

Risk Sharing in the Middle East and North Africa – The Role of Remittances and Factor Incomes*

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Abstract

This paper investigates welfare gains and various channels of risk sharing among 14 Middle Eastern and North African (MENA) countries, including the oil-rich Gulf region and the resource-scarce economies such as Egypt, Morocco, and Tunisia. The results show that the overall welfare gain across MENA countries is higher than those documented for the Organization for Economic Cooperation and Development (OECD) nations. We find that income smoothing through factor income flows is higher for the oil-rich Gulf economies compared with the overall MENA region, indicating the positive spillover from wealth funds created by the Gulf states to smooth variations in government expenditures over the business cycle. The results also show that a significant portion of shocks is smoothed via remittance transfers in the economically less developed MENA countries, compared with the oil-rich Gulf and OECD countries. Savings smooth out a fair portion of shocks to output, although the extent is lower than that of the OECD countries. Finally, for the overall MENA region, a large part of the shock remains unsmoothed, suggesting that more market integration is needed to remedy the weak link of incomplete risk-sharing.

Keywords: MENA region; remittance transfer; risk sharing; welfare gain.

JEL Codes: E21, E60, F36, I31.

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1 Introduction

Despite their homogeneity in terms of history, geography, culture, language, stage of development and political structure, the Middle Eastern and North Africa (MENA) countries¹ differ in their resource endowments. Some, especially the Gulf Cooperation Council (GCC) countries within the MENA region, are characterized by a relatively small population, scant water, poor farmlands and few complementary resources with stable oil reserves, a shortage of skilled labor and a small domestic market. Others, the non-oil MENA countries, are characterized by large populations, good agricultural potential, non-oil mineral resources, a large and better trained workforce and a generally more diversified economy. These physical differences *within* the MENA region have naturally opened up certain possibilities for greater market integration to diversifying away some of the income risk associated with resource-based (oil & non-oil) economies. The observed cross-country heterogeneity in the MENA region has been the subject of a growing body of literature on economic growth, trade and financial integration, governance and international political relations, and so forth. The collection of papers in Nugent and Pesaran (2007) provides a comprehensive overview of the growth experience of the overall as well as selected individual countries in the MENA region.

There are at least four principal ways in which MENA countries are interlinked. They include trade in commodity and services, labor flows across the countries of the region, cross-border capital flows (especially foreign direct investment, FDI) and interlinkages through political relations, bilateral as well as multilateral – see Chapter 1 in Nugent and Pesaran (2007) for elaborate discussion. The 14 MENA countries considered in this study can be classified into three sub-regions: namely *GCC*, *Maghreb* and *Mashreq*.² The GCC has by far the most remarkable economic achievement, outpacing Maghreb and Mashreq countries. For instance, of the \$654 billion of the MENA region’s total exports in 2007, the GCC’s export-earning contribution was a staggering \$477 (World Bank, 2008). In many respects, the GCC is acting as an economic ‘buffer zone’ for capital and labor flows in the region. Within a short span of six years (2003–2008), the GCC’s investment spending in the rest of the MENA region amounted to over \$110 billion, thanks to a period of high energy revenues and internal market reforms in

¹The MENA region generally includes 22 Arabic-speaking states plus Iran and Turkey. Due to differences in reliable statistics, only 14 member countries are considered in this study. Turkey is not included in our analysis.

²GCC: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE). Maghreb: Algeria, Libya, Morocco, and Tunisia. Mashreq: Egypt, Jordan, and Syria. The remaining country, Iran, is considered in the literature as a MENA country. Except for Libya, both Mashreq and Maghreb countries can be referred to as ‘non-oil’ MENA countries.

many Mashreq and Maghreb countries (Burke *et al.*, 2009). Perhaps the most visible source of interdependence has been labor flows from Mashreq and Maghreb countries toward the GCC region, spurred by the GCC's dearth of population and labor force. In all these countries, oil is justifiably perceived as the most important source of growth in the MENA region, since part of the Arab oil revenues eventually spillover into the non-oil Arab countries through trade, migration and foreign investment.

How have these economic interlinkages materialized in terms of income smoothing among MENA countries over the past two decades? More precisely, what is the relative contribution of various economic mechanisms through which the MENA countries have achieved international risk sharing?³ This paper attempts to provide an answer to these questions. Income smoothing involves strategies which reduce risk in the income process. Often, the strategy considered is diversification of income sources so that different income sources do not move together. For instance, as an oil-exporting nation, Saudi Arabia would benefit from diversifying away some of the income risk associated with oil price fluctuations through risk sharing agreements with, say, Egypt, which relies primarily on agriculture and manufacturing.⁴ Generally, gains from risk sharing increase when countries are less similar. As such, more diversified countries tend to be more resilient to shocks and hence capable of achieving sustainable growth rates.

We have computed unexploited welfare gains that can be achieved through risk sharing among 14 MENA countries. If those gains are small, it might not be worthwhile to hold a regionally diversified portfolio, given the small costs of investing abroad (van Wincoop, 1994). Sørensen and Yosha (2003) conducted a similar study for nine Middle Eastern countries over the 1980–94 period. They found a high potential gain from risk sharing, where the bulk of the smoothing was achieved via saving. We extend their analysis by including additional Middle East countries (with a particular emphasis on the GCC region) and include more recent observations (1992–2007). Moreover, we estimated the amount of risk sharing through workers' remittances among the non-oil MENA economies. For the sake of comparison, we also estimate, using the same method, the extent of risk sharing among selected Organization for Economic Cooperation and Development (OECD) countries as well as European Monetary Union (EMU) countries. As a result, our study importantly complements the existing evidence of income smoothing in MENA countries.

³Throughout the paper, we use the terms income smoothing and risk sharing interchangeably.

⁴See Table 2 in Makdissi *et al.* (2007) for an overview of sectoral distribution of production in selected MENA countries for the period 1960–1998.

Our results can be summarized as follows. First and foremost, we find that the total welfare gains from international risk sharing among a set of 14 MENA countries are large, implying that insurable (idiosyncratic) components of shocks to country output are substantial and there are exceptionally large benefits from income insurance among countries. In terms of contribution of the various risk sharing mechanisms, we find that only 6 percent of output shocks are absorbed by factor income flows, while the bulk of the smoothing stems from saving (58 percent). International transfers contribute to about 12 percent of risk sharing in the non-oil MENA economies. A considerable fraction (43 percent) of the shocks remains unsmoothed. Finally, workers' remittance (residents and non-residents) absorb a hefty 13 percent of output shocks in the non-oil MENA countries, emphasizing the notion that workers' remittances are an ever-increasingly important aspect of the economies of most MENA countries.

The rest of the paper is organized as follows. Section 2 summarizes the concepts for evaluating potential welfare gains and the channels of risk sharing, while the empirical results are presented in Section 3. In Section 4, we measure the amount of income smoothing achieved in practice through workers' remittance in the non-oil MENA countries. Section 5 concludes the paper.

2 Conceptual framework

This section briefly explains the concepts underlying the empirical results presented below. International economic integration could result in potentially large welfare gains, as it allows domestic residents, firms and countries to smooth fluctuations in their consumption/income by diversifying away country-specific risks. Moreover, there are different ways that countries can achieve risk sharing. For example, during recessions, countries can borrow from international markets and mitigate the adverse impact of declines in aggregate output on consumption and investment. The potential welfare gains from international risk sharing and the various channels through which countries pool their risks can be calculated using methods developed in the literature. Some of these methods are discussed in turn below.

2.1 Utility-based measure of gains from international risk sharing

Recently, Kalemli-Ozcan, Sørensen and Yosha (2001) (KSY hereafter) proposed a measure of welfare gains from risk sharing that uses counter-factual thought experiments, judging what

would happen under alternative states of the economy. Roughly, the KSY measure can be approximated as follows. In the first environment, there is no additional risk sharing relative to what is already implied by the observed output level. In the second environment, there is perfect risk sharing as countries are able to diversify away all country-specific risk associated with domestic output. The difference represents *potential* welfare gains from risk sharing. The gains are expressed as the permanent percentage increase in the level of each country's consumption. For the case of logarithmic utility, the measure takes the form:

$$G_i^{KSY} = 100 \times \frac{1}{\delta} \left(\frac{1}{2}\sigma^2 + \frac{1}{2}\sigma_i^2 - cov_i \right), \quad (1)$$

where δ is the intertemporal discount rate, cov_i is the covariance of country i 's endowment with the world endowment, and σ^2 and σ_i^2 are the variance of the group-wide and country per capita output growth respectively. The KSY measure states that the gains from risk sharing for country i will be larger when both the group-wide and country-specific variance of output growth is larger, and when the covariance of output growth between country i and the rest of the area is smaller. The interpretation of the negative sign on the covariance is straightforward, as joining an area with largely unrelated fluctuations will provide more insurance by stabilizing aggregate output. Furthermore, the higher the variance of growth, the more is gained by risk sharing.

To compute the KSY measure, either consumption or gross domestic product (GDP) data, or both, can be used. However, when consumption data is used, the gains should be interpreted as the 'unexploited' gains from risk sharing, while it represents 'total' welfare gains from risk sharing when GDP data are used.

2.2 Decomposing the cross-sectional variance of shocks to GDP

There are different ways countries can share risk with each other. These include, for example, investing in foreign capital markets and/or by simply saving for a rainy day. In an influential paper, Asdrubali *et al.* (1996) offered an intriguing way of assessing different mechanisms for sharing risk among countries. Their approach involves a simple decomposition of output (that is, GDP) that allows one to quantify three alternative channels of risk sharing, namely the 'capital', 'credit' and 'federal government' channels. Any remaining shocks that are not smoothed through these three channels are identified as *unsmoothed* risk. Later, Sørensen and

Yosha (1998) extended the Asdrubali *et al.* (1996) framework to include two additional sources of risk sharing: international transfers and capital depreciation. In this paper, we followed Sørensen and Yosha (1998) to measure the fraction of shocks to GDP absorbed at different levels among the 14 MENA economies. For brevity, the discussion is kept short. Interested readers are referred to the original papers for full details.

Suppose we have a panel data of GDP^{*i*}, gross national income (GNI^{*i*}), national income (NI^{*i*}), disposable national income (DNI^{*i*}), and consumption (private and public consumption, C^{*i*} + G^{*i*}), all stated in real terms. Consider the following cross-sectional variance decomposition of shocks to GDP, holding for any period *t*:

$$\text{GDP}^i = \frac{\text{GDP}^i}{\text{GNI}^i} \frac{\text{GNI}^i}{\text{NI}^i} \frac{\text{NI}^i}{\text{DNI}^i} \frac{\text{DNI}^i}{\text{C}^i + \text{G}^i} (\text{C}^i + \text{G}^i), \quad (2)$$

where all the magnitudes are in per capita terms and *i* is the country index. To stress the cross-sectional nature of our derivation, we suppress the time index.⁵ Following Sørensen and Yosha (1998), we obtain the decomposition of the cross-sectional variance in GDP:

$$\begin{aligned} \text{var}\{\Delta \log \text{GDP}^i\} &= \text{cov}\{\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\} \\ &+ \text{cov}\{\Delta \log \text{GNI}^i - \Delta \log \text{NI}^i, \Delta \log \text{GDP}^i\} \\ &+ \text{cov}\{\Delta \log \text{NI}^i - \Delta \log \text{DNI}^i, \Delta \log \text{GDP}^i\} \\ &+ \text{cov}\{\Delta \log \text{DNI}^i - \Delta \log (\text{C}^i + \text{G}^i), \Delta \log \text{GDP}^i\} \\ &+ \text{cov}\{\Delta \log (\text{C}^i + \text{G}^i), \Delta \log \text{GDP}^i\}. \end{aligned}$$

In the equation above $\text{var}\{X\}$ and $\text{cov}\{X, Y\}$ denote the statistics $\frac{1}{N} \sum_{i=1}^N (X^i - \bar{X})^2$ and $\frac{1}{N} \sum_{i=1}^N (X^i - \bar{X})(Y^i - \bar{Y})$, respectively, where *N* is the number of countries in the sample. Dividing the result by $\text{var}\{\Delta \log \text{GDP}^i\}$, we get $1 = \beta_f + \beta_d + \beta_\tau + \beta_s + \beta_u$, where, for example:

$$\beta_f = \frac{\text{cov}\{\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\}}{\text{var}\{\Delta \log \text{GDP}^i\}}, \quad (3)$$

is the estimated slope in the cross-sectional regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$ on $\Delta \log \text{GDP}^i$, and similarly for β_d , β_τ , β_s , and β_u .

The coefficients β_f , β_d , β_τ , and β_s are interpreted as the fraction of shocks absorbed through

⁵The national accounting identities relevant to the present analysis are: $\text{GNI} = \text{GDP} + \text{net factor income}$, $\text{NI} = \text{GNI} - \text{capital depreciation}$, $\text{DNI} = \text{NI} + \text{international transfers}$, and $\text{C} + \text{G} = \text{DNI} - \text{net saving}$.

factor income flows, depreciation, international transfers, and saving, respectively. If full risk sharing is achieved only through factor income flows, then $\beta_f = 1$. If full risk sharing is achieved through both factor income flows and capital depreciation, then $\beta_f + \beta_d = 1$. Similar reasoning applies for other combinations. The bottom line is that these coefficients reflect the incremental amount of smoothing achieved through the various channels discussed above. If full risk sharing is achieved through all four channels – that is, if the real consumption per capita growth is statistically uncorrelated with real output per capita growth (that is, $\text{cov}\{\Delta \log(C^i + G^i), \Delta \log \text{GDP}^i\} = 0$) – this implies that $\beta_u = 0$. Conversely, $\beta_u > 0$ when full risk sharing is not achieved. The coefficient β_u is thus interpreted as the fraction of shocks to GDP that is not smoothed. Following Sørensen and Yosha (1998), our analysis does not impose any restrictions on the sign of the β -coefficients.

We estimate the following panel equations:

$$\begin{aligned}
\Delta \log \text{GDP}_t^i - \Delta \log \text{GNI}_t^i &= \nu_{f,t} + \beta_f \Delta \log \text{GDP}_t^i + \epsilon_{f,t}^i, \\
\Delta \log \text{GNI}_t^i - \Delta \log \text{NI}_t^i &= \nu_{d,t} + \beta_d \Delta \log \text{GDP}_t^i + \epsilon_{d,t}^i, \\
\Delta \log \text{NI}_t^i - \Delta \log \text{DNI}_t^i &= \nu_{\tau,t} + \beta_{\tau} \Delta \log \text{GDP}_t^i + \epsilon_{\tau,t}^i, \\
\Delta \log \text{DNI}_t^i - \Delta \log (C_t^i + G_t^i) &= \nu_{s,t} + \beta_s \Delta \log \text{GDP}_t^i + \epsilon_{s,t}^i, \\
\Delta \log (C_t^i + G_t^i) &= \nu_{u,t} + \beta_u \Delta \log \text{GDP}_t^i + \epsilon_{u,t}^i,
\end{aligned} \tag{4}$$

where $\nu_{.,t}$ are time fixed effects (time dummy variables) which capture year-specific impacts on growth rates, most notably the impact of the growth in aggregate output. Furthermore, with time-fixed effects, the β -coefficients are weighted averages of the year-by-year cross-sectional regressions. Following Sørensen and Yosha (1998), we model autocorrelation using an first order autoregressive, or AR(1), process, which is assumed to be identical across countries and equations. We allow for state-specific variances of the error terms. We estimate the system in Equation (4) using a two-step Generalized Least Squares (GLS) procedure as described in Asdrubali *et al.* (1996).

3 Empirical results

3.1 Preliminary findings

Table 1 presents selected summary statistics for GDP and consumption per capita growth rates of individual MENA countries for the period of 1992–2007.⁶ Comparable figures for European Union (EU) countries are reported in Demyanyk and Volosovych (2008) and are therefore not repeated here to save space. The yearly average GDP growth rate of the GCC countries in the 1992–2007 period was 2.33 percent compared to 0.22 percent for non-oil MENA countries. Iran has done rather poorly, while none of the non-oil MENA countries grew faster than the GCC countries over the whole period. A common feature of the growth performance of the MENA countries (both oil and non-oil) is its high volatility in comparison to other regions. The rather surprising lower standard deviation of output growth in oil-exporting GCC countries compared to non-oil MENA countries possibly indicates that the latter countries were frequently affected by unfavorable weather conditions that threatened their agricultural output, which outpaced the GCC's exposure to the vagaries of the international oil market. Likewise, the GCC fared better in its consumption growth and its variability compared to non-oil MENA countries. The average growth rate of consumption for the former is 3 percent versus 0.89 percent for the latter; the average standard deviations are 3 percent and 4.62 percent, respectively. In the 1994–2005 period, the yearly average output growth rate for 15 EU member countries was 2.46 percent with a standard deviation of 1.7 percent, while the growth rate of consumption and its variability was 2.12 percent and 1.09 percent (Demyanyk and Volosovych, 2008).

The risk sharing behavior of a country can be measured by the relative volatility (in terms of the standard deviation) of consumption to that of income. From the statistic reported in Table 1, it is evident that consumption is less variable than income in Bahrain, implying high risk sharing. The reverse is true for Oman. Averaged over all 14 countries, consumption is as variable as income, indicating too little risk sharing. Table 1 also presents correlations between consumption and output across countries. These correlations are calculated with respect to the 14-country aggregate, based on the Hodrick and Prescott (1997) filtered data. Contrary to previous theoretical predictions (see, for example, Backus *et al.*, 1992), we find that in some countries, consumption is much less correlated across countries than output. Particularly in the four rich Gulf economies (Kuwait, Qatar, Saudi Arabia, and the UAE), the average correlation

⁶See Appendix A for a description of the data used in this study.

of consumption (0.31) was much less than that of output (0.55). It is possible that consumption growth rates in these Gulf economies are more synchronized with their wealthier industrial economy counterparts than the economically disadvantaged MENA region. Overall, the results suggest that economic activities are more synchronized among GCC economies than across the non-oil MENA economies.

3.2 Potential welfare gains from risk sharing among MENA countries

Table 2 presents the potential welfare gains based on the KSY method for all 14 countries. The numbers are expressed as percentages and are obtained using the assumption of full risk sharing within the MENA region. It is apparent that the potential gains for Iran, Syria and Algeria are relatively large compared to other countries, particularly with respect to the GCC countries. The average gains for non-oil MENA countries well exceeded those of the GCC countries (8.12 percent versus 2.83 percent). In the 1994–2005 period, Demyank and Volosovych (2008) obtained an average welfare gain of 4.11 percent for the new EU countries (those that became members after 2004) and a mere 0.69 percent for the original 15 EU member countries. The relatively large welfare gains for the non-oil MENA countries can be explained in light of the high volatility of output and consumption (Table 1), particularly for Iran, Algeria and Syria. As such, countries with large variance and a counter-cyclical pattern of output growth would contribute the most in stabilizing the regional aggregate consumption pattern. The estimated gains reported in Table 2 are based on an intertemporal discount rate of $\delta = 0.03$. As a sensitivity analysis, we also estimated the KSY gains using different discount parameters ($\delta = 0.02, 0.04, 0.06$). Roughly, the results reveal that a lower intertemporal discount rate increases the welfare gains from risk sharing (data not shown but available from the authors upon request).

3.3 Channels of risk sharing among MENA countries

Table 3 displays the estimated percentages of GDP shocks smoothed through each channel for the GCC and non-oil MENA countries. For the sake of comparison, we also report similar results separately for OECD and EMU countries. We find significant evidence of income insurance through inter-country ownership of productive assets, contrary to the well-documented home bias in security holdings (see, for example, French and Poterba, 1991). However, the extent of income smoothing achieved through factor income flows was much higher for GCC countries

compared to non-oil MENA countries. Clearly, the rise in oil prices since 2000 and into mid-2008 has helped the GCC countries to accumulate huge foreign exchange reserves, the bulk of which has been invested in foreign financial and real assets, primarily due to lower domestic absorption capacity. When oil prices decline, the GCC's accumulated wealth is used to smooth out income/consumption, which is necessary for continued economic activity and growth. Our results are different from those of Sørensen and Yosha (2003), who found evidence of income dis-smoothing through factor income flows for selected Middle Eastern countries over the 1983–93 period. Continuous improvement in cross-border market integration and a reduction in home bias underlies the positive income smoothing documented in the recent decades. By comparison, the lack of income insurance among OECD and EMU countries (as indicated by the last two columns in Table 3) is in line with the results obtained by Sørensen and Yosha (2008).

Capital depreciation provides dis-smoothing (-4 percent for GCC and -5 percent for non-oil MENA countries, and similar levels for OECD and EMU countries, though in different magnitudes) since it generally constitutes a large fraction of output during recessions and a smaller fraction in boom years. As stated earlier, capital depreciation is responsible for the difference between national income and GNI, and its negative contribution to smoothing may be, in part, the result of how national accounts data are calculated (see, Marinheiro (2003) for further details). International transfers smooth 12 percent shocks to output in non-oil MENA countries. This channel of income smoothing includes aid from international institutions, aid from Arab oil-exporting countries (including GCC countries) and remittances by foreign workers, which are counted in the National Accounts as part of international transfers.⁷ The extent of smoothing is slightly higher than that given by Sørensen and Yosha (2003), who obtained about 9 percent smoothing for selected Middle East countries over the 1983–93 period. By comparison, international transfers do not seem to provide income smoothing in OECD or EMU countries. As indicated by Marinheiro (2003), in the EU countries, such transfers are mainly due to the Common Agricultural Policy, structural funds and their counterpart – the member states' contributions to the EU budget. The negative coefficient of the international transfers for GCC countries is consistent with the huge outflow of remittances from GCC countries to the rest of the world. For example, over the 2008–2010 period, an estimated US\$179 billion was trans-

⁷A recent IMF (2011) study shows that aid flows – mainly from Kuwait, Saudi Arabia, and the UAE – have averaged about 1.5 percent of their combined GNI between 1973 and 2008; many MENA countries have received between 10 percent and 70 percent of their total official development assistance from other countries in the MENA region.

ferred from the GCC to the rest of the world through remittances flows, partially mitigating the impact of the global financial crisis on many countries in the non-oil MENA region (IMF, 2011).

A significant amount of the smoothing of output shocks for the GCC and MENA countries is achieved via saving. For the GCC countries, about 46 percent of the country-specific shocks are buffered through this channel, as opposed to 33 percent in the non-oil MENA countries. When combined, saving is able to reduce 58 percent of shocks to output in MENA countries, similar to the magnitudes observed in OECD and EMU countries in the same table. However, Sørensen and Yosha (2003) documented a 42 percent smoothing via saving for their sample of Middle East countries. In general, when shocks to output are more persistent, the incremental percentage amount of smoothing through saving behavior is lower, as predicted by the permanent income theory (see, for example, Becker and Hoffmann, 2006). Our sample of MENA countries is too short to examine this hypothesis using time horizons of varying length (namely, using autoregressive lags), but this caveat should be kept in mind.⁸ Finally, we find that over 50 percent of shocks to the output of countries in the region are not smoothed. The magnitude of the unsmoothed portion reduces considerably (and becomes comparable to that of the OECD and EMU countries) when the estimation is performed using the overall MENA sample. This is in line with the findings of the previous section that the unexploited welfare gains from financial market integration among MENA countries are substantial.⁹

4 Workers' remittances and risk sharing in MENA countries

The preceding discussion showed that potential welfare gains from risk sharing are large among MENA countries, often exceeding the potential gain from sharing risk among OECD/EU countries. Further, we find that the bulk of the smoothing of country-specific output shocks for MENA countries has been achieved via saving and international transfers. International transfers, which typically include foreign aid and workers' remittance income, constitute a larger frac-

⁸We thank an anonymous referee for raising this point.

⁹We have repeated the above analysis over two subperiods, namely 1992–2000 and 2001–2007, to find out the extent of changes in the levels of smoothing over time. We did not find any considerable differences from the pattern of risk sharing for the entire sample, save in one case: the income insurance through factor income flow in the non-oil MENA region for the subperiod 1992–2000 is negative but statistically insignificant. This result, in line with Sørensen and Yosha (2003), possibly indicates how less integrated some Middle Eastern countries were with the world's capital markets. Overall, the magnitude of risk sharing achieved through different channels was higher during the 2001–2007 subperiod, magnifying the vital role of oil revenues in the GCC countries and the resulting spillover of the accumulated oil wealth in the MENA region. These results are not presented here to conserve space, but are available from the authors upon request.

tion of output when the receiving country is in recession. As the oil-exporting GCC countries have traditionally relied mostly on workers from the labor-surplus countries of the MENA region (alongside those of Asian and European origin) for continued economic activity and growth, it is interesting to assess whether remittances transferred by migrant workers smoothed income in the non-oil MENA countries.¹⁰ In general, workers' remittances provide a stable source of external funding (Ratha, 2003), lower the probability of current account crisis (Bugamelli and Paterno, 2009), reduce poverty rates in the country of origin (Adams and Page, 2003) and provide a host of other benefits including fostering consumption of both durable and nondurable goods, accumulating human capital and increasing physical and financial investment.¹¹

For some non-oil MENA economies (for example, Jordan), remittances constitute the single largest source of foreign exchange, exceeding export revenues, FDI and other private capital inflows.¹² Remittances have especially proved remarkably resilient during economic downturns and crises, hence providing an important channel of international risk sharing.¹³ Ilahi and Shendy (2008) have documented the positive spillover effects of financial and remittance outflows from Saudi Arabia – which accounts for roughly three-quarters of the GCC's outward remittances – into real GDP growth in non-oil MENA economies. A number of studies (for example, Glytos, 2002; Makdisi *et al.*, 2007; Mohamed and Sidiropoulos, 2010) have documented the positive effect of remittance inflows on economic growth in MENA countries; however, the question of to what extent remittance inflows buffer output shocks in the recipient MENA economies has not yet been addressed in the literature. This section aims to fill this gap by quantifying the amount of shocks to output absorbed by remittance inflows.

Data on workers' remittances are taken from the IMF's Balance of Payments Statistics Yearbook (5th ed.), which reports two components of remittances registered in the current account. These are *workers' remittances*, which 'cover current transfers by migrants who work

¹⁰Due to the unavailability of a sufficient sample span of aid from oil-exporting Arab countries to the MENA region, we could not analyze the foreign aid channel of risk sharing.

¹¹See Chapter II of the 'World Economic Outlook' prepared by the International Monetary Fund (April 2005) for a recent contributions in this area.

¹²Over the 1992–2007 sample period, the annual average remittances contribution to a country's GDP across the seven non-oil MENA countries varied: Algeria (2.12 percent), Egypt (5.59 percent), Iran (0.86 percent), Jordan (20.70 percent), Morocco (6.85 percent), Syria (2.46 percent) and Tunisia (4.21 percent). In the case of Maghreb countries (Algeria, Morocco and Tunisia), the remittances received were largely from Europe, especially from France and Germany. The authors' calculation is based on the World Development Indicators databank of the World Bank.

¹³However, in extreme situations, such as the Iraqi invasion of Kuwait in 1990, unexpected swings in remittance flows could spoil risk sharing in the country of origin. The substantial loss of unremitted savings from Egyptian workers in Kuwait in 1990 is clearly an example of this sad event. The departure of thousands of workers from GCC countries in the wake of the recent financial crisis caused unpleasant economic disturbances in labor-exporting countries that rely heavily on remittances.

and are considered residents of new economies’; and *compensation of employees*, which refers to ‘wages, salaries, and other benefits earned by individuals for work that they performed in economies in which they are not residents’. In the former, workers staying in the new economy for more than one year are considered residents; workers expected to stay less than one year are treated as examples of ‘compensation of employees’. We use *net* figures, which are adjusted for all remittance outflows from the non-oil MENA countries. In order to measure the degree of risk sharing in income through workers’ remittances, we estimate the following panel regression equation:

$$\Delta \log \text{GDP}_t^i - \Delta \log(\text{GDP}_t^i + \text{WR}_t^i) = \nu_{k,t} + \beta \Delta \log \text{GDP}_t^i + \epsilon_{i,t}, \quad (5)$$

where WR_t^i is the net workers’ remittances received by country i in year t , and $\nu_{k,t}$ is the time fixed effects. Equation 5 examines whether domestic income plus workers’ remittances (which can be considered as ‘total income’ available before other mechanisms of risk sharing take place) varies less than one-to-one with output. Treated this way, the coefficient β measures the degree of international income smoothing achieved by country i in year t .

A similar type of regression is estimated to measure the effect of compensation of employees in risk sharing. More precisely:

$$\Delta \log \text{GDP}_t^i - \Delta \log(\text{GDP}_t^i + \text{CE}_t^i) = \nu_{k,t} + \beta \Delta \log \text{GDP}_t^i + \epsilon_{i,t}, \quad (6)$$

where CE_t^i refers to the net compensation of employees received for country i in year t , and $\nu_{k,t}$ is the time fixed effects. The coefficient β has a similar interpretation as above.

The estimation results for panel specifications in Equations 5 and 6 are given in Table 4. Similar equations are estimated for the OECD countries to facilitate comparison. As can be seen in Panel A in Table 4, about 8 percent of the country-specific (output-specific) risks for the group of non-oil MENA economies over the entire sample period is shared by workers’ remittances. Not surprisingly, the degree of risk sharing was especially higher during the 2001–2007 subperiod, possibly indicating the burgeoning of remittance outflows in the face of persistently strong oil surpluses in the GCC region. Similar calculations done for the group of OECD countries do not provide evidence of significant risk sharing. Panel B in Table 4 presents results for the compensation of employees over three different periods. The findings are again stronger for MENA countries than that their OECD counterparts, supporting the notion that workers’ remittances are an ever-increasingly important aspect of the economies of most MENA countries.

Overall, the shortfall in income smoothing through other mechanisms (such as, factor income flows and saving) is partly compensated by migrant workers' remittances in the MENA countries. While our results support remittances as being an important channel through which the process of international risk sharing is taking place in the MENA countries, the *actual* impact of remittances in absorbing idiosyncratic earning risks may be far greater as not all cross-border remittance flows are officially recorded. This is because the IMF data, which we have used in our analysis, only count remittances which enter official banking channels, and do not include the large – but unknown – amount of remittances that are transmitted through information and unrecorded channels (Adams, 2006). Clearly, an improved reporting of workers' remittances will likely strengthen the role of workers' remittance in income insurance.

5 Conclusions

Despite a number of common features, countries in the MENA region exhibit considerable differences among themselves. They vary in population size; endowment of cultivable land; access to international markets; oil and other natural resources; income and wealth; governance types and quality of economic institutions. Nevertheless, the presence of such cross-country heterogeneity is the basis of fostering risk sharing through market mechanisms among countries. We find that total welfare gains from international risk sharing among a set of 14 MENA countries are large, implying that the insurable (idiosyncratic) components of shocks to country output are substantial and there are exceptionally large benefits from income insurance among countries. In terms of the contribution of the various risk sharing mechanisms, we find that only 6 percent of output shocks are absorbed by factor income flows, while the bulk of the smoothing stem from saving (58 percent). International transfers contributed to about 12 percent of risk sharing for non-oil MENA economies. A considerable fraction (43 percent) of the shocks remains unsmoothed. Finally, workers' remittance and compensation of employees absorb a hefty 13 percent of output shocks in the non-oil MENA countries, emphasizing the importance of this channel for the process of risk sharing or consumption smoothing in the non-oil MENA countries.

A Data Appendix

Gathering long-span balanced data across developing countries is always a daunting task. While long-span GDP is generally available, very little information is usually available for other national income aggregates such as GNI, NI or DNI. Due to the paucity of long-span data, our sample period is 1992–2007 for 14 MENA countries. National accounts aggregate data (that is, GDP, GNI, NI, DNI) and consumption (public plus private) were extracted from the United Nations’s National Accounts Main Aggregates Databases (unstats.un.org). Population and exchange rate data were also obtained from the same source. The consumer price index (CPI) series for each country was obtained from the IMF’s International Financial Statistics database. The nominal income aggregates are converted into real per capita variables by dividing by the economy’s population by the CPI.

As mentioned, we compare our results with OECD and EMU countries. Comparable national accounts data for the OECD countries were taken from the OECD National Accounts: Main Aggregates (vol. I) and Detailed Tables (vol. II). Our sample OECD countries include all OECD members except Luxembourg (very small and atypical), Iceland (incomplete data), and Czech Republic, Hungary, Korea, Mexico, Poland, Slovakia and Turkey (less developed countries). The EMU sample includes Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain. Data on remittance flows were collected from the World Bank’s Migration & Remittances Data, while data on (net) compensation of employees from the rest of the world were obtained from the United Nations database.

Table 1: Selected summary statistics of output and consumption growth rates in MENA countries

	GDP		Consumption		Rel. Vol.	GDP Consumption	
	Mean	St. Dev.	Mean	St. Dev.		Correlations	Correlations
Algeria	0	8	1	7	0.89	0.81	0.82
Bahrain	3	4	3	2	0.58	0.76	0.72
Egypt	0	4	1	4	1.17	0.14	0.18
Iran	-1	7	1	7	1.02	0.81	0.93
Jordan	1	1	2	2	1.06	0.32	0.20
Kuwait	3	6	4	3	0.88	0.51	0.21
Libya	1	8	1	5	0.65	0.74	0.62
Morocco	1	4	2	4	1.03	0.36	0.29
Oman	1	1	2	4	2.01	0.40	0.41
Qatar	3	6	3	4	0.79	0.48	0.39
Saudi Arabia	2	4	2	3	0.62	0.71	0.26
Syrian	0	6	2	6	1.14	0.47	0.58
Tunisia	1	3	2	3	0.99	0.30	0.32
UAE	2	2	4	2	1.19	0.51	0.40
MENA (except GCC) average	0.22	5.00	0.89	4.62	1.00	0.50	0.50
GCC average	2.33	3.67	3.00	3.00	1.01	0.56	0.40

Notes: The sample period was 1992–2007. Relative volatility (Rel. Vol.) is the ratio of the standard deviation (St. Dev.) of consumption per capita growth rate to that of GDP per capita growth rate. Correlations are calculated with respect to the 14-country aggregate. Means and standard deviations are multiplied by 100.

Table 2: Potential welfare gains from risk sharing across MENA countries

Algeria	11	Morocco	5
Bahrain	2	Oman	1
Egypt	5	Qatar	4
Iran	15	Saudi Arabia	2
Jordan	2	Syria	8
Kuwait	6	Tunisia	6
Libya	13	UAE	2
MENA (except GCC) average	8.12		
GCC average	2.83		

Notes: The sample period was 1992–2007. The welfare gains are based on the method of Kalemli-Ozcan *et al.* (2001). The gain parameters are interpreted as the total potential welfare gains that a country would obtain from fully diversifying any country-specific variance in output, expressed as a percentage of the permanent increase in consumption as a share of a country’s own GDP. The potential welfare gains are calculated under the assumption of logarithmic utility with the log-difference of country-specific and group GDP, all following a joint normal distribution, the parameters of which are estimated from the individual time series.

Table 3: Channels of risk sharing (percent)

	GCC	MENA (excluding GCC)	MENA	OECD	EMU
Factor income flows (β_f)	12 (4)	4 (2)	6 (2)	0 (1)	2 (1)
Capital depreciation (β_d)	-4 (3)	-5 (2)	-2 (4)	-8 (1)	-6 (1)
International transfers (β_τ)	-15 (9)	12 (4)	-5 (4)	0 (1)	1 (1)
Saving (β_s)	46 (10)	33 (8)	58 (7)	59 (2)	54 (3)
Not Smoothed (β_u)	55 (9)	57 (6)	43 (6)	44 (2)	45 (3)

Notes: The sample period was 1992–2007.

GCC: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the U.A.E.

MENA: Algeria, Egypt, Iran, Jordan, Libya, Morocco, Syria, Tunisia, and GCC countries.

OECD: Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and the United States.

EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain.

Standard errors are given in parentheses. Percentages of shocks absorbed at each level of smoothing: β_f is the GLS estimate of the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$ on $\Delta \log \text{GDP}^i$; β_d is the slope in the regression of $\Delta \log \text{GNI}^i - \Delta \log \text{NI}^i$ on $\Delta \log \text{GDP}^i$ (β_τ and β_s are derived by a similar process). β_u is the estimate of $\Delta \log(c^i + g^i)$ on $\Delta \log \text{GDP}^i$. The β -coefficients are interpreted as the incremental percentage amounts of smoothing achieved at each level, and β_u is the percentage of shocks not smoothed. See Section 2 for further details.

Table 4: Risk sharing through workers' remittances (percent): MENA versus OECD countries

Panel A. Net remittance transfers from immigrants			
	1992- 2000	2001- 2007	1992- 2007
MENA (except GCC)	3 (3)	13 (4)	8 (3)
OECD	0 (1)	-1 (1)	1 (1)
Panel B. Net compensation of employees from abroad			
	1992- 2000	2001- 2007	1992- 2007
MENA (except GCC)	3 (1)	6 (1)	5 (1)
OECD	1 (1)	-1 (1)	1 (1)

Notes: The sample period was 1992–2007.

MENA: Algeria, Egypt, Iran, Jordan, Libya, Morocco, Syria, and Tunisia.

OECD: Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and the United States.

Standard errors are given in parentheses. Income Smoothing through net remittance inflows is obtained by estimating $\Delta \log \text{GNI}^i - \Delta \log(\text{GNI} - \text{WR})^i$ on $\Delta \log \text{GDP}^i$. Income smoothing through net compensation of employees is obtained by estimating $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP} + \text{CE})^i$ on $\Delta \log \text{GDP}^i$. See Section 4 for further details.

References

- Adams, R.H. Jr. and Page, J. (2003). 'International migration, remittances and poverty in developing countries', World Bank Policy Research Working Paper No. 3179. <http://ideas.repec.org/p/wbk/wbrwps/3179.html>.
- Adams, R.H. Jr. (2006). 'Migration, remittances and development: The critical nexus in the Middle East and North Africa', UN/POP/EGM/2006/021. Beirut, United Nations Secretariat.
- Asdrubali, P., Sørensen, B.E. and Yosha, O. (1996). 'Channels of interstate risk sharing: United States 1963–90', *Quarterly Journal of Economics*, 111, pp. 1081–1110.
- Backus, D., Kehoe, P. and Kydland, F. (1992). 'International real business cycles', *Journal of Political Economy*, 100, pp. 745–775.
- Becker, S.O. and Hoffmann, M. (2006). 'Intra- and international risk sharing in the short-run and the long-run', *European Economic Review*, 50, pp. 777–806.
- Bugamelli, M. and F. Paterno (2009). 'Do workers' remittances reduce the probability of current account reversals?', *World Development*, 37, pp. 1821–1838.
- Burke, E., Echagüe, A. and Youngs, R. (2009). 'Why the European Union needs a 'broader Middle East' Policy', Documenti IAI 09/37. December, Istituto Affari Internazionali. <http://www.iai.it/pdf/DocIAI/iai0937.pdf>.
- Demyanyk, Y. and Volosovych, V. (2008). 'Gains from financial integration in the European Union: Evidence for new and old members', *Journal of International Money and Finance*, 27, pp. 277–294.
- French, K. and Poterba, J. (1991). 'International diversification and international equity markets', *American Economic Review*, 81, pp. 222–226.
- Glytos, N.P. (2002). 'The role of migrant remittances in development: Evidence from Mediterranean countries', *International Migration*, 40, pp. 5–26.
- Hodrick, R. and Prescott, E. (1997). 'Postwar U.S. business cycles: An empirical investigation', *Journal of Money, Credit, and Banking* 29, 1–16.
- Ilahi, N. and Shendy, R. (2008). 'Do the Gulf oil-producing countries influence regional growth? The impact of financial and remittance flows', IMF Working Paper No. 167. Washington D.C., International Monetary Fund. <http://www.imf.org/external/pubs/ft/wp/2008/wp08167.pdf>.
- IMF (2011). 'Spillover from the GCC', in *Regional Economic Outlook: Middle East and Central Asia*, April 2011. Washington D.C., International Monetary Fund, p. 21.
- Kalemli-Ozcan, S., Sørensen, B.E. and Yosha, O. (2001). 'Regional integration, industrial specialization and the asymmetry of shocks across regions', *Journal of International Economics*, 55, pp. 107–137.
- Makdisi S., Fattah, Z. and Limam, I. (2007). 'Determinants of economic growth in the MENA countries', in Nugent, J.B. and Pesaran, H. (eds.), *Explaining Growth in the Middle East*, Contributions to Economic Analysis 278. The Netherlands, Elsevier.
- Marinho, C.F. (2003). 'Output smoothing in EMU and OECD: Can we forego government contribution? A risk sharing approach', CESifo Working Paper No. 1051. http://econpapers.repec.org/paper/cesceswps/_5f1051.htm.

- Mohamed, S.E. and Sidiropoulos, M.G. (2010). 'Does workers' remittances affect growth: Evidence from seven MENA labor exporting countries', *International Research Journal of Finance and Economics*, 46, pp. 181–194.
- Nugent, J.B. and Pesaran, H. (2007). 'Explaining Growth in the Middle East', *Contributions to Economic Analysis* 278. The Netherlands, Elsevier.
- Ratha, D. (2003). 'Workers' remittances: An important and stable source of external development finance', in *Global Development Finance: Striving for Stability in Development Finance*, World Bank, pp. 157-175.
- Sørensen, B.E. and Yosha, O. (1998). 'International risk sharing and European monetary unification', *Journal of International Economics*, 45, pp. 211–38.
- Sørensen, B.E. and Yosha, O. (2003). 'Financial market integration in the Middle East: How big is the peace dividend?', *Israel Economic Review*, 2, pp. 1–19.
- van Wincoop, E. (1994). 'Welfare gains from international risk sharing', *Journal of Monetary Economics*, 34, pp. 175–200.
- World Bank. (2008). 'Economic Developments and Prospects: Regional Integration for Global Competitiveness', Washington D.C.
<http://siteresources.worldbank.org/INTMENA/Resources/2008MENA-EDP-full.pdf>.