

The Role of Trade Openness for Labor Share of Income During Currency

Crises

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Abstract

Empirical studies find that currency crises often result in a decline in the level of output. However, only few studies examine how the smaller output is distributed between labor and capital following a currency crisis. This paper investigates the impact of currency crises on labor share of income in the short- and long-term using an international panel dataset of 58 developed and developing countries during 1980-2005. Moreover, we examine how the impact of crisis on labor share varies depending on the level of integration to the global economy. The results suggest that higher openness leads to a significant decline in labor share. In fact, a country with the level of openness that is in 75th percentile of average trade openness distribution, experiences about 5 percentage points decline in its labor share, while a country with lower exposure to trade experiences no significant impact on the labor share of income. The dynamic analysis reveals that the recovery of labor share following a currency shock is higher in open economies and takes about four years.

Keywords: currency crisis, labor share, labor market institutions

JEL Codes: E25, F3, F41

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1. Introduction

Does greater level of integration into the world economy adversely affect wages and worker's conditions during currency crises? Are these effects long-lasting or temporary? These questions have important policy implications in the globalized economy where economic crisis seems to be a recurring inevitably. Political discourse about issues such as outsourcing and protectionism revolve around these questions. In this paper we answer these questions using a panel of 58 countries including developing and developed countries over the period of 1980-2005. Indeed, we find that countries with higher level of openness on average experience a larger decline in labor share of income during currency crises. Because wages are the main source of income in most countries, a decrease in the wage share is associated with higher income inequality and lower aggregate demand. Hence, policies aiming at redistributing income can potentially reduce the inequality and also pace the recovery from the crisis through boosting consumption.

Why do currency crises lead to a decline in labor share? One channel through which currency crises can lead to a decline in labor share of income is related to the bargaining power of labor during currency crises.¹ It is argued that globalization featured by higher exposure to trade and increased mobility of capital has eroded the bargaining power of labor vis-à-vis capital (See Rodrik, 1997; Slaughter, 2001). This is simply because globalization has increased the global competition and at the same time made it easier for

¹ The other channel concerns the reallocation implications of crises; currency crises lead to reallocation of factors from non-tradable to tradable sectors. If sectors differ in their capital intensities, this reallocation may alter the aggregate labor share of income. Using manufacturing sectoral panel data for 20 countries, Maarek and Orgiazzi (2013) find evidence in favor of bargaining power channel as opposed to reallocation channel. In this paper, due to data limitations for our sample size, we were not able to focus on this channel.

capital to re-locate to countries with lower wage. Therefore, during currency crisis when labor and capital have to bargain over the already reduced output, labor is in weaker position in the negotiations. Thus, labor share of income is likely to decline. Bazillier and Najman (2012), Diwan (2001), Harrison (2002), and Jayadev (2007) use the United Nations System of National Accounts to calculate labor share of income and find that indeed labor share of income declines during currency crises.²

The goal of this paper is to assess the role of trade openness in ameliorating or aggravating the impact of currency crisis on labor share of income while controlling for other relevant variables. In particular, we use a panel data from the United Nations Accounts Statistics Database for 58 countries for the period 1980-2005 to address the following questions: How does impact of currency crises on labor share of income vary with the country's level of openness? Does long-run adjustment of labor share to a currency shock differ in countries with higher level of openness versus countries with lower level of openness?

The main contributions of this paper to the current literature are three folded. First, most related literature examines the direct impact of either crisis or trade openness on the labor share of income. To our knowledge no study thus far has looked into how the impact of crisis on labor share of income varies depending on the level of trade openness³. Second,

² Bazillier and Najman (2010) find that all else equal, labor share is 0.9 percentage points lower in the three years following currency crises. Furthermore, Dafour and Orhangazi(2009) provide support for lower labor share in the case of the Turkish crisis in 2001 where the labor share fell by 26 percent. Jayadev (2007) explains the fall in the labor share with the capital openness. Rodrik (1998) finds a negative impact of trade openness on wages, especially for OECD countries.

³ There are few studies, which assess the role of labor market institutions and/or trade openness for labor market variables such as employment or unemployment rate. Gamberoni et al. (2010) assesses the role of labor market institutions and trade openness for employment dynamics during banking and sovereign debt crises. Bernal-Verdugo et al. (2012) document the impact of labor market institutions on unemployment, as well as how the impact changes based on labor market institutions in a panel of 97 countries during 1980-2008 period. Furceri& Mourougane (2012) examine the effect of economic crises on structural unemployment while accounting for the role of institutional settings on a panel of 30 OECD countries. Artha

the previous studies only focus on the immediate or short-term impact of currency crises on labor share (Bazillier & Najman, 2010; Diwan, 2001; Harrison, 2005; Jadayev, 2007). Hence, the question of whether currency crises permanently reduce labor share of income or whether the adjustment depends on the country's level of openness remains unaddressed. Third, most studies on labor share either focus on OECD countries or if they include developing countries, they do not control for the impact of labor market institutions on labor share of income. In this paper, we use a new panel dataset on labor market institution constructed by Aleksynska & Schindler (2011) that includes institutional data for both developing and developed countries. Therefore, we are able to include both developed and developing countries in our analysis and at the same time control for the impact labor market institutions on labor share.

The results suggest that higher exposure to trade leads to a significant decline in labor share. In fact, in a country with the level of openness that is in 75th percentile of average openness distribution, experiences about 5 percentage points decline in its labor share following a currency crisis. On the other hand, currency crises have no significant impact of labor share of income in countries with low level of integration into the world. The long-run analysis reveals that on average it takes about four years for labor share to return to its pre-crisis level after a currency crisis.

In the next section we discuss the data and the empirical methodology used in this paper. Section four presents and discusses the results and robustness checks. Section five concludes.

& de Haan (2011) investigates the relationship between labor market flexibility and output cost during financial crises. Guerriero & Sen (2012) focuses on the relationship between labor share and measures of international trade and technological change, but does not consider the how the impact changes during financial crises.

2. Data and Empirical Methodology

2.1 Measuring Labor Share of Income

Labor share refers to the amount of national income that goes to labor. Using data from the United Nations National Accounts Statistics 1993 (Table 2.3), We calculate labor share as the ratio of compensation of employees to Gross Value Added at basic prices.⁴ We limit the analysis to the countries that have at least ten years of consecutive data on labor share of income, which results in total of 58 countries during 1980-2005 period⁵. The sample covers: 19 countries in West Europe, 10 in Latin America, 9 in East Europe, 8 in Asia, 3 in North Africa, 8 in Sub-Saharan Africa, and one in Middle East.

Calculating labor share with this approach underestimates the actual labor share for two reasons. First, because the income of informal sector is not included in this measure of labor share, the overall labor share is likely to be underestimated. This is particularly important in this study because it could lead to bias the impact of currency crises on labor share. During crises, many workers move to informal sectors. Therefore, the decline in labor share during crisis maybe due to this movement rather than the decline in the actual labor share per se. Unfortunately, no reliable data is available for the income of informal sector for developing countries. However, We control for the share of rural population in total population as a proxy for the share of informal sector in the economy. The data is obtained from *World Development Indicators* database.

Second, as pointed out by Gollin (2002) and Krueger (1999), the income of self-employed is disregarded and implicitly classified as capital income. This also leads to a

⁴ This measure has been used by previous studies: Harrison (2002), Diwan (2001), Jayadev (2007).

⁵ Out of 58 countries, only 37 of them experienced at least one currency crisis during the 1980-2005 period, the rest of the countries are used as the 'control group'.

systematic underestimation of the actual labor share. Many workers may become self-employed during a currency crisis. Therefore, our measure of labor share is likely to overestimate the impact of currency crises on the labor share.

In order to address this issue, we adjust the labor share for the income of self-employed with a method proposed by Gollin (2002). We impute employee compensation for those workers who are self-employed. In order to do so, we calculate average compensation by dividing compensation of employees by the number of employees. Thereafter, scaled this up for the entire workforce by multiplying this average compensation by total employment:⁶

$$LS = \frac{\text{Compensation of employees}}{\text{Value added at basic prices}} * \frac{\text{Total employment}}{\text{Number of employees}}$$

After adjusting the labor share, the size of dataset shrinks to one third and includes mostly developed countries. The drawback of this approach to adjusting labor share is that we are assuming self-employed earn the same average wages as the employees.

2.2 Identifying Currency Crisis Episodes

Following Leaven and Valencia (2008), a currency crisis is defined as “a nominal exchange rate depreciation of 30 percent or more, which is also 10 percent higher than the rate of depreciation in the previous period”. The first condition guarantees that only large depreciation episodes are captured. The second condition excludes hyperinflation episodes in which nominal exchange rate constantly depreciates to catch up with higher inflation. The dummy variable *Crisis* is constructed based on these criteria and it is coded one when the two criteria are met and is coded zero otherwise. Moreover, to avoid counting an

⁶ We use ILO Yearbook of Labor Statistics, which provides statistics on the composition of total employment for nearly 200 countries from 1969-2008 to calculate the adjusted labor share.

ongoing crisis as a new crisis, we exclude any crises within a three-year window of each crisis. Given the availability of the labor share data, this definition yields 60 episodes of currency crises in our sample.

2.3 Measuring Openness to Trade and capital liberalization

Heckscher-Ohlin (H-O) model of trade implies that labor share of income in labor abundant countries increases, while in capital abundant countries it decreases. However, recent empirical literature challenged the prediction of H-O model. It is argued that globalization characterized by liberalization of trade and financial accounts increases the elasticity of labor demand and mobility of capital vis-à-vis labor (see Rodrik, 1997; Slaughter, 2001). In such an environment, capital can credibly threaten to flee to a country with lower labor costs. Therefore, during currency crisis when capital and labor negotiate over the already reduced output, labor is in a weaker position. Hence, labor share of income declines. Indeed, Diwan (2001) and Harrison (2002) find a negative relationship between labor share and trade openness in a panel of developing and developed countries. Guscina (2006) finds similar results for 18 OECD countries.

In this paper, we are interested to examine whether the impact of currency crises on labor share varies with the level of trade openness in the crisis-hit country. In particular, we are concerned with the interaction of trade openness with the crisis variable.

On the theoretical ground, the impact of trade on labor share during currency crises episodes is ambiguous. On one hand, greater exposure to trade implies higher elasticity of labor demand and higher mobility of capital and therefore weakens the bargaining position of labor and labor share of income during currency crises. On the other hand, currency crises characterized by large depreciation of nominal exchange rate help make the domestic

economy more competitive. Hence, higher trade openness means easier access to the world market, which can lead to an increase in labor demand and labor share of income during currency crises. This is not always the case. For example, if export sector is heavily dependent on external finance, then during currency crisis when external funds are dried up, export sector may be negatively affected, thus labor demand and labor share of income is adversely affected (See Berman, 2009).

Overall, the role of trade openness during currency crisis is theoretically ambiguous and is more of an empirical question. We use the ratio of Trade to GDP (sum of exports and imports to GDP) as one measure of trade openness. The goal is to assess the role of trade openness in affecting labor share in the short- and long-run following a currency crisis. Jayadev (2007) uses an alternative measure of trade openness on the grounds that trade to GDP ratio is correlated with the income and the size of the country. He defines openness as the residual when the trade ratio of a country is regressed on the log of per capita GDP and the log of population.⁷ The logic behind this measure is to obtain a measure of trade openness, which is not affected by the size or the income of the country. We include the interaction of trade openness measures with the crisis dummy (Crisis* Trade) to assess the effect of trade openness on labor share during currency crises episodes.

Capital account openness also lowers bargaining power of labor by increasing the mobility of capital relative to labor. Therefore, higher capital openness can be associated with lower labor share of income. Indeed, Jadayev (2007) and Harrison (2002) find empirical support for this hypothesis. We use Chinn & Ito (2008) as a measure of capital openness (KAOPEN). Our main focus is on trade openness during currency crises because

⁷ Pritchett (1996) was the first who proposed to use "structure adjusted trade intensity" measures, which are the residuals from a regression of trade intensity on structural characteristics such as population, land area, level of per capita GDP, and so on.

Jadayev (2007) already provides comprehensive evidence on negative impact of capital openness on labor share of income.

2.4 Labor Market Institutions

Labor market institutions are another important determinant of the labor share of income because they can influence the bargaining power of labor. The institutional data is taken from a new dataset collected by Aleksynska & Schindler (2011). The dataset includes series of different labor market institutions for a large set of low-, middle-, and high-income countries from 1980-2008.

We consider two measures of labor market rigidity: a measure of employment protection, which captures cost of firing workers and therefore rigidity of employment, and a measure of unemployment benefits, which reflects rigidity of real wages⁸. The employment protection measure used is severance pay, which is in terms of months of salary an employer is required to pay in case of dismissal. The data is available for a worker who has been employed since nine months, four years, and 20 years⁹. Following Gamberoni et al. (2010), we take the principle component of the three aforementioned series of severance pay to capture all the available information. The subsequent measure is labeled “Severance Pay_PC”. The measure of unemployment benefit reflects the Gross Replacement Rate, defined as the level of statutory entitlements over average wages after the first and second year. This measure is labeled “UB_GRR12”.

Labor market regulations can impact labor share by affecting wages (price channel) and/or employment (quantity channel). While these regulations mainly have a positive effect on wages (for example, minimum wage laws or unemployment benefit), their impact

⁸ Higher unemployment benefit means that workers have fall back option in case of dismissal, therefore, the real wage rigidity increases.

⁹ Labeled *epl_sp9m*, *epl_sp4y*, and *epl_sp20y*, respectively.

on employment is often negative (Blanchard & Wolfers, 2000; Furceri & Mourougane, 2009). Therefore, the overall impact of these institutions on labor share of income depends on the whether wage or employment channel dominates. For instance, higher unemployment benefit provides a fall back option to labor and can lead to downward real wage rigidities and higher unemployment (See Campolmi et al., 2005 or Zanetti, 2010). Indeed, Gamberoni et al. (2010) finds that countries with higher unemployment benefit experienced on average a deeper decline in employment growth during financial crises. On the other hand, when severance pay is high, firms are more likely to adjust to shocks through cutting wages (or hours) rather than laying off their workers. Therefore, real wages considerably decline while the impact on employment is less pronounced. These examples make it clear that impact of institutions on labor share can go either ways and depend on the direction and size of these wage and employment effects (ILO report, 2011).

2.5 Other Controlled variables

Labor share of income is expected to increase with the level of development of a country (Kravis, 1962 ; Kuznets ,1966). Hence we control for GDP per capita (in logs). The data for GDP per capita is obtained from *World Bank Development Indicators*. We also include government expenditure as a percentage of GDP as a proxy for government involvement in the economy. Finally, following Diwan (2001), as a proxy for the share of informal sector in the economy we control for the share of rural population in the total population.

Finally, following Diwan (2001), as a proxy for the share of informal sector in the economy we control for the share of rural population in the total population. If part of the decline in labor share during currency crisis is due to expansion of informal sector, then by

controlling for share of informal sector with a proxy, we reduce the bias in coefficient estimation of *Crisis* variable. Short summary of variables' statistics is provided in Table 1.

TABLE 1 ABOUT HERE

In order to estimate the impact of currency crises on labor share, we estimate equation (1) using panel two-way fixed effects.

$$(1) \quad LS_{it} = \alpha_i + \alpha_t + \alpha_0 \cdot Crisis_{it} + \alpha_1 \cdot Crisis_{it-1} + \alpha_2 \cdot Crisis_{it-2} + \sum_j \beta_j \cdot X_{jit} + \gamma_0 \cdot Tradeopenness_{it} \cdot Crisis_{it} + \gamma_0 \cdot Tradeopenness_{it} \cdot Crisis_{it-1} + \varepsilon_{it}$$

The interaction term is the variable of interest. We would like to see to evaluate the impact of currency crises on labor share of income at different levels of openness to trade.

We also take a dynamic approach and estimate an Autoregressive Distributed Lag model (ARDL) of equation (2) using fixed effects and Arellano and Bond (1991) Difference GMM estimation methods:

$$(2) \quad LS_{it} = \alpha_i + \alpha_t + \delta_1 \cdot LS_{it-1} + \alpha_0 \cdot Crisis_{it} + \alpha_1 \cdot Crisis_{it-1} + \alpha_2 \cdot Crisis_{it-2} + \sum_j \beta_j \cdot X_{jit} + \gamma_0 \cdot Tradeopenness_{it} \cdot Crisis_{it} + \gamma_0 \cdot Tradeopenness_{it} \cdot Crisis_{it-1} + \varepsilon_{it}$$

Where LS is the economy wide labor share. Country fixed effects, and time fixed effects, are represented by α_i and α_t , respectively. The $Crisis_{it}$ variable is a dummy variable, which is equal to one in times of currency crises, and zero otherwise, and X_j represents all control variables. We only include one lag of labor share because higher lags were found statistically insignificant. Further, the lags for crisis variable are selected based on Schwarz criteria.

In order to estimate the long-term impact of currency crisis on labor share, we use the estimated coefficients in equation (2) to calculate the impulse response of labor share to a currency shock. For example, the initial response of labor share ($\partial LS_{it}/\partial crisis_{it}$) to a currency shock will be $\alpha_0 + \gamma_0 \cdot \overline{Tradeopenness}$. The 1-year ahead response ($\partial LS_{it}/\partial crisis_{it-1}$) will be $\alpha_1 + \delta_1 \cdot (\alpha_0 + \gamma_0 \cdot \overline{Tradeopenness})$, and so on. Thereafter, we evaluate these responses for a low level of trade to GDP ratio (mean of average trade to GDP ratio minus one standard deviation of average trade to GDP ratio) and high level of trade to GDP ratio (mean plus one standard deviation). The significance of the impulse responses are assessed by computing 90% level confidence bands, which are derived from 1000 Monte-Carlosimulations. The responses are statistically significant if the 90% intervals exclude the zero line.

3. Results: Static Model

We first estimate equation (1) without the interaction term to examine the direct impact of crisis and trade openness on labor share of income. The results are presented in Table 2.

TABLE 2 ABOUT HERE

Column (1) documents the partial impact of trade openness, characterized by sum of imports and exports over GDP, on the labor share of income controlling for country fixed effects, time fixed effects, and the level of development for the largest sample. In column (2), we add Chinn & Ito (2008) measure of capital openness (KAOPEN) and currency crises dummies to the specification. In column (3), we control for unemployment benefit and the principle component of the three available severance pay indices as proxies for labor market institutions. Column (4) presents the full specification, introducing rural population as a percentage of total population and government expenditure as a percentage of GDP. In column (5) we use an alternative trade openness measure proposed by Jayadev (2007), which we call residual measure of trade openness. Finally, we include

country specific time trend to our full specification and repeat the regression for Trade/GDP ratio and the residual measure of openness in column (6) and (7), respectively.

The interesting result is that the direct impact of trade openness on labor share of income is negative, regardless of trade openness measure and specification. One percentage point increase in the ratio of Trade/GDP ratio decreases labor share of income by 0.04 percentage points. Once we include the country specific time trend in the benchmark model (column (6) and (7)), the negative impact of trade on labor share increases to about 0.1 percentage point. Country specific time trends can proxy for country specific technological progress.

Capital Openness on the other hand has a significant negative impact on labor share only when country specific time trends are controlled for. Increasing the capital account index by one-unit results in a decline around 0.6 percentage points in labor share of income, depending on the specification. These results are similar to those of Jayadev (2007) who finds a negative and significant impact of trade and capital openness on labor share using different measures of trade and capital openness.¹⁰

Currency crises can impact labor share of income only with two lags. Two years following a currency shock, labor share of income declines overall by about 1.5 percentage points. Once we control for country specific time trends, crises variables become insignificant. This can be due to the correlation between crises and country time trends. Table 2 also shows that the level of development proxied by the log of GDP per capita, have a significant and positive impact on labor share of income in most specifications.

As for labor market regulations, only unemployment benefit has a significant and negative impact on labor share of income. This implies that employment effect (lower employment) of such a regulation dominates the wage effect (real wage rigidity).

Government share of GDP affects labor share positively and significantly. Finally, larger rural population as a percentage of total population is associated with a negative and significant effect on

¹⁰ Jayadev (2007) does not control for the labor market regulations or the informal sector.

labor share. This provides some suggestive evidence that labor share is lower in countries with greater informal sector.

Next, we ask the following question: does openness to trade aggravates or ameliorates the negative impact of currency crises on the labor share? Our hypothesis is higher openness has increased the elasticity of labor demand as well as mobility of capital vis-à-vis labor and thus has led to a decrease in bargaining power of labor. Hence, during currency crises when capital and labor bargain over already reduced output, labor is in a weaker position. Consequently, economies that are more integrated into the global economy are likely to observe a larger decline in their labor share, as the bargaining power argument is more relevant in these economies.

In order to test this hypothesis, we estimate equation (1) with the interaction terms and all the control variables. Now, the parameters of interest are no longer the coefficients for crisis dummies or trade openness, but they are the interaction between crisis and trade openness. We are interested in:

$$\partial LS_{it} / \partial Crisis_{it} = \alpha_0 + \gamma_0 \times \overline{Trade\ Openness}$$

and,

$$\partial LS_{it} / \partial Crisis_{it-1} = \alpha_1 + \gamma_1 \times \overline{Trade\ Openness}$$

Therefore, the coefficients of interests include: α_0 , γ_0 , α_1 and γ_1 . To save space, we only report the values of $\hat{\alpha}_0$, $\hat{\alpha}_1$, $\hat{\gamma}_0$, and $\hat{\gamma}_1$ in Table 3.

TABLE 3 ABOUT HERE

The full estimation results are available in the Appendix. In almost all specifications $\hat{\gamma}_0 < 0$ and $\hat{\gamma}_1 < 0$ are significant at the 10% level. To clarify our results, we evaluate the estimated value of $\partial LS_{it} / \partial Crisis_{it}$ and $\partial LS_{it+1} / \partial Crisis_{it}$ at reasonable values of our “Trade Openness” variable. Specially, we calculate the average value of “Trade Openness” variable for each country in our

sample over the period 1980-2005, which we denote by $\overline{TradeOpenness}$. The 10th, 25th, 50th, 75th, 90th, 95th percentile, and mean of $\overline{TradeOpenness}$ correspond to Colombia, Finland, Ukraine, Belarus, Estonia, and Philippines respectively. From Table 3, it is evident that $\partial LS_{it}/\partial Crisis_{it}$ and $\partial LS_{it}/\partial Crisis_{it-1}$ both decline as $\overline{TradeOpenness}$ increases from 10th to 95th percentile of its value. The negative impact of trade openness on labor share during currency crisis is present only after 75th percentile of $\overline{TradeOpenness}$. This implies that negative impact of trade openness is only present for 25% of countries in our sample. For three quarter of countries in the sample, openness to trade has a positive but insignificant effect on labor share of income during currency crisis. If we consider openness to trade as a proxy for bargaining power of labor, then the results suggest that only in highly open economies, the bargaining power of labor is reduced enough to overcome any increase in the demand for labor (and labor share of income) due to increased competitiveness in the global economy.

To further check the robustness of results, we estimate equation (2) once with both country and time fixed effects as well as country specific time trends. In addition, we repeat the analysis with the residual measure of trade openness (not reported) and the results remains robust.

Next, we divide the sample to high-, middle-, and low-income countries based on World Bank classification of income and repeat the analysis to see if the negative impact of greater openness during crisis is consistent across different income levels. This time we only include the time fixed effects. The results are reported in Table 4.

TABLE 4 ABOUT HERE

In all country groups, more openness is associated with larger declines in labor share of income. However, in case of high and low-income countries, these declines are insignificant. Note that out of 60 occurrences of currency crises in our sample, 41 are in middle-income, 12 in low-income, and 7 in high-income countries. Therefore, insignificance of the declines in case of low-, and high-income countries can be due to small number of currency crises events in these countries.

Overall, results confirm our hypothesis that during currency crises, labor share of income declines in countries that are more integrated into the global economy. This negative impact is more pronounced in middle-income countries and countries with level of openness that is in the 75th or higher percentile of average trade openness distribution.

4. Openness to Trade and Dynamics of Labor Share of Income

In this section, we analyze the role of openness during currency crises for the dynamics of labor share of income. Hence, we estimate equation (2) including all relevant control variables with two way fixed effects. In contrast to the static model of previous section, equation (2) explicitly takes the dynamic nature of labor share of income into account. Therefore, the approach allows us to examine the persistence in the deviation of labor share from its steady state level as well as its dynamic adjustment after a currency crisis shock.

Based on parameter estimates of equation (2) we calculate the impulse response of labor share of income to a currency crisis shock. Thereafter, we evaluate the response of labor share to a currency shock for countries with a low ratio of trade to GDP ratio (20 percent, corresponding to Argentina), and we compare this response to countries with a high ratio of trade to GDP ratio (122 percent, corresponding to Belgium). The low and high

values of trade to GDP ratio correspond to the mean openness minus or plus one standard deviation in our sample, respectively.

Nickell (1981) argues that using the fixed effect estimator for autoregressive dynamic models leads to an inconsistent estimate of coefficients when the number of periods is kept fixed. The autoregressive coefficient in this case tends to be biased downward and the order of bias is $1/T$ and thus serious in short panels. To address the “dynamic panel bias”, we also estimate equation (2) using differenced GMM. All independent variables except for trade are all treated as strictly exogenous. We only use internal instruments- no external instruments are included in the estimations. Moreover, we limit the lag length of dependent and endogenous variable (trade) to be used as instrument to 4 lags. The results are presented in Graph 1. The impulse responses are presented with 90 percent confidence intervals based on Monte Carlo simulations of the estimated coefficient uncertainty. We refer to responses as statistically significant if the 90% intervals exclude the zero line.

GRAPH 1 ABOUT HERE

The results are in line with the previous section as the labor share decline significantly in countries with high trade openness (one standard deviation above mean). Nevertheless, the labor share of income recovers within four years. Therefore, even in highly open economies, labor share of income does not decline permanently following a currency crisis. The decline in labor share in countries with low level of openness is insignificant since the standard errors include the zero line at any time horizon after a currency shock.

5. Conclusion

Most studies on currency crises assess the impact of these crises on output. Only limited number of studies has examined the impact of such events on the labor share of income. Documenting the impact of currency crises on labor share is of importance, because these events often lead to a decline in output. Therefore, looking into distributional effect of crises allows us to understand who bears the output cost associated with these events.

Theoretically, there are two channels through which labor share of income can decline during currency crisis. One channel is related to lower bargaining power of labor; in an environment of increased globalization characterized by higher openness to trade and higher capital, it has become relatively easier for capital to re-locate where as labor still faces many limitations for moving across borders. Therefore, during currency crises that the return for factors of production decreases, capital can credibly threaten to re-locate. As a result, the balance of bargaining power is shifted in favor of capital and labor share of already reduced income, declines.

The other channel concerns the reallocation implications of crises; currency crises lead to reallocation of factors from non-tradable to tradable sectors. If sectors differ in their capital intensities, this reallocation may alter the aggregate labor share of income. This paper investigates the relevance of the first channel. If the argument holds true, then we would expect the bargaining power argument to apply more strongly in more open economies. Hence, we attempt to examine whether the impact of currency crisis on labor share of income varies depending on the level of trade openness. In order to do so, we use a panel data from the United Nations Accounts Statistics Database for 58 countries for the

period 1980-2005 and augment the simple regression of labor share of income on all its relevant determinants with an interaction of crisis and level of trade openness. In addition, we also use a dynamic approach to model labor share of income to compare the adjustment process of labor share in countries with high versus low level of trade openness.

To our knowledge studies that look into the interaction of crisis and trade openness, all focus on other variables such as output, employment growth, or unemployment rate. Moreover, most of these studies only consider OECD countries or otherwise do not control for the impact of labor market institutions on labor share of income. Therefore, this paper fills these gaps by looking at the interaction between trade openness and currency crises in a dataset including both developing and developed countries while controlling for the impact of labor market institutions and all other relevant determinants of labor share.

The results suggest that higher exposure to trade reduces labor share of income significantly. The impact is specially pronounced in middle-income countries and countries whose level of trade openness falls into upper quartile of openness distribution in our sample. The dynamic analysis confirms the result further; countries with the level of openness that is one standard above trade openness mean experience a deeper and statistically significant decline in their labor share, while countries with the level of openness that is one standard deviation below mean experience a positive but insignificant change in their labor share. These results provide some suggestive evidence of bargaining power argument. However, the adverse impact of trade openness during currency crisis is only significant in highly open economies. We check the robustness of results with different measures of trade openness and different estimation methods, and in a sub-sample of countries.

References

- Aleksynska, M., & Schindler, M. (2011). *Labor Market Regulations in Low-, Middle- and High-Income Countries: A New Panel Database*. International Monetary Fund. Washington, DC: International Monetary Fund.
- E Bernal-Verdugo, L., Furceri, D., & Guillaume, D. (2012). Labor Market Flexibility and Unemployment: New Empirical Evidence of Static and Dynamic Effects. *Comparative Economic Studies*, 54 (2), 251-273.
- Arellano, M., & Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *Review of Economic Studies*, 58 (2), 277-97.
- Arellano, M., & Bover, O. (1995). Another Look at the Instrumental Variables Estimation of Error Components Models. *Journal of Econometrics*, 68 (1), 29-51.
- Artha, I., & de Haan, J. (2011). Labor market flexibility and the impact of the financial crisis. *Kyklos*, 64 (2), 213-230.
- Bazillier, R., & Najman, B. *Labour and Financial crises :Is labour paying the price of the crisis?* unpublished.
- Bordo, M., Eichengreen, B., Klingebiel, D., & Martinez-Peria, M. S. (2001). Is Crisis Problem Growing More severe? *Economic Policy*, 16, 53 – 82.
- Bussiere, M., Saxena, S., & Tavor, C. E. (2010). Chronicle of Currency Collapses: Re-Examining the Effects on Output. *BIS Working Paper No.314*.
- Campolmi, A., Faia, E., & Win, R. *Frictions, Fiscal Calculus in a New Keynesian Model with Matching*. Magyar Nemzeti Bank (The central Bank of Hungary).
- Cerra, V., & Saxena, S. C. (2008). Growth Dynamics: The Myth of Economic Recovery. *American Economic Review*, 98 (1), 439-457.
- Chinn, M., & Ito, H. (2008). A New Measure of Financial Openness. *Journal of Comparative Policy Analysis*, 10 (3), 309 - 322.
- Cooper, R. N. (1971). Currency Devaluation in Developing Countries. (G. Ranis, Ed.) *Government and Economic Development*.
- Diwan, I. (2001). *Debt as Sweat: Labor, Financial Crises, and the Globalization of Capital*. The World Bank.
- Diwan, I. (November 1999). *Labor shares and Financial Crises*. The World Bank.
- Edwards, S. *Real Exchange Rates, Devaluation, and Adjustment*. Cambridge, Massachusetts: MIT Press.
- Edwards, S. (1989). *Real Exchange Rates, Devaluation, and Adjustment*. Cambridge, Massachusetts: MIT Press.
- Furceri, D., & Mourougane, A. (2009b). *How do Institutions Affect Structural Unemployment in Times of Crises?* OECD Publishing.
- Gamberoni, E., Von Uexkull, E., & Weber, S. (2010). *The Roles of Openness and Labor Market Institutions for Employment Dynamics During Economic Crises*. The World Bank. Washington, DC: Unpublished Manuscript.
- Gollin, D. (2002). Getting Income Shares Right. *Journal of Political Economy*, 110 (2), 458-474.

- Guscina, A. (2006). *Effects of Globalization on Labor's Share in National Income*. International Monetary Fund. Washington, DC: International Monetary Fund.
- Harrison, A. (2002). *Has Globalization Eroded Labor's Share? Some Cross-Country Evidence*. Berkeley: University of California at Berkeley and NBER: Mimeo.
- Hong, K., & Tornell, A. (2005). Recovery from a Currency Crisis: Some Stylized Facts. *Journal of Development Economics* , 76 (1), 71-96.
- Hutchison, M. M., & Ilan, N. (2005). How Bad Are Twins? Output Costs of Currency and Banking Crises. *Journal of Money, Credit and Banking* , 37 (4), 725-752.
- Hutchison, M. M., & Noy, I. (2002). Output Costs of Currency Crisis and Balance of Payment Crises in Emerging Markets. *Comparative Economic Studies* , 44 (2), 27-44.
- Jayadev, A. (2007). Capital account openness and the labour share of income. *Cambridge Journal of Economics* , 31 (3), 423-443.
- Kaminsky , G., & Reinhart, C. (1999). The Twin Crises: the causes of banking and balance-of-payments problems. *American Economic Review* , 89 (3), 473-500.
- Krueger, A. (1999). Measuring Labor's Share. *The American Economic Review* , 89 (2), 45-51.
- Laeven, L. A., & Valencia, F. (2008). *Systematic Banking Crises: A New Database*. IMF Working Paper No. 08/224.
- Laeven, L. A., & Valencia, F. V. (2010). *Resolution of Banking Crises: The Good, the Bad, and the Ugly*. IMF Working Paper No.10/146.
- Maarek, P., & Orgiazzi, E. (2013). Currency Crises and the Labour Share. *Economica* , 80 (319), 566-588.
- Rodrik, D. (1998). *Capital Mobility and Labor*. Harvard University.
- Rodrik, D. (1997). *Has globalization Gone too Far?* Institute for International Economics. Institute for International Economics.
- Slaughter, M. (2001). International Trade and Labor-Demand Elasticities. *Journal of International Economics* , 54 (1), 27-56.
- Zanetti, F. (2011). Labor market institutions and aggregate fluctuations in a search and matching model. 55 (5), 644-658.

Table1- Summary statistics

Variable	All Countries		High Income		Middle Income		Low Income	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Labor Share of Income	0.45	0.14	0.55	0.06	0.39	0.12	0.30	0.12
(imports+exports)/GDP	0.68	0.45	0.76	0.61	0.67	0.34	0.54	0.20
Log (GDP per Capita)	9.03	1.09	10.10	0.29	8.63	0.56	7.18	0.51
UB_GRR12	0.15	0.18	0.29	0.17	0.07	0.12	0.02	0.04
Severance Pay-PC	0.00	1.54	-0.72	0.67	0.66	1.70	-0.24	1.75
epl_sp9m	0.40	0.68	0.06	0.14	0.70	0.73	0.35	0.91
epl_sp4y	1.67	2.14	0.73	1.02	2.60	2.50	1.13	1.77
epl_sp20y	6.45	9.00	3.56	5.03	9.01	10.64	5.77	8.93
Rural Pop (%Total)	37.79	20.05	22.05	11.11	41.46	15.47	68.20	9.16
KAOPEN	0.40	1.61	1.68	1.15	-0.37	1.34	-0.90	0.72
Gov. Spending/GDP	16.14	5.24	18.76	4.74	14.47	4.99	14.01	4.11

Table 2- *Dependent Variable is Labor Share of Income: Compensation of Employee/Value added GDP.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Trade Openness	-0.0222*	-0.0447***	-0.0437***	-0.0235*		-	
	(0.0134)	(0.0137)	(0.0140)	(0.0135)		0.1002***	
						(0.0141)	
Log (GDP per capita)	0.0584***	0.0793***	0.0725***	0.0588***	0.0538***	0.0357*	0.0110
	(0.0127)	(0.0138)	(0.0149)	(0.0141)	(0.0138)	(0.0202)	(0.0206)
Trend	-0.0021***	-0.0027***	-0.0025***	-0.0026***	-		
	(0.0005)	(0.0006)	(0.0006)	(0.0006)	0.0027***		
					(0.0006)		
KAOPEN		0.0036	0.0033	0.0010	0.0010	-	-
		(0.0023)	(0.0023)	(0.0022)	(0.0022)	0.0059***	0.0058***
						(0.0021)	(0.0021)
Crisis		0.0028	0.0007	-0.0066	-0.0064	0.0003	0.0003
		(0.0088)	(0.0092)	(0.0090)	(0.0090)	(0.0062)	(0.0062)
Crisis (t-1)		-0.0110	-0.0132	-0.0123	-0.0120	-0.0076	-0.0076
		(0.0081)	(0.0084)	(0.0082)	(0.0082)	(0.0057)	(0.0057)
Crisis (t-2)		-0.0134*	-0.0160*	-0.0156*	-0.0154*	-0.0058	-0.0058
		(0.0079)	(0.0082)	(0.0080)	(0.0080)	(0.0055)	(0.0055)
Unemployment Benefit			-0.0746***	-0.1053***	-	-0.0167	-0.0167
			(0.0278)	(0.0262)	0.1055***	(0.0264)	(0.0264)
					(0.0262)		
Severance Pay_PC			0.0020	-0.0024	-0.0024	-0.0019	-0.0018
			(0.0030)	(0.0028)	(0.0028)	(0.0023)	(0.0023)
Rural Pop (% Total)				-0.0027***	-	-0.0032**	-0.0031**
					0.0026***		
				(0.0008)	(0.0008)	(0.0015)	(0.0015)
Gov. spending/GDP				0.0061***	0.0062***	0.0052***	0.0053***
				(0.0009)	(0.0009)	(0.0009)	(0.0009)
Trade Openness (residual)					-0.0268**		-
					(0.0136)		0.1002***
							(0.0141)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country time trend	No	No	No	No	No	Yes	Yes
# Observations	1119	1035	999	975	975	975	975
#Cross Section	56	56	55	54	54	54	54
R ² : Within	0.05	0.07	0.07	0.11	0.89	0.64	0.64

Standard errors are in parenthesis. * Significance at 10%; ** Significance at 5%; *** Significance at 1%. Severance pay is the principle component of the three Severance Pay indices. Two measures of trade openness are included: Trade/GDP ratio and residual of the regression of trade to GDP ratio on log of population and log of GDP per capita. Column (5) and (6) use the residual as the measure of openness to trade. Country fixed effects are included in all specifications. In column (6) and (7) country time trends are also included.

Table 3- $\partial LS_{it}/\partial Crisis_{it} = \alpha_0 + \gamma_0 \times \overline{Trade\ Openness}$ and $\partial LS_{it}/\partial Crisis_{it-1} = \alpha_1 + \gamma_1 \times \overline{Trade\ Openness}$ evaluated at different levels of $\overline{Trade\ Openness}$.

Value of Trade	Percentile of $\overline{Trade\ Openness}$	Corresponding Country	Two Way		Two way +country time trend	
			$\partial LS_{it}/\partial Crisis_{it}$	$\partial LS_{it}/\partial Crisis_{it-1}$	$\partial LS_{it}/\partial Crisis_{it}$	$\partial LS_{it}/\partial Crisis_{it-1}$
0.32	10	Colombia	0.012	0.0026	0.0108	0.0006
0.46	25	France	0.0036	-0.0039	0.006	-0.0029
0.62	50	Finland	-0.0058	-0.0111	0.0008	-0.0069
0.86	75	Ukraine	-0.0198*	-0.0218**	-0.0071	-0.0129*
1.22	90	Belarus	-0.041**	-0.0381**	-0.019	-0.0218*
1.49	95	Estonia	-0.0568**	-0.0502**	-0.0279	-0.0286*
0.75	Mean	Philippines	-0.0131	-0.0167*	-0.0033	-0.0100*

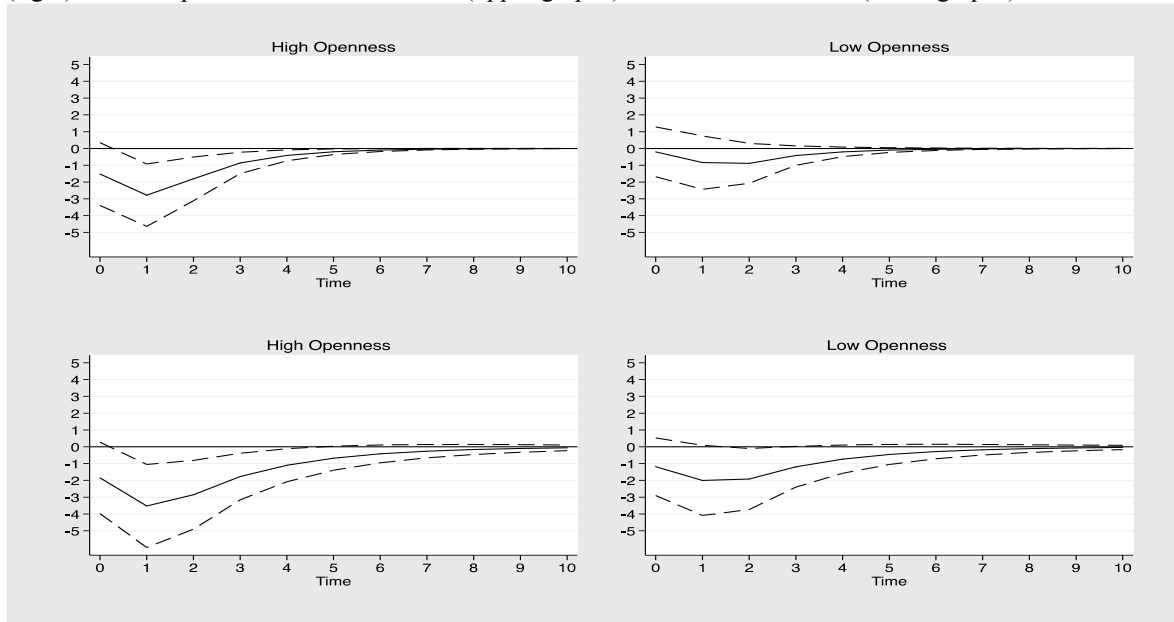
Note: $\overline{Trade\ Openness}$ is the sum of imports and exports as a percentage of GDP and $\overline{Trade\ Openness}$ is the average of $\overline{Trade\ Openness}$ variable, from 1980-2005 in 58 countries. * Significance at 10%; ** Significance at 5%; *** Significance at 1%.

Table 4- $\partial LS_{it}/\partial Crisis_{it} = \alpha_0 + \gamma_0 \times \overline{Trade\ Openness}$ and $\partial LS_{it}/\partial Crisis_{it-1} = \alpha_1 + \gamma_1 \times \overline{Trade\ Openness}$ evaluated at different levels of $\overline{Trade\ Openness}$ for high-, middle-, and low-income countries.

Percentile	$\partial LS_{it}/\partial Crisis_{it}$			$\partial LS_{it}/\partial Crisis_{it-1}$		
	High	Middle	Low	High	Middle	Low
10	0.0116	0.012	0.0139	0.0091	0.0003	0.0125
25	0.0059	0.002	-0.0053	0.0021	-0.0065	0.0009
50	-0.0017	-0.0167	-0.0156	-0.0073	-0.0193	-0.0054
75	-0.0086	-0.0329*	-0.0199	-0.0156	-0.0304*	-0.008
90	-0.0359	-0.0533*	-0.026	-0.049	-0.0442*	-0.0116
95	-0.095	-0.0539*	-0.026	-0.1211	-0.0447*	-0.0116
Mean	-0.0142	-0.016	-0.0117	-0.0225	-0.0188	-0.003

Note: $\overline{Trade\ Openness}$ is the sum of imports and exports as a percentage of GDP and $\overline{Trade\ Openness}$ is the average of $\overline{Trade\ Openness}$ variable, from 1980-2005 in 58 countries. * Significance at 10%; ** Significance at 5%; *** Significance at 1%.

Graph 1- Impulse response of labor share of income to a currency crisis in countries with high (left) or low (right) level of openness with fixed effects (upper graphs) and difference GMM (lower graphs).



Note: The horizontal axes indicate time in years. The vertical axes measure responses in percentages. For upper panels, equation (2) is estimated using fixed effects. In lower panels, equation (2) is estimated using difference GMM. In all estimations country and time fixed effects are included. The left (right) panels show impulse responses of labor share of income in countries with high (low) level of openness. The dotted lines represent 90 percent confidence intervals based on 1000 Monte Carlo simulations. The sample includes 58 countries during the 1980-2005 period.

Appendix: Dependent Variable is Labor Share of Income

	(1)	(2)	(3)	(4)	(5)	(6)
Trade Openness	-0.0175 (0.0141)	-0.0389*** (0.0138)	-0.0383*** (0.0141)	-0.0193 (0.0136)	-0.0960*** (0.0142)	
Log (GDP per capita)	0.0560*** (0.0133)	0.0762*** (0.0138)	0.0687*** (0.0150)	0.0558*** (0.0142)	0.0330 (0.0203)	0.0094 (0.0206)
Trade Openness*Crisis	0.0025 (0.0128)	-0.0610** (0.0290)	-0.0595** (0.0295)	-0.0590** (0.0283)	-0.0332* (0.0192)	-0.0329* (0.0192)
Trade Openness*Crisis (t-1)	-0.0424*** (0.0124)	-0.0549** (0.0257)	-0.0528** (0.0262)	-0.0453* (0.0249)	-0.0250 (0.0168)	-0.0249 (0.0168)
Trend	-0.0022*** (0.0006)	-0.0027*** (0.0006)	-0.0024*** (0.0006)	-0.0026*** (0.0006)		
KAOPEN		0.0035 (0.0022)	0.0032 (0.0023)	0.0009 (0.0022)	-0.0062*** (0.0021)	-0.0060*** (0.0021)
Crisis		0.0412** (0.0201)	0.0386* (0.0208)	0.0312 (0.0202)	0.0216 (0.0138)	0.0214 (0.0138)
Crisis (t-1)		0.0241 (0.0183)	0.0208 (0.0188)	0.0174 (0.0181)	0.0088 (0.0123)	0.0087 (0.0123)
Crisis (t-2)		-0.0133* (0.0079)	-0.0160* (0.0082)	-0.0155* (0.0080)	-0.0058 (0.0055)	-0.0058 (0.0055)
Unemployment Benefit			-0.0746*** (0.0277)	-0.1057*** (0.0261)	-0.0203 (0.0265)	-0.0202 (0.0265)
Severance Pay_PC			0.0012 (0.0030)	-0.0032 (0.0028)	-0.0023 (0.0023)	-0.0023 (0.0023)
Rural Pop (% Total)				-0.0027*** (0.0008)	-0.0032** (0.0015)	-0.0032** (0.0015)
Gov. spending/GDP				0.0062*** (0.0009)	0.0052*** (0.0009)	0.0052*** (0.0009)
Trade Openness (residual)						-0.0010***
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country time trend	No	No	No	No	Yes	Yes
# Observations	1119	1035	999	975	975	975
#Cross Section	56	56	55	54	54	54
R ² : Within	0.06	0.08	0.07	0.12	0.64	0.64

Standard errors are in parenthesis. * Significance at 10%; ** Significance at 5%; *** Significance at 1%. Severance pay is the principle component of the three Severance Pay indices. Two measures of trade openness are included: Trade/GDP ratio and residual of the

regression of trade to GDP ratio on log of population and log of GDP per capita. Column (5) use the residual as the measure of openness to trade. Country fixed effects are included in all specifications. In column (5) and (6) country time trends are also included.