the study of imports and business cycles data. Section 3 presents the main stylized facts from the data and discusses a simple model that explains them. Section 4 uses a standard one-sector small open economy model to study the consequences of varying factor shares. Section 5 concludes.

2 Data

Our data on the labor share of income comes from a dataset available from the Penn World Tables. For some of the countries in the sample, for a certain period of time, the labor share is constant.[1] Next, the data used to construct business cycle moments comes from Martin Uribe's webpage [2], dataset provided by Aguiar and Gopinath (2007) and IMF.[3] When I calculate the average labor share in each country I use the period starting from the 1980s until the last period that is available in the data.[4] Additionally, I obtain data from the study on labor shares by Guerriero (2019) and perform checks with this data.

The data on input-output matrices is obtained from the OECD statistical database. This data features an input-output table for 34 sectors in the economy at purchasers' prices. The data also provides already calculated Leontief matrices and its inverse.

These tables also provide already calculated value-added per sector, as well as the output per sector, which can be further used to calculate the shares of factors of production in the production function, as well as the shares of sectors in the output. Importantly, the data

[1] I have performed robustness checks using only years in which labor shares are not constant and results do not change.

[2] http://www.columbia.edu/ mu2166/book/empirics/

[3] Most of the data comes from the World Bank, but some countries the data is not available on World Bank. For those countries, I use data from IFS. More information can be found in the Appendix

[4] As in the previous case, results do not change significantly if I include only years for which labor share changes.

from the OECD on input-output matrices is available starting from 1995 and till 2012.

Compared to previous studies on business cycle differences, our study has more countries in the sample. The final sample that is used in most of the paper is 25 countries. Two of the countries were dropped as there is no data on input-output matrices available. The list of countries is presented in Appendix - Table A1.

3 Labor Share in EMEs and DEs

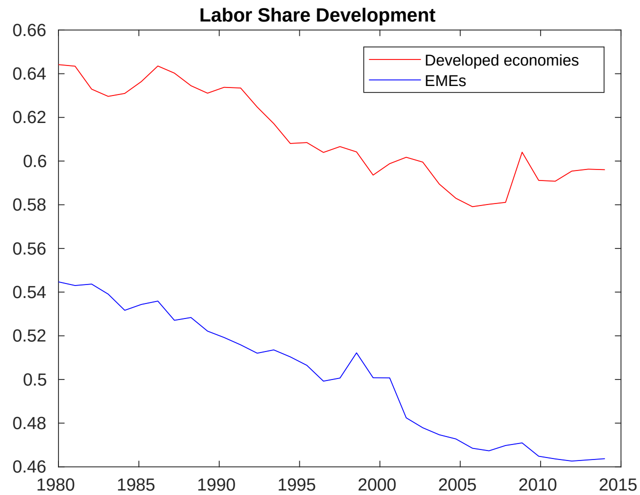
Labor share is a well-studied concept in macroeconomics at least since Kaldor (1957). Recently, there has been a large literature documenting the decrease of the labor share of income in a rich sample of countries. However, very few studies have covered cross-country differences in labor share or documented it. For example, Kabaca (2011) studies labor share fluctuations in EMEs, but also documents that they are considerably different across EMEs and DEs. Gollin (2002) studies differences in labor share among rich and poor countries and argues that once one makes adjustments the differences disappear.

Our first step is documenting the differences in labor share across two groups of countries since the 1980s. I use a dataset available from the Penn World Tables. Figure 1 presents results of this exercise. There are several things to notice on this graph. First, during the whole period we observe, emerging market economies have constantly lower labor share of income. This is perhaps not surprising as labor is usually much cheaper in emerging market economies than in the developed economies, while intermediate and capital goods are relatively more expensive Hsieh and Klenow (2003). Second, the difference between the two remains roughly constant over the whole period. The difference between the two is roughly 0.1 percent at the beginning of the period. This difference increases only by a small amount right at the end of the period we observe. Third, the labor share of income is declining during the whole period. This observation was already studied by Karabarbounis and Neiman (2013). However, it is interesting to see that even after the changes in the labor share of income across the world were taking place, the difference between the two groups of countries remains relatively stable.

This is an important observation, as it gives us an insight into how the production process is different in these two groups of economies. Since the difference in labor shares remains almost constant it is important to understand the consequences of such differences for the business cycle moments.

Our next observation is related to the relationship between the labor share of income and the cyclicality of the trade balance. One could say that solely by transitivity we would expect that labor share and correlation between trade balance and output are positively

Figure 1: Labor Shares - EMEs vs DEs



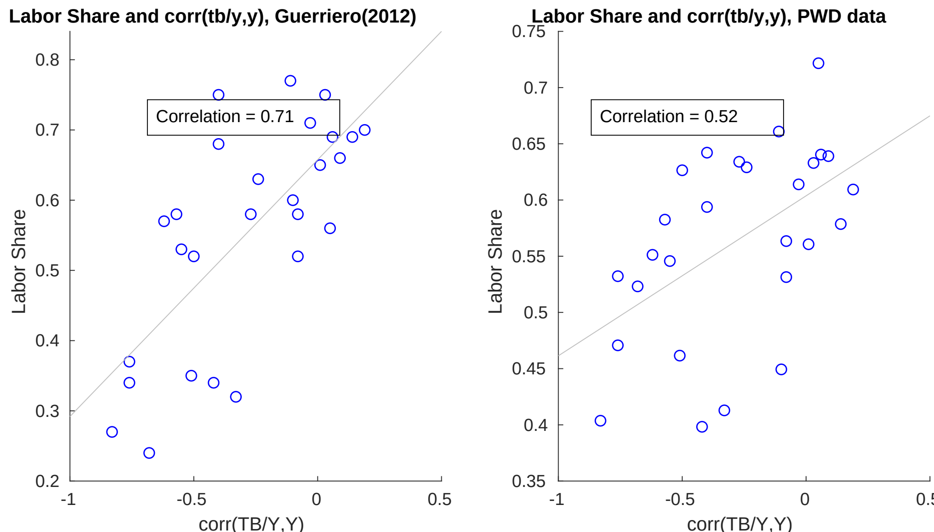
Notes: Red line shows average labor share in DEs and red line in EMEs. This figure uses data from the PWT. For each country we take the average of labor share from 1980 till 2012. Then we take the average of labor share for each group.

correlated. However, since correlation is not transitive this may not be the case. To explore this relationship we use two datasets. The first dataset features data points from the Penn World Database. I take the average labor share from 1980 till 2012, the time span I also use to calculate business cycle moments, and investigate the relationship. As Guerriero (2019) shows, literature has considered many ways in which labor share can be calculated. Most of them are highly correlated among each other, but differ in levels. Since the Penn World Database features some countries with constant labor share in the beginning of the sample I also check the robustness of this finding using the data from Guerriero (2019), where I use her first version of labor share [5], as it has the largest number of countries in the sample.

Figure 2 presents the result from previous exercise. It is clear that the relationship between these two exists and is quite strong. Using the data from Guerriero (2019), I find that the correlation between the labor share of income and the correlation between trade balance and output is 0.71. This relationship is a bit weaker if we look at the relationship between the labor share and output calculated using the Penn World Database, with around 0.52. In other words, it is those countries that have a higher labor share and a lower capital share that have a more procyclical trade balance. Conversely, countries that have a lower labor share of income and a higher share of capital are the ones who have a more countercyclical trade balance.

[5] In the paper by Guerriero (2019) referred to as LS1.

Figure 2: Labor Share and Trade Balance



Notes: These graphs show the relationship between the labor share and the cyclicality of trade balance using two different datasets. We can see that the relationship between the labor share and the cyclicality of trade balance exists and is strong. The right graph uses the average of labor shares from 1980 till 2012 for each country using PWD data. Trade balance as a share of output has been filtered using HP filter with a smooting parameter 1600.

Figure 3 repeats the previous exercise using the results from Rodríguez and Ortega (2006) and finds that the previous relationship also holds if we use the capital share instead of the labor share.

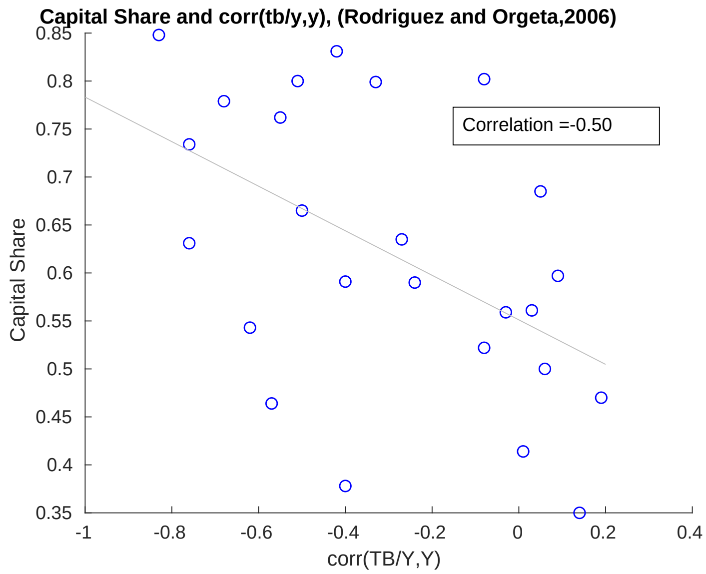
Where does the difference in labor shares across these two groups of countries come from? We are looking at the labor share of income in a cross-section of countries. We can write the difference in labor shares of income across groups of countries as:

$$\Delta\bar{\alpha_g} = \sum_i \bar{\alpha}_{g,i}\Delta\eta_{g,i} + \sum_i \bar{\eta}_g\Delta\alpha_{i,g}, \tag{1}$$

where $\Delta\bar{\alpha_g}$ is the difference of labor share of income across two groups, i is denoting the sector, g denotes the group of countries. η is the share of the sector in the GDP of a country. I use the data on labor shares from 34 sectors across 17 years. For each sector, I take the average of labor share over 17 years, as well as the average of the share of sectors in output. This is the first column of Table 1. Next, I fix the share of labor within sectors to be equal to the mean labor share of developed economies. I allow the share of sectors to change across countries. This exercise is presented in Column 2. Finally, I fix the share of sectors to be

[6]Notes: Data for this figure was taken from Rodríguez and Ortega (2006). Czech Republic and Switzerland data is not available and is omitted from this figure.

Figure 3: Capital Share and Trade Balance [6]



Notes: This figure presents the relationship between the cyclicality of the trade balance and the capital share, where the capital share data is obtained from Rodríguez and Ortega (2006)

equal to the mean of sector share in developed and I allow labor share to vary across sectors. The results of this exercise are presented in Table 1.

The results of this exercise show that most of the difference in the labor share of income in the countries comes due to all sectors in developed economies having a relatively high labor share. This also suggests that it is not the case that in developed economies, there are some sectors that have a higher share in GDP and also a high labor share of income. Taking stock, these results suggest that the dispersion of labor share of income across sectors in an economy does not play an important role. Since what is important is weighted labor share of income and dispersion across sectors doesn't matter, we can think about one-sector models to study how the varying labor share (capital share) of income affects various moments of business cycles.

Table 1: Decomposition of Labor Shares

Group	Mean	Fixed Labor Share	Fixed Sector Shares
Developed Economies	0.56	0.57	0.55
Emerging Market Economies	0.4	0.54	0.42
Diff.	0.16	0.03	0.13

The table shows the decomposition of labor share differences between the DEs and EMEs. Differences can be either due to high labor share sectors having larger share in DEs, or it could be that all sectors have higher labor share in DEs. The table was produced using the data available from the OECD input-output matrix. Labor share for each sector was calculated using the average value over the observable period.

3.1 Factor Shares in the Present-Value Model of the Current Account

I now turn to explain the importance of labor, that is capital share, for the response of main aggregates in a standard international macroeconomics model. To that end, I use the present-value model of the current account. Our goal is to investigate how lower labor shares — higher capital shares — matter for the response of savings and investments.

The economy consists of a representative household maximizing its sum of discounted utilities:

$$U_t = \sum_{t=0}^{\infty} \beta^t lnC_t, \tag{2}$$

where C_t is consumption in period t. Labor is inelastically supplied. Firms have a standard Cobb-Douglas production function:

$$Y_t = A_t K_t^{\alpha}, \tag{3}$$

where K_t is the stock of capital at time t and A_t is productivity at time t. For simplicity, I assume that there is no depreciation and the law of motion for capital is:

$$K_{t+1} = K_t + I_t, \tag{4}$$

where I_t are investments in period t. Current account is defined as:

$$CA_t = Y_t + rB_t - C_t - I_t, \tag{5}$$

where r is the world interest rate, which is a standard assumption in small open economy models. As usual in the literature, I assume that the current account is identical to the trade balance and all statements that I make are related to the current account are translated to trade balance. Next, I define total wealth as:

$$W_t = (1+r)B_t + \sum_{s=t}^{\infty} \left(\frac{1}{1+r}\right)^t (Y_t - I_t), \tag{6}$$

where B_t is the value of debt at time t. In the following assume that $\beta(1+r) = 1$. Using the optimal decision rules of firm and household, as well as aggregate constraint, I obtain:

$$\bar{C} = \frac{r}{1+r} W_t, \tag{7}$$

where $\bar{C}$ is used as consumption in all periods is equal, given that productivity stays constant. In this case, the household is consuming an annuity of total wealth.

Having defined the setup, we can see that the model we presented does not feature any stochastic shocks. While this is the main feature that will make our analysis more interesting, for now, we are able to make the main point about the change of investments and permanent income due to a change in productivity, using this simple model.

Consider the following experiment. The economy is in a steady-state, and has a productivity $A_t = 1$. An unanticipated shock to productivity, with the magnitude of η, hits the economy at time t. The shock is permanent and does not decrease over time. Using the firm decision rule we can see that:

$$\hat{K}_{t+1} = (1+\eta)^{\frac{1}{1-\alpha}}, \tag{8}$$

where $\hat{K}_{t+1} = \frac{K_{t+1}}{K_t}$ and we can see that the next period capital increases in the value of shock. More importantly, we can see that higher capital share, that is lower labor share, means that capital is increasing more in response to an unanticipated productivity shock. This property of the model is very intuitive and just means that, as long as an economy needs more capital to produce the good, the larger will be an increase in capital due to growth.

We know that in this simple model consumption is determined by wealth. To make things more simple, we additionally assume that the value of debt in period t is 0. Then, using our previously derived expression for consumption, we obtain the following:

$$\hat{W}_t = \frac{W_t - W_{t-1}}{W_{t-1}} = \eta + \frac{1}{r}((1+\eta)^{\frac{1}{1-\alpha}} - 1) - (\frac{\alpha}{r})((1+\eta)^{\frac{1}{1-\alpha}} - 1), \tag{9}$$

By inspecting a derivative of wealth response with respect to α:

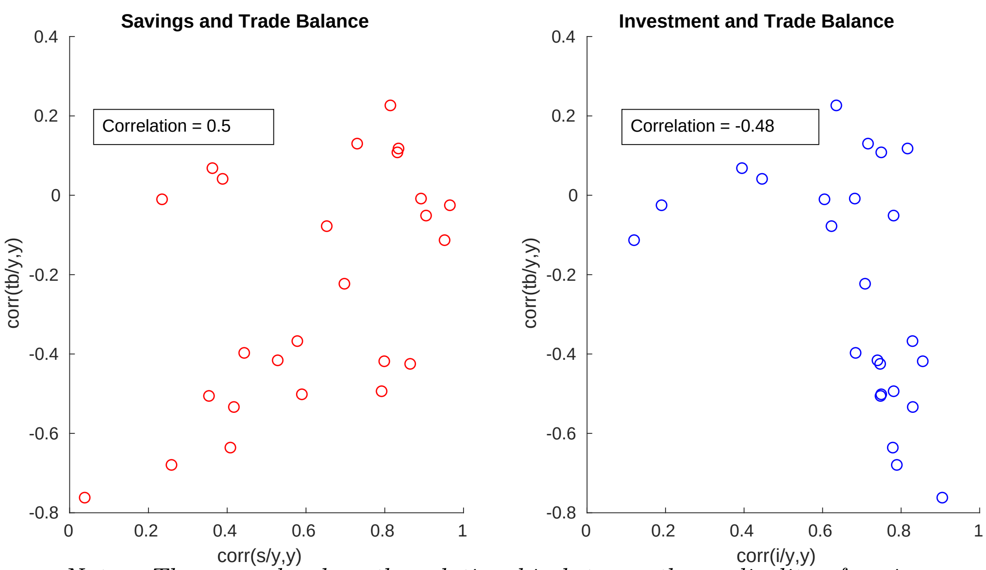
$$\frac{d\hat{W}_t}{d\alpha} = \frac{1 + (\frac{log(1+\eta)}{1-x}) - 1)(1+\eta)^{\frac{1}{1-\alpha}}}{r} \tag{10}$$

where we can see that the percent increase in wealth, and therefore consumption, is higher for larger value of α. The intuition for this result is simple. The higher is the capital share in the production function, transferring resources across periods is more feasible and the same value of productivity shock, therefore, yields a bigger change in the permanent income in response to a productivity increase.

We have now established how consumption, and therefore savings, respond to an increase in productivity. In our previous analysis, we have also found that an increase in the next period capital is bigger if the capital share is higher. We can now conclude how the share of labor — or capital — affects the response of trade balance in response to an unanticipated shock. Namely, the higher is the share of capital, the lower is the growth of savings and the higher is the growth of investment in response to positive productivity shocks. These two together imply that a lower share of labor means a more negative trade balance in response to a positive productivity shock.

What drives the countercyclicality of trade balance? It could be countercyclical savings or procyclical investments, or a combination of the two. Figure 4 shows the relationship between the correlation of trade balance and output and the correlation of savings and output, as well as the correlation between investments and output.

Figure 4: Savings and Investments



Notes: These graphs show the relationship between the cyclicality of savings and investments, and the cyclicality of trade balance. These graphs tell us that both investments and savings are driving the countercyclicality of trade balance in EMEs. Trade balance as a share of output has been filtered using HP filter with a smooting parameter 1600.

Figure 4 [7] is important for our understanding of the mechanism that drives changes in the trade balance. I find that it is those countries that have countercyclical savings are also the ones that have a countercyclical trade balance. This means that in countries with a countercyclical trade balance consumption responds more to an unanticipated productivity shock, which decreases savings relatively more. At the same time, I find that countries that have relatively more procyclical investments are the ones that experience a more countercyclical trade balance. These two observations point in the direction that a theory that explains countercyclical trade balance needs to explain both larger responses of investments and consumption. In the Appendix, I show that these relationships are the same if I include more countries in the sample. Figure A1 shows the previous exercise once I also include additional countries[8].

[7] Note that in this Figure data on the Czech Republic is missing. Czech Republic is not in the figure, as there was no available data on consumption or investments for the given period. All the variables have been filtered using HP filter with a smoothing parameter 1600.

[8] Additional countries are Ecuador, Portugal and Slovak Republic

4 Model

In this section I present a small open economy model and investigate how varying factor shares matters for the key moments of business cycles in this model. Production function of the firm is:

$$Y_t = exp(a_t)K_t^{\alpha}L_t^{1-\alpha}, \tag{11}$$

where Y_t is the output at time t, a_t is the productivity at time t, K_t is the amount of capital used in production at time t, L_t is the amount of labor employed at time t. Capital follows the law of motion:

$$K_{t+1} = I_t + (1-\delta)K_t, \tag{12}$$

where I_t are investments in the next period capital and δ is the rate of depreciation.

This model features a productivity process, that follows an $AR(1)$ process, which is presented by equation:

$$a_t = \rho a_{t-1} + \epsilon_{a,t}, \tag{13}$$

where $\epsilon_{a,t} \sim \mathcal{N}(0, \sigma_a)$ and ρ is the coefficient of the $AR(1)$ process.

Households maximize sum of discounted utilities, where the per-period utility is given by:

$$U(C_t, L_t) = \frac{[C_t^{\gamma}(1-L_t)^{1-\gamma}]^{1-\sigma}}{1-\sigma}, \tag{14}$$

where γ is the share of consumption in per-period utility and σ is the intertemporal elasticity of substitution.

Aggregate resource constraint is:

$$Y_t = C_t + I_t + \frac{\phi}{2}\left(\frac{K_{t+1}}{K_t} - 1\right)^2 K_t + NX_t, \tag{15}$$

where ϕ captures investment adjustment costs and NX_t are net exports at time t.

Economy has access to international financial market, where it can issue debt, which it must repay next period with an interest rate r_t. Therefore, current account is equal to:

$$NX_t = B_t - (1+r_t)B_{t+1}, \tag{16}$$

where B_t is debt position at time t. Additionally, to make our model stationary I resort to one of the possible solutions introduced by Mendoza (1991). Namely, I make the country-specific interest rate respond to the level of debt of a country:

$$1 + r_t = R^{\star} + \psi(exp(B_{t+1} - B_t) - 1), \tag{17}$$

where $R^{\star}$ is the steady-state interest rate and ϕ governs the response of interest rate to a change in debt.

4.1 Shares and Properties of Business Cycles

Having specified our framework, I can use the model to investigate the channels through which differences in factor shares affect the economy. I am interested in how the factor shares of labor — or capital — affect the properties of business cycles. We have previously established that the labor shares are different across two groups of countries.

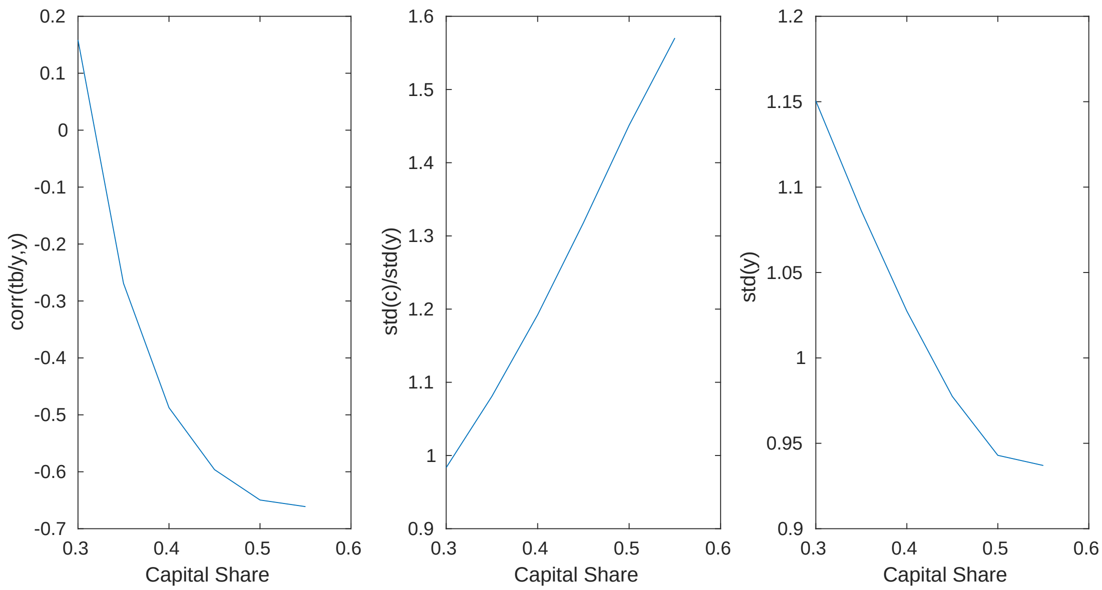
Table 2: Parameter Values

Parameter	β	ψ	σ	δ	ϕ	γ	ρ	σ_a
Value	0.98	0.0001	2.0	0.1	10	0.3	0.9925	0.008

Calibration is presented in Table 2. The period in this study is quarter and I set the discount rate to 0.98. Risk-free rate is such that $\beta(1 + r^{\star}) = 1$. The parameter governing intertemporal substitution is 2. The depreciation rate is 0.1. The coefficient on the elasticity of the interest rate is 0.0001. The steady-state level of debt is 10 percent of GDP, as in Aguiar and Gopinath (2007). Capital adjustment costs are set to 10, as in Neumeyer and Perri (2005). Values of parameters used are standard and are taken from Aguiar and Gopinath (2007), except for the standard deviation of the productivity shock and its persistence, which I fix in different specifications. I examine how the changes in capital share affect the correlation between trade balance and output, the standard deviation of output, and the relative standard deviation of consumption with respect to output. Figure 5 presents the results of this exercise.

First, notice that the moment we are interested in, the correlation between trade balance and output is decreasing in the share of capital in the production process. The channel through which the capital share affects the trade balance movement is through changes in the permanent income of households and the larger response of investments. Namely, higher capital share, as already explained in previous sections, enables households to transfer resources across periods, with a higher return compared to the lower capital share case. When the economy is hit by a positive productivity shock, permanent income changes much more compared to the case with lower capital share. Since current consumption depends on the

Figure 5: Capital Share and Key Moments



Notes: Results from the calibration exercise, where I use the calibration described in 2. The only parameter that changes is the capital share. I simulate the model 10,000 times for each calibration and plot the cyclicality of trade balance, relative standard deviation of consumption and output volatility.

permanent income, this means that current consumption will increase much more in the case of a high capital share. Intuition for the response of investments is simple. The higher the share of capital in an economy, the more investments will this economy need once it starts growing.

Second, notice that the standard deviation of output is decreasing in the level of capital share. In small open economy models the ratio between capital and labor in steady state is determined by the steady-state interest rate, depreciation rate, and the capital share:

$$\frac{K}{L} = \left(\frac{r+\delta}{\alpha}\right)^{\frac{1}{1-\alpha}}, \tag{18}$$

where we can see that an increase in the capital share implies an increase in the capital-labor ratio. Now if we consider a production function, we can see that we are increasing the share of a variable that is a stock variable. Moreover, with an increase of α, we are also increasing the level of stock. The stock of capital is a variable that is less volatile than labor. For this reason, an increase in capital share leads to a decline in the volatility of output. This is one undesirable property of the one-sector model. In this model, an increase in capital

Table 3: Business Cycle Moments

	$\sigma(y)$	$\sigma(i)$	$\sigma(c)$	$\sigma(nx)$	$\rho(y)$	$\rho(\Delta y)$	$\rho(c,y)$	$\rho(i,y)$	$\rho(nx,y)$
$\alpha = 0.3$	2.08	2.47	1.99	0.51	0.75	0.1	0.98	0.98	0.16
$\alpha = 0.6$	1.74	2.5	2.99	2.19	0.77	0.26	0.89	0.96	-0.66

[9]See below

share necessarily leads to an increase in the capital to labor ratio. This is not the case in two-sector models, where an increase in capital share could be due to the higher price of investment goods compared to a consumption good.

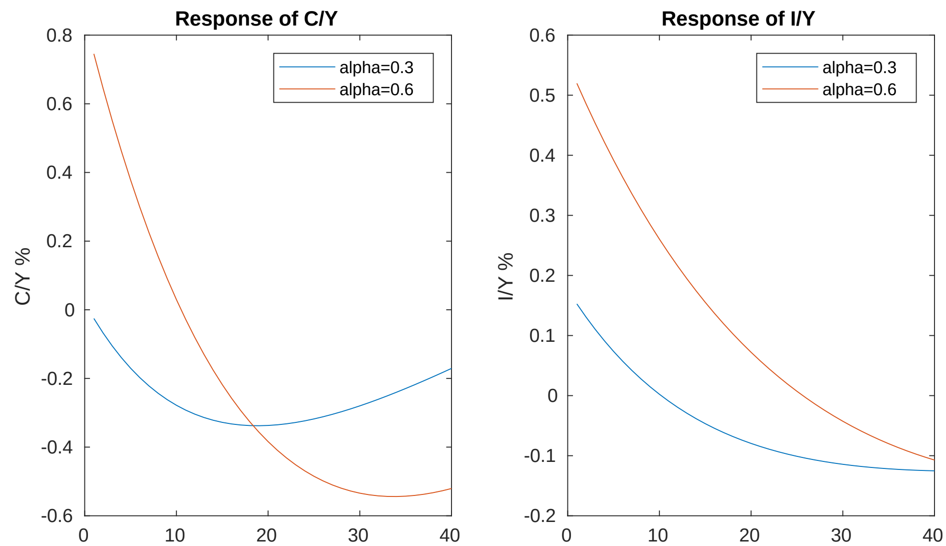
Third, the standard deviation of consumption relative to the standard deviation of output increases with a higher level of capital share. Increasing capital share increases the response of permanent income and the initial response of consumption to productivity shocks and the correlation of consumption with output. Moreover, since the volatility of output is decreasing in the share of capital, these two in effect mean a higher relative standard deviation of consumption with respect to output.

Table 3 presents the theoretical business cycle moments from the following exercise. I use the parameters already provided in Table 2. I provide business cycle moments of the exercise where I use the capital share of 0.3 and 0.6. I do so for the moments that are usually inspected in the business cycles literature. We can see that an increase in the capital share leads to an increase in the countercyclicality of trade balance and that it can generate it in the range that we see in the data. This is also true for the relative standard deviation of consumption. Interestingly, increasing the capital share also means a higher autocorrelation of output growth. This is interesting as it suggests that we are possibly measuring relatively more important permanent shocks in EMEs exactly because they have higher capital shares, which generates previously mentioned persistence of output growth. Additionally, the standard deviation of the trade balance is increasing with an increase in the capital share.

In the previous section, I have argued that that the response of consumption and investments is crucial for understanding the trade balance. Figure 4 suggests that savings and investment both play an important role for the trade balance and not only savings. Correlation between savings and output doesn't even approach negative values, which would be the case if only savings change was driving the trade balance. I examine the effect of a positive productivity shock on the trade balance by looking separately on how consumption and investments respond to a shock.

[9]Results from the simulation exercise, for two different values of the capital share.Theoretical moments are computed using the parameters provided in Table 2.

Figure 6: Capital Share and Impulse Response Functions



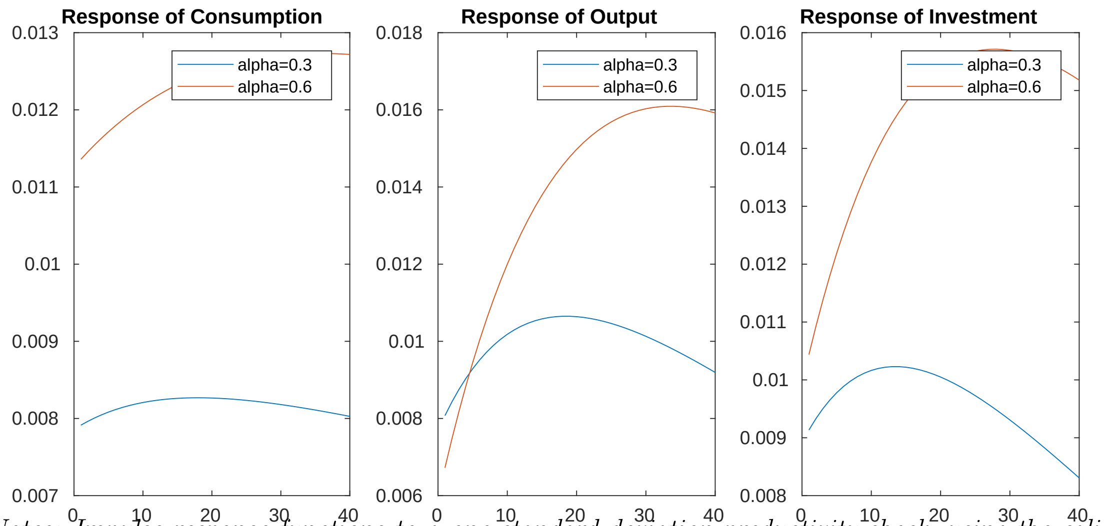
Notes: Impulse response functions of consumption and investments as a share of output, to a one-standard deviation productivity shock, using the calibration described in the Table 2.

Figure 6 shows consumption and investments in response to a productivity shock. Both consumption and investments as a fraction of output respond to a productivity shock. This is in accordance with what we see in the data, as it is both savings and investment that play a role in the countercyclicality of trade balance.

In Figure 7 we can see the response of consumption, investments, and output in response to a positive productivity shock. Consumption is the component that has the largest change in response due to different capital share, with an increase of around 3 percentage points for the given calibration. Investments also exhibit a significant increase. Output also exhibits an increase, but this increase comes after more than 10 periods in the model. It is exactly this response of output which yields a decreasing standard deviation of output with respect to capital share.

As suggested by Garcia-Cicco et al. (2010), if the parameters governing permanent shocks are estimated using long samples, the autocorrelation of net exports becomes almost 1 even 100 periods after the shock. The reason for this is that since interest rate elasticity with respect to debt in these models tends to be small, consumption is relatively persistent. Of course, this is not the only determinant of net export autocorrelation, but it is certainly one of the main drivers. I explore the possibility that our specification is plagued by the same problem since our value used for interest rate elasticity to debt is even lower than in standard calibration such as Aguiar and Gopinath (2007). I use the same calibration as in the previous section. Figure 8 presents the results of this exercise.

Figure 7: Capital Share and Impulse Response Functions 2



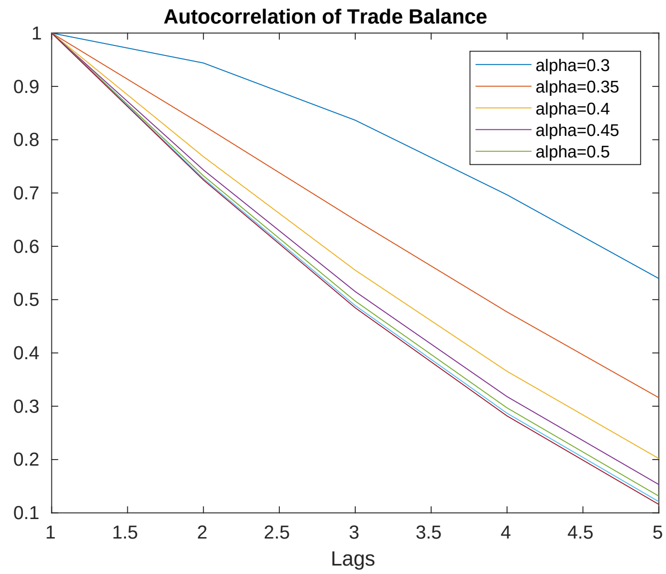
Notes: Impulse response functions to a one-standard deviation productivity shock, using the calibration described in the Table 2. While investment and consumption have a larger response for a higher value of capital share, this is not true for output. This leads to the lower standard deviation of output when we increase the capital share.

Figure 8 shows that this approach does not suffer from the problem with autocorrelation being constantly 1. Different color lines represent autocorrelation functions with different lags. None of the autocorrelation functions are close to being constant at unity. This makes sense as the main driver of the countercyclicality are not the permanent shocks, which would make consumption much more permanent. What is perhaps even more interesting is that the autocorrelation function is steeper downwards for higher capital shares.

We have previously seen that labor shares — capital shares — are highly correlated with the cyclicality of trade balance in the data. Throughout the paper we have argued that factor shares are doing a good job at explaining the countercyclicality of trade balance in EMEs. Now that we have set up a model we can use it to explore how much of variation in the cyclicality of the trade balance that we see in the data can be explained by the model if the only variable that we change in the calibration are the factor shares. The experiment is the following. I use the previously defined calibration from the Table 2. I produce the correlation between the trade balance and output for each country in the sample using the data on labor shares from the PWT and compare these with the actual correlation between the trade balance and output that we see in the data.

Figure 9 shows the results of the exercise. We can see that the correlation between the model generated cyclicality of the trade balance and the one that we see in the data is 0.45 and quite close to the correlation between the labor share and the cyclicality of the trade balance.

Figure 8: Autocorrelation of Trade Balance-To-Output Ratio



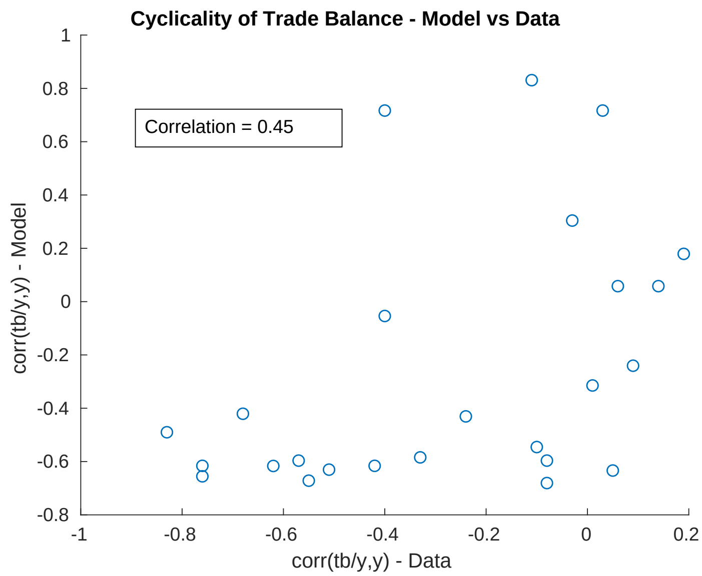
Notes: Autocorrelation function for different values of lags. Different colors are functions for different values of capital share. It is clear that the increase in the capital share does not lead to an increase in persistency of the trade balance.

5 Sectoral Diversification and Output Volatility

Our previous considerations point to the fact that the capital share alone can't generate the standard deviation of output that we see in the data. Reasons for a high standard deviation of output are many, and in the context of emerging market economies, this fact has been analyzed by many researchers. Garcia-Cicco et al. (2010) argue that financial frictions are responsible for a higher standard deviation of output in EMEs. According to them, emerging market economies face more financial restrictions when they want to borrow internationally. This makes it harder for households to smooth consumption and translates into higher consumption volatility. Since investment also depends on the interest rate, it also translates into higher investment volatility. Given that these two are the main components of output, the standard deviation of output increases.

Unlike previous papers, Koren and Tenreyro (2007) are interested only in the standard deviation of output. Using data from the United Nations Industrial Development Organization (UNIDO), they identify that one of the possible reasons for higher output volatility is a more specialized economy and lower sectoral diversification. While their result is intuitive, it relies on the data from the manufacturing sectors. More recently, Carvalho and Gabaix (2013) use a static model to analyze how changing sectoral diversification has affected the volatility of output in the United States and find a strong relationship between the two.

Figure 9: Cyclicality of Trade Balance - Model vs Data



Notes: Results from the exercise where we compare the cyclicality of the trade balance from the data and the one generated by the model. The correlation between the two is 0,45.

Both point to a strong relationship between sectoral diversification and output volatility.

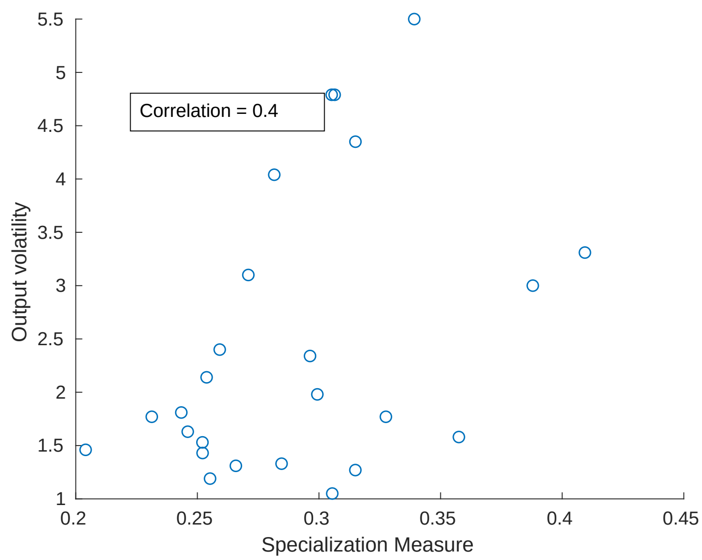
I further investigate the previous hypothesis using the data obtained from the OECD, which features input-output matrices, allowing us to obtain sectoral shares for all sectors. I calculate the following measure:

$$\sigma_f = \sqrt{\frac{1}{T}\sum_{i=1}^{K}\left(\frac{S_{i,t}}{GDP_t}\right)^2}, \tag{19}$$

where $S_{i,t}$ are sectoral sales in sector i at time t, T is the number of periods, and σ_f is the model-implied volatility and K is the number of sectors. Notice that this measure is different from Carvalho and Gabaix (2013), as it does not include varying sectoral level TFP volatility. The reason for this is that we are interested in the role of sectoral diversification and not the volatility of sector-specific TFP shocks in explaining output volatility. This measure most resembles the Herfindahl index, which measures the extent of specialization, with the exception that we average the specialization over years and take a square root.

Figure 10 presents results of the exercise. There is a strong relationship between the sectoral diversification and output volatility. This suggests that the results obtained by Koren and Tenreyro (2007) are confirmed even when using all sectors of the economy and not only manufacturing. Correlation between our specialization measure and output volatility is 0.4

Figure 10: Sectoral Diversification and Output Volatility



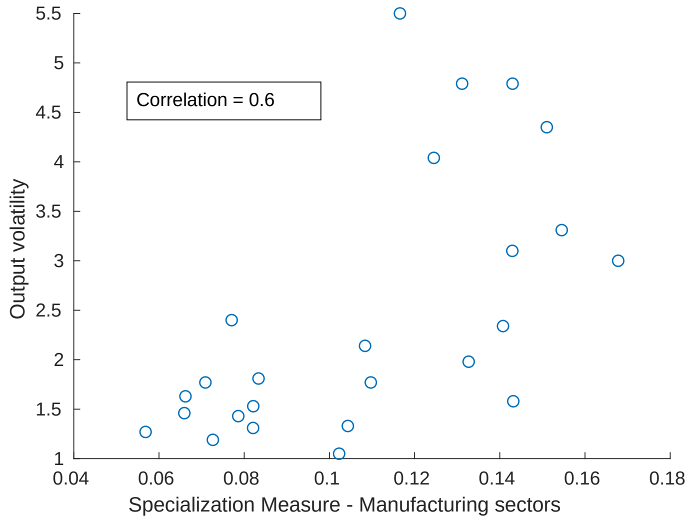
Notes: This figure presents the relationship between the specialization of an economy and the output volatility using the data on all sectors from the OECD database.

However, this result could be driven because of differences in the data between the OECD and UNIDO. I perform one additional check using the data from the OECD, but constructing our measure σ_f using only the data on manufacturing sectors.

Figure 11 presents results of this exercise. Correlation between the actual volatility of output and the the specialization measure using only manufacturing sectors is very similar and reaches 0.6. This result suggests that the result by Koren and Tenreyro (2007) translates to the full sector case and that the sectoral diversification plays an important role in the volatility of output.

One concern is that the decrease in the volatility of output due to the increase in the capital share is too large and that even though the differences in sectoral diversification of countries generate differences in the volatility of output, these differences are not large enough to see the patterns between the volatility of output and the capital share that we see in the data. To address these concerns we want to use our previous calibration and modify it such that the standard deviation of the productivity shock follows the relationship between the sectoral diversification and the volatility of output. First, I run a linear regression of output volatility on our measure of specialization. From this regression, I obtain fitted values of output volatility. I want the differences in the productivity shock to follow the same pattern with respect to our measure of specialization as the output volatility. In all of the previous calibrations, I have set the standard deviation of productivity shock to 0,008.

Figure 11: Sectoral Diversification and Output Volatility



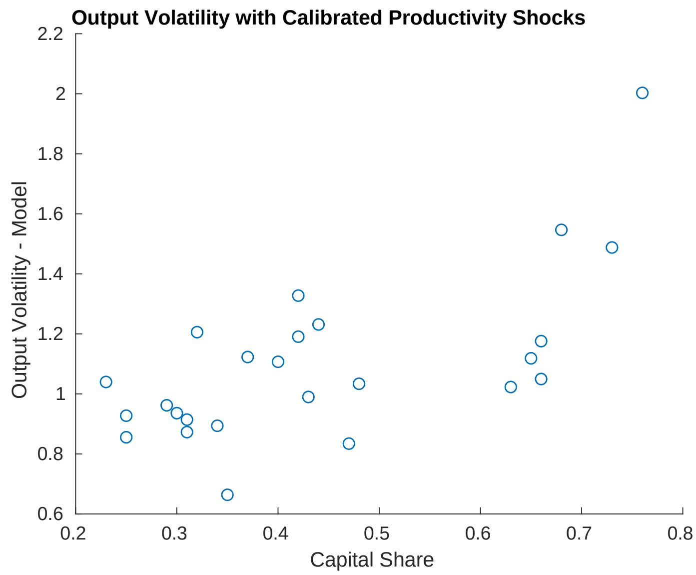
Notes: This figure presents the relationship between the specialization of an economy and the output volatility using the data on manufacturing sectors from the OECD database. The relationship is much stronger than for all sectors.

The mean of the fitted values of output volatility is approximately 3,04 times higher than the standard deviation of productivity shocks. To obtain the standard deviation of the productivity shock for each country, I divide all of the predicted values of output volatility with 3,04. This makes sure that the relationship between the volatility of the productivity shocks and the specialization measure is the same as the one between the output volatility and the specialization measure.

Next, I plug in the values of obtained standard deviation of productivity shocks for each country. Notice that now for each country not only factor shares are different, but also standard deviation of productivity shocks. I show the results of this experiment in Figure 12.

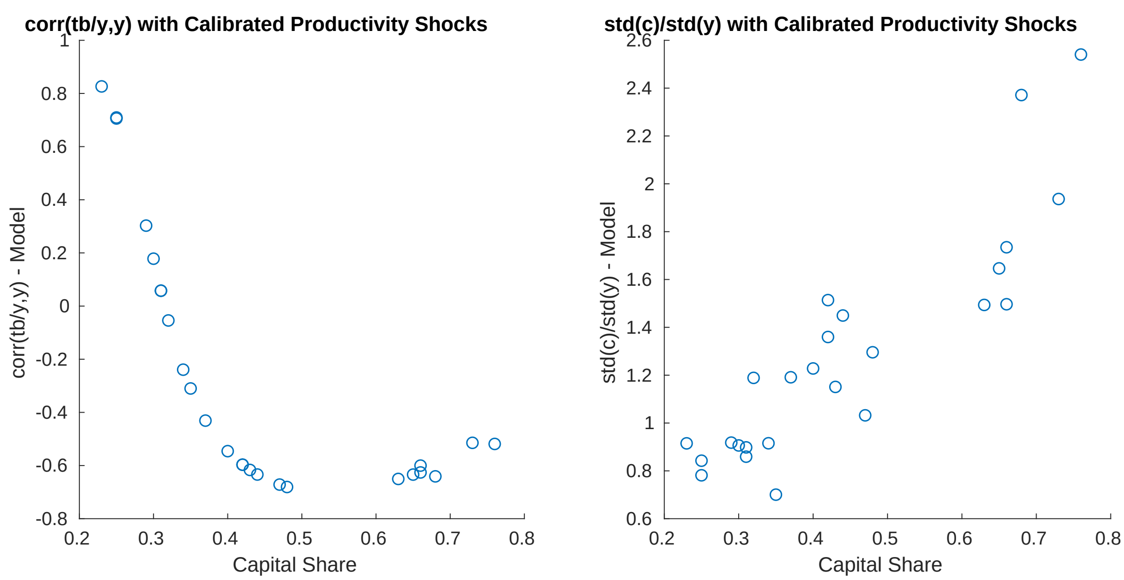
It is clear that with the previously described calibration this model does well at explaining the difference in the volatility of output. More precisely, the model generates a positive relationship between the volatility of output and the capital share, with the correlation coefficient of around 0,6. However, it is possible that this calibration invalidates our previous conclusions on the relationship between the capital share and relative standard deviation of consumption, and the cyclicality of the trade balance.

Figure 12: Output Volatility with Calibrated Productivity Shocks



Notes: Results from the exercise where we vary both capital share and the standard deviation of productivity for each country. Standard deviation of productivity has been obtained through the empirical relationship between the output volatility and the previously described specialization measure.

Figure 13: corr(tb/y,y) and std(c)/std(y) with Calibrated Productivity Shocks



Notes: Results from the exercise where we vary both capital share and the standard deviation of productivity for each country. Standard deviation of productivity has been obtained through the empirical relationship between the output volatility and the previously described specialization measure. The cyclicality of trade balance and the relative standard deviation of consumption have the same pattern with respect to capital share as in the previous calibration.

Figure 13 shows that this is not the case. The correlation between the trade balance and output generated by the model is not affected by the previous calibration significantly. Relative standard deviation of consumption remains positively correlated with the capital share. Therefore, when one accounts for the sectoral diversification and calibrates the model to account for these differences, by adjusting productivity shocks, the model manages to match the key patterns that we see in the data, for all three moments discussed in the literature.

6 Conclusion

Emerging market economies and developed economies data on business cycles feature several key differences in terms of the correlation between trade balance and output, the standard deviation of output and the relative standard deviation of consumption with respect to output. However, as previous research suggests (Aguiar and Gopinath, 2007), it is the correlation between trade balance-to-output and output that is considered a moment that is particularly informative about the sources of business cycles differences.

Emerging market economies have a lower labor share of income during the whole period that is usually used in the studies of these countries. I identify the importance of labor share — or capital share — for the response of trade balance with respect to a productivity shock. Data on labor shares confirms the hypothesis that factor shares play an important role in the correlation between trade balance and output.

I investigate the implications of varying factor shares for the three key moments used in the study of business cycles. Results suggest that factor shares can have a significant impact on the response of trade balance to a productivity shock. As in the standard current account model used in international macroeconomics, this channel works through the response of investment and consumption increasing more with respect to shocks. The relative standard deviation of consumption with respect to output is also increasing in the share of capital. The volatility of output is decreasing in the share of capital. This is not in line with what we see in the data and is a consequence of using a one-sector model, where an increase in the share of capital results in a significant increase in capital stock, which is less volatile than labor. Using data on a larger sample of sectors I confirm the hypothesis by Koren and Tenreyro (2007) that sectoral diversification plays an important role in the differences in the volatility of output. Adjusting our previous calibration using the data on sectoral diversification of countries, one-sector model manages to generate a positive relationship between the capital share and the output volatility.

References

Aguiar, M. and G. Gopinath (2007): "Emerging Market Business Cycles: The Cycle is the Trend," *Journal of Political Economy*, 115, 69–102.

Bernanke, B. S. and R. S. Gürkaynak (2002): "Is Growth Exogenous? Taking Mankiw, Romer, and Weil Seriously," in *NBER Macroeconomics Annual 2001, Volume 16*, National Bureau of Economic Research, Inc, NBER Chapters, 11–72.

Boz, E., C. Daude, and C. Bora Durdu (2011): "Emerging Market Business Cycles: Learning About the Trend," *Journal of Monetary Economics*, 58, 616–631.

Carvalho, V. and X. Gabaix (2013): "The Great Diversification and Its Undoing," *American Economic Review*, 103, 1697–1727.

Caselli, F. and J. Feyrer (2007): "The Marginal Product of Capital," *The Quarterly Journal of Economics*, 122, 535–568.

Drechsel, T. and S. Tenreyro (2018): "Commodity booms and busts in emerging economies," *Journal of International Economics*, 112, 200–218.

Garcia-Cicco, J., R. Pancrazi, and M. Uribe (2010): "Real Business Cycles in Emerging Countries?" *American Economic Review*, 100, 2510–2531.

Gollin, D. (2002): "Getting Income Shares Right," *Journal of Political Economy*, 110, 458–474.

Guerriero, M. (2019): "The Labor Share of Income Around the World: Evidence from a Panel Dataset," Working Papers id:13008, eSocialSciences.

Hsieh, C.-T. and P. J. Klenow (2003): "Relative Prices and Relative Prosperity," Working Paper 9701, National Bureau of Economic Research.

Izyumov, A. and J. Vahaly (2015): "Income Shares Revisited," *Review of Income and Wealth*, 61, 179–188.

Kabaca, S. (2011): "Labor Share Fluctuations in Emerging Markets: The Role of the Cost of Borrowing," Koç University-TUSIAD Economic Research Forum Working Papers 1122, Koc University-TUSIAD Economic Research Forum.

Kaldor, N. (1957): "A Model of Economic Growth," *The Economic Journal*, 67, 591–624.

Karabarbounis, L. and B. Neiman (2013): "The Global Decline of the Labor Share," .

Koren, M. and S. Tenreyro (2007): "Volatility and Development," *Quarterly Journal of Economics*, 122, 243–287.

Mendoza, E. (1991): "Real Business Cycles in a Small Open Economy," *American Economic Review*, 81, 797–818.

Neumeyer, P. and F. Perri (2005): "Business Cycles in Emerging Economies: the Role of Interest Rates," *Journal of Monetary Economics*, 52, 345–380.

Rodríguez, F. and D. Ortega (2006): "Are capital shares higher in poor countries? Evidence from Industrial Surveys," Wesleyan Economics Working Papers 2006-023, Wesleyan University, Department of Economics.

Tretvoll, H., F. Leibovici, and D. Kohn (2017): "Trade in Commodities and Emerging Market Business Cycles," 2017 Meeting Papers 743, Society for Economic Dynamics.

7 Appendix

Derivation of Consumption and Investment Reponse in Current Account Model

Start from the problem of the firm which chooses optimal level of capital. It sets capital such that the next period marginal product of capital is equal to the interest rate:

$$r = \alpha A_{t+1} K_{t+1}^{\alpha-1} \tag{20}$$

To see the response of capital consider the optimal capital level rule:

$$K_{t+1} = (\frac{r}{\alpha})^{\frac{1}{\alpha-1}} A_{t+1}^{\frac{1}{1-\alpha}}, \tag{21}$$

which is increasing in α. Now we can obtain the change of capital by dividing the next period capital with today's capital.

$$\hat{K}_{t+1} = (1+\eta)^{\frac{1}{1-\alpha}} \tag{22}$$

Now note that the deviation of consumption from its previous level will be:

$$\hat{C}_t = \frac{W_t}{W_{t-1}}, \tag{23}$$

where W_{t-1} is the wealth in period $t-1$. There are a few things to note. We know that in period when the shock hits, investment will have to increase:

$$I_t = K_{t+1} - K_t = (\frac{r}{\alpha})^{\frac{1}{\alpha-1}}((1+\eta)^{\frac{1}{1-\alpha}} - 1), \tag{24}$$

and for $s = 1, 2..n$, investment will be 0.

Also note that for $s = 1, 2..n$, output will be:

$$Y_{t+s} = \left(\frac{r}{\alpha}\right)^{\frac{\alpha}{\alpha-1}} (1+\eta)^{\frac{1}{1-\alpha}}, \tag{25}$$

while for period s=0, when the shock hits, we have:

$$Y_t = \left(\frac{r}{\alpha}\right)^{\frac{\alpha}{\alpha-1}} (1+\eta) \tag{26}$$

Then we can calculate net output for different periods. In period $s = 0$, we have that:

$$Y_t - I_t = \left(\frac{r}{\alpha}\right)^{\frac{\alpha}{\alpha-1}}(1+\eta) - (\frac{r}{\alpha})^{\frac{1}{\alpha-1}}((1+\eta)^{\frac{1}{1-\alpha}} - 1), \tag{27}$$

for periods $s = 1, 2, .., n$, net output will be:

$$Y_{t+s} - I_{t+s} = \left(\frac{r}{\alpha}\right)^{\frac{\alpha}{\alpha-1}}(1+\eta)^{\frac{1}{1-\alpha}}. \tag{28}$$

Using the equation for wealth and plugging in previous terms, we can obtain:

$$\hat{W}_t = \frac{W_t - W_{t-1}}{W_{t-1}} = \eta + \frac{1}{r}((1+\eta)^{\frac{1}{1-\alpha}} - 1) - (\frac{\alpha}{r})((1+\eta)^{\frac{1}{1-\alpha}} - 1), \tag{29}$$

Data

Data comes from several sources. I obtain GDP and its components for most of the countries from the dataset available on the website of Martin Uribe (http://www.columbia.edu/ mu2166 /book/empirics/). For some countries I obtain GDP and its components from other sources. We obtain data on Hungary from IMF. Brazil data comes from the dataset made available by Aguiar and Gopinath (2007), which was provided to them by Neumeyer and Perri (2005).

Country	Data Range	Source
Argentina	1980Q1-2012Q4	World Bank
Brazil	1991Q1-2002Q1	NP
Israel	1980Q1-2012Q4	World Bank
Korea	1980Q1-2012Q4	World Bank
Malaysia	1991Q1-2003Q4	IFS
Mexico	1980Q1-2012Q4	World Bank
Peru	1980Q1-2012Q4	World Bank
Philippines	1981Q1-2003Q1	IFS
Thailand	1993Q1-2003Q1	IFS
Turkey	1980Q1-2012Q4	World Bank
South Africa	1980Q1-2012Q4	World Bank
Indonesia	1990Q1-2011Q4	IFS
Hungary	1995Q1-2011Q4	IFS
Australia	1980Q1-2012Q4	World Bank
Austria	1980Q1-2012Q4	World Bank
Belgium	1980Q1-2012Q4	World Bank
Canada	1980Q1-2012Q4	World Bank
Denmark	1980Q1-2012Q4	World Bank
Spain	1980Q1-2012Q4	World Bank
Finland	1980Q1-2012Q4	World Bank
Netherlands	1980Q1-2012Q4	World Bank
Norway	1980Q1-2012Q4	World Bank
New Zealand	1980Q1-2012Q4	World Bank
Sweden	1980Q1-2012Q4	World Bank
Switzerland	1980Q1-2012Q4	World Bank

[a] NP stands for (Neumeyer and Perri, 2005)

Table A1: Data Range

Table A2: Business Cycle Moments

Statistic	Arg	Aust	Aut	Bel	Can	Denm	Ecu	Fin	Isr	Kor	Mal	Mex	Neth	New Zeal	Norw
$\sigma(y)$	4.04	1.27	1.05	1.53	1.63	2.4	1.81	2.14	1.81	2.14	2.69	2.34	1.43	1.77	1.46
$\frac{\sigma(c)}{\sigma(y)}$	1.25	0.89	0.78	0.94	0.71	1.10	2.27	0.60	1.63	1.46	1.52	1.30	0.91	1.00	2.16
$\frac{\sigma(i)}{\sigma(y)}$	3.45	4.88	1.95	3.93	2.81	5.19	8.29	4.97	3.34	3.80	4.31	3.54	3.66	3.52	5.48
$\sigma(\frac{tb}{y}, y)$	-0.76	-0.42	0.22	-0.22	0.10	-0.36	-0.51	-0.01	0.06	-0.53	-0.50	-0.50	0.13	-0.07	0.04
$\sigma(\frac{s}{y}, y)$	0.04	0.79	0.81	0.69	0.83	0.57	-0.04	0.89	0.36	0.41	0.58	0.35	0.72	0.65	0.38
$\sigma(\frac{i}{y}, y)$	0.90	0.85	0.63	0.70	0.74	0.83	0.57	0.68	0.39	0.83	0.75	0.75	0.71	0.62	0.44

Notes:Standard deviations are expressed in percentages except for the model implied standarddeviation of the net exports to output ratio, which is expressed in percentage points. All series,except for the net exports over output ratio and valuation effects, are real per capita variables,have been logged, seasonally adjusted and filtered using the HP filter with smoothing parameter $\lambda = 1,600$.

Table A3: Business Cycle Moments

Statistic	Peru	Port	Sth. Afr	Spa	Swe	Swi	Tha	Tur	Phil	Bra
$\sigma(y)$	4.79	2.11	1.58	1.33	1.77	1.31	3.69	3.30	3.00	1.98
$\frac{\sigma(c)}{\sigma(y)}$	1.08	1.11	1.56	1.20	0.74	0.55	0.95	1.30	0.62	2.00
$\frac{\sigma(i)}{\sigma(y)}$	2.49	2.97	6.71	4.24	4.54	4.28	4.29	3.26	4.65	3.08
$\sigma(\frac{tb}{y}, y)$	-0.42	-0.39	-0.56	-0.63	0.11	-0.05	-0.49	-0.68	-0.42	-0.01
$\sigma(\frac{s}{y}, y)$	0.52	0.44	0.11	0.41	0.83	0.90	0.79	0.26	0.86	0.23
$\sigma(\frac{i}{y}, y)$	0.74	0.68	0.63	0.78	0.82	0.78	0.78	0.79	0.75	0.60

Notes:Standard deviations are expressed in percentages except for the model implied standard-deviation of the net exports to output ratio, which is expressed in percentage points. All series,except for the net exports over output ratio and valuation effects, are real per capita variables,have been logged, seasonally adjusted and filtered using the HP filter with smoothing parameter $\lambda = 1,600$.

Figure A1: Savings and Investment