

The Determinants of Foreign Worker Remittances in the Kingdom of Saudi Arabia

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Abstract. This paper investigates foreign worker remittances in the Kingdom of Saudi Arabia (KSA). Historical patterns and some summary statistics on total and per worker remittances are firstly discussed to gauge the performance of these remittances through the sample period. The study then proceeds to a discussion of the possible determinants of worker remittances from the KSA and to measure their impact on the volume of remittances per worker from the Kingdom. Variables used in the study as determinants include the real GDP income variables, wages per worker, returns and parity conditions, plus some composite indices pertaining to socio-economic factors and to risk indicators in the Kingdom.

Results obtained generally point to a number of facts. The per capita GDP activity variable has a positive relationship to levels of per worker remittances showing that remittances from the Kingdom are pro-cyclical increasing during booms and declining during recessions. Wages also turn out to be a significant positive determinant of remittances per worker from the Kingdom. Differential return variables have the expected inverse relationship with the dependent variable, while results relating to the various political, economic and financial risks' variables indicate that the variables measuring the degree of government stability and the degree of law and order, have a significant impact on remittances. Using composite risk variable led to responses being generally in the expected directions with per worker remittances having a significant negative relationship to socio-political stability.

1. Introduction

The Kingdom of Saudi Arabia (KSA) possesses one of the largest economies in the Middle East and North Africa (MENA) region. Its Gross Domestic Product (GDP) reached 705.9 billion Saudi Riyals (SR) in the year 2002 and its real GDP at 1999 prices was 647.8 billion. The real GDP growth rate was 1.02% in 2002. The Current Account (CA) balance of the KSA was US\$ (-)6.8 billion for 1999 and was at a surplus with a US\$ 7.0 billion in 2000.

The KSA's economy is heavily dependent on oil with oil revenues making up around 90-95% of total KSA export earnings and around 35-40% of the country's GDP.

Due to the sharp rise in oil revenues since 1974, the KSA's economy grew at a fast pace during the following decade. To meet its ambitious development requirements in the absence of an adequate labor force, the KSA resorted to the importation of foreign workers where a massive influx ensued. Since then the performance of the economy has slackened considerably and its fortunes remain largely tied to that of the exogenous oil market. But, the country's dependence on the foreign work force has not abated and the Kingdom continues to face both short and long-term pressures to liberalize and reform its economy. To achieve the desired liberalization and reform, adopted policies focused on privatization, investment promotion and Saudization⁽¹⁾. In that regard the importance of worker remittances from the economy has been recently highlighted mainly because of the mentioned financial pressures on the economy on one hand and due to the sheer magnitudes involved in these flows on the other. Indeed, the KSA has declared its concern through raising the possibility of curbing this form of private capital flight by enticing it to remain in the economy through appropriate policies.

The KSA has no controls on capital movements and hence worker remittances are transferred mainly through legal banking channels. In addition to that some sums are transferred in the form of currency and travelers checks. Currency swaps also abound specially to countries where capital controls and black markets in currencies predominate. But, due to the virtual absence of information and data on these later unofficial types of remittances, we concentrate our attention on remits that are transferred through the legal financial channels and hence are appropriately recorded and officially documented. Hence, data used in the study are from primary official sources which list remittances made through official channels only.

It should also be noted that the paper considers the problem from the Kingdom's perspective. Policies undertaken by the Kingdom to lessen the numbers of foreign workers or to curb their remittances flows might be advantageous to the Kingdom's economy but are likely to be counterproductive for the economies of the labor exporting countries. Implications for these countries are not discussed since that will fall outside the scope of the present study.

Section 2 of the paper discusses remittances in terms of overall trends, rates of growth and the impacts these remittances have on the macroeconomy of the Kingdom. Section 3 deals with empirical issues related to causality flows involving these remittances with other important variables in the economy. Models are also developed in this section to establish the determinants of per worker remittances where the roles of economic activity, wage rates, returns and country risk in affecting transfers are investigated. A final section of the paper then concludes the study.

⁽¹⁾ Saudization is a policy targeted to increasing the contribution of the national Saudi labor force thus simultaneously reducing the dependence on foreign work force.

2. Foreign Worker Remittances in the KSA

Most of the studies that addressed the issue of worker remittances stressed their impact on the countries of origin; their incomes, balance of payments, employment etc. El-Sakka [1]⁽²⁾, for example, conducted a study on the Egyptian workers' remittances. He stressed the fact that the ultimate goal of worker transfers was to finance the consumption of durable goods. In addition, he referred to some studies that focused on the motive of improving the worker's family standard of living, education, and health as the most important variables that affected the decision on levels of remittances. El-Sakka also found in his study that interest and exchange rates parities between the origin and the residence countries played important roles as determinants of flows. In a later study El-Mittieri and El-Sakka [2]⁽³⁾ developed empirical models to investigate the nature of capital flight from the Kuwaiti economy being primarily in worker remittances form. On the other hand, Swamy [3] rejected the importance of the interest rate and the exchange rate parities as important determinants of these remittances. Rather, he found that instabilities in both origin and country of residence economies were the most important factor that affected workers' transfers. Other studies along the same spirit include Straubhaar [4], Rocha [5], Elbadawi and Rocha [6], Ketkar and Ketkar [7], and Manuel [8]. Studies concentrating on the capital flight nature of remittances included Alesina and Taballeni [9], and Dooley [10]. But, few studies tried to focus on the impact of the remittances on the host countries.

2.1. Worker remittances and the KSA economy: Patterns and trends

In this section we discuss the volume of worker remittances from the KSA. Table A1 in the appendix provides data on the historical pattern of these remittances over a sample period covering 1975 to 2001, where data for KSA are for net worker remittances to abroad, which is a subdivision of net transfers in value. The source for these data is the International Monetary Fund (IMF) Balance of Payments (BOP) statistics where data are given originally as millions of local currency units and were subsequently converted to thousands of dollars by use of the appropriate exchange rate. Figure 1 below illustrates graphically the behavior of these remittances over the specified period.

⁽²⁾ In Arabic.

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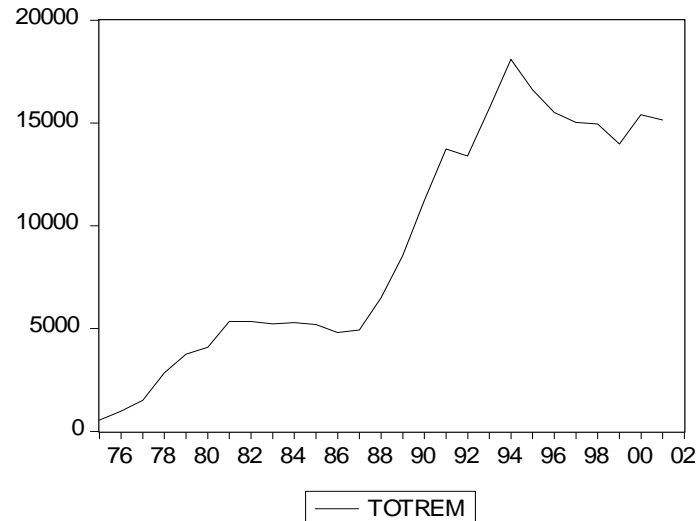


Fig. 1. Workers remittances: Historical patterns.

The data and figure clearly show the strong upward trend in the volume of remittances over substantial periods of the sample despite some noted later declines. Periods of sustained increases covered 1975-1981 and 1988-1994. Since 1994 there appears to have been a declining trend and some stability in the volume of these remittances with a slight perturbation followed by a rebound occurring in 1999-2000 because of variations in incomes resulting from events in the oil market.

Table 1 below provides summary statistics relating to the volume of worker remittances in the KSA.

Table 1. Worker remittances in the KSA: Summary statistics 1975-2001

	KSA
Mean	9029.63
Median	6510.01
Maximum	18102.00
Minimum	554.35
Std. Dev.	5688.55
C.V.	0.63
Skewness	0.11
Kurtosis	1.45

Mean worker remittances over the sample period was US\$ 9.03 billion with a relative coefficient of variation (C.V.) of 0.63 magnitude. Annual remittances were as low as US\$ 554 million but increased sharply to achieve a maximum in excess of US\$ 18 billion over the sample period. The proportional growth rate in worker remittances over the entire sample period, 1975-2001 was high and equal to 10.37%.

As a further detail to the above, Table A1 in the appendix lists also the annual growth rates over the sample period whereas Fig. 2 depicts the same information graphically. The table and graph show that growth in worker remittances surged early and as of late as the period 1988–1991. Factors contributing to that acceleration could be attributable to the decline in confidence in the Kingdom's economy after the major oil slump in 1985, a declaration of the government's intentions to tax foreigners, and the onset of the Gulf crisis in 1990, which prompted a sudden and massive flight of capital from the country. Since 1995 the growth rate has been negative but generally low with the exception of the year 2000.

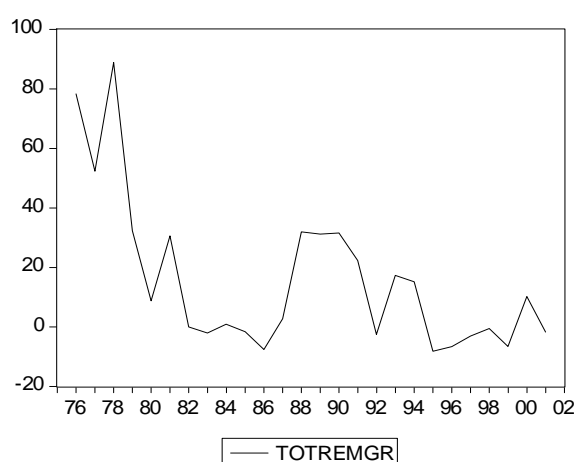


Fig. 2. Annual growth rates: Workers remittances.

Foreign worker remittances in the KSA also constituted a high ratio of the country's GDP. The mean ratio over the last decade 1990-1999 was 11.79% with a range of 9.80-15.06% which far exceeds ratios recorded for other countries outside the Gulf Cooperation Council (GCC) states⁽⁴⁾. Remittances were also generally increasing in relation to GDP for the KSA but the ratios started to decline since 1994.

Worker remittances also constituted a substantial source of leakage in the BOP of

⁽⁴⁾ Among the group of GCC countries, Qatar shows the highest remittance-GDP ratio over the same time period with an average of 13.26% while Kuwait is the lowest with a 4.91% ratio.

the Kingdom and served to drain its foreign exchanges. Indeed, whereas the CA excluding remittances was in deficit or surplus, the addition of remittances served sometimes to worsen the deficits, or to substantially reduce the surpluses or to change the surpluses into deficits. An example of this happened in 1993 where the deficit rose by 91% since the deficit in the current account excluding remittances was US\$ 1550.8 million which in turn increased to US\$ 17267.8 after the addition of US\$ 15717 million in recorded workers remittances in that year. Similar patterns of behavior occurred in the years 1983, 1986 and 1989. On the other hand, a surplus achieved in the balance in 1998 of magnitude US\$ 1804.6 million turned into a deficit of US\$ 13149.5 million with the addition of worker remittances. Other years where a similar pattern occurred were 1979, 1990 and 1995. Yet still, there were cases where remittances led to appreciable reductions in the surplus of the CA. This occurred in 2001 where a surplus of US\$ 29642.2 million without remittances was more than halved to US\$ 14502.3 million with the addition of the US\$ 15139.9 million remittance outflows. Other years of similar patterns included 1975, 1982 and 1996.

2.2. Per worker remittances in the KSA: Patterns and trends

Table A2 in the appendix shows data on remittances per worker for the KSA. This has been obtained by dividing dollar total worker remittances by the number of foreign workers in the KSA where data starts at 1980 because of the unavailability of foreign workers numbers before that period. Figure 3 below illustrates these patterns graphically:

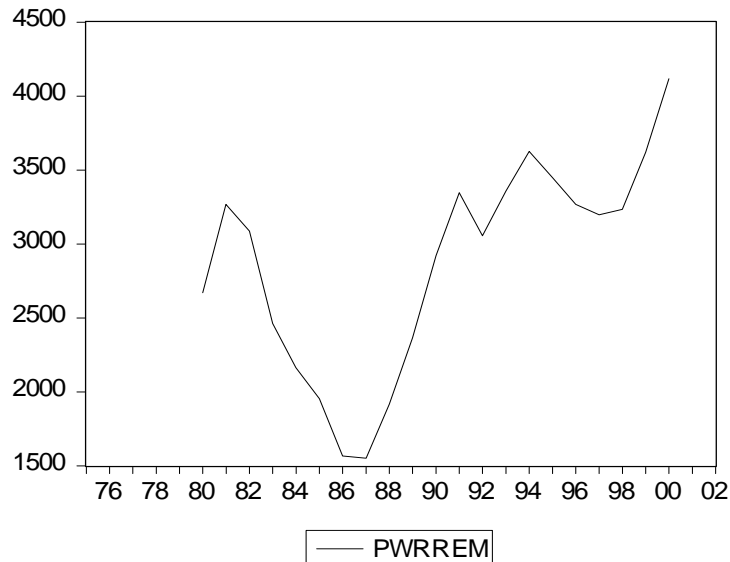


Fig. 3. Per worker remittances: Historical patterns.

As seen in the figure, there were noticeable fluctuations over the sample period where a sharp downward trend occurring after the oil slump in 1986-1987 was reversed upwards thereafter. Table 2 provides some summary statistics on these per worker remittances:

Table 2. Per worker remittances: Summary statistics

	KSA
Mean	2866.35
Median	3086.54
Maximum	4117.35
Minimum	1551.72
Std. Dev.	716.60
C.V.	0.25
Skewness	-0.44
Kurtosis	2.21

A high mean value of US\$ 2855 – or SR 10706 - was obtained and there were large fluctuations around this mean as judged by the standard deviations and C.V. The figure on median per worker remittances being US\$ 3087 - or SR 11576 - is broadly consistent with the median value obtained from a sample survey conducted by the Economic Integration Program [11] on foreign workers in the KSA where median per worker remittances was US\$ 2912 – or SR 10920 - per year. The difference between the two median estimates of per worker remittances could be attributable to monies transferred outside the official channels and hence not recorded or included in the values of worker remittances used in this study. These non-official transfers are specially important in the case of labor sending countries where black markets in currencies predominate. In that case, an added incentive in the form of the black market premium induces the foreign worker to remit his monies through these unofficial channels which generally assume the forms of closely knit *Hawala* systems, or through friends and relatives.

The proportional rate of growth in per worker remittances over the entire sample periods was 2.6%. However, the proportional rate of growth reflect the fact that over the entire sample period the rate of growth in per worker remittances may not have been that high as compared to the rate of growth of total remittances, but at the same time it also hides some large fluctuations witnessed in this rate. It may also point to the fact that the main factor explaining the strong trend in total worker remittances may be the influx of foreign workers to the Kingdom in large numbers and not the increase in per worker remittances *per se*.

Table A2 in the appendix also provides the yearly rates of growth in per worker remittances over the entire sample period whereas Fig. 4 below shows a diagrammatic representation of the annual growth rates in per workers remittances where fluctuations

but no obvious trends could be detected. Rates were high at the out start and rebounded over the period 1986-1988 following the slump in oil and activity of 1985.

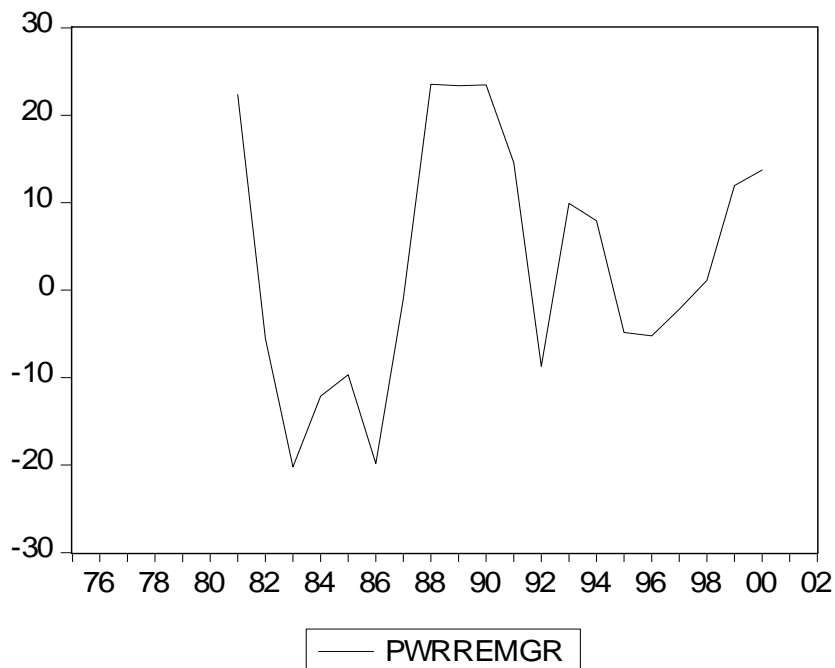


Fig. 4. Annual growth rates: Per workers.

3. Empirical Models of Worker Remittances in the KSA

This part of the study presents empirical models aimed at studying causality flows from remittances to other important variables of the KSA economy and to gauge the various determinants of per worker remittances and estimate their impacts.

3.1. Causality flows

In this section, we examine causality flows between worker remittances and other variables including output and incomes, wages, and domestic interest rates in the KSA economy within the relevant sample periods. These flows are thought to provide prior insights into the nature and direction of causation connecting these variables. Causality flows are determined by application of pair-wise Granger techniques to the respective variables.

3.1.1. Remittances and output (growth)

As far as causation between worker remittances and the relevant output variable is concerned, the directions may not be that clear-cut. For, on one hand, remittances are

leakages from the income streams of the domestic economy and hence will serve to dampen output levels and stifle growth. But, on the other hand, activity in the economy as measured by output levels and growth clearly causes remittance outflows through income effects which would establish causation in the opposite direction. Table 3.a presents the results with respect to the KSA, where causality flows are detected with respect to total remittances (*rem*) and where output is measured by the KSA's real GDP variable. GDP in dollars was used in this respect and data on that were obtained from Ministry of Planning, Central Department of Statistics sources (2002) and official website⁽⁵⁾.

Table 3.a. Pair-wise Granger causality tests: Remittances and output

Causality flow	F-statistics	p-value
<i>rem</i> \nrightarrow <i>gdp</i>	1.600	0.219
<i>gdp</i> \nrightarrow <i>rem</i>	1.093	0.307

* \nrightarrow Does not Granger cause.

The second column in the table contains the F-statistic of the Granger test and the last column the associated p-value. As can be seen from the table, the hypothesis that remittances do not Granger-cause output (*gdp*) in the Saudi economy is accepted while that of GDP not Granger-causing remittances is also accepted at the specified 5% level. Thus, according to this test, there is no evidence of clear-cut causality in this instance.

As a further investigation, Table 3.b conducts the same causality test on per worker remittances (*pwrem*) and per capita GDP levels (*gdppc*) in the KSA.

Table 3.b. Pair-wise Granger causality tests: Per worker remittances and per capital output

Causality flow	F-statistics	p-value
<i>pwrem</i> \nrightarrow <i>gdppc</i>	4.205	0.052
<i>gdppc</i> \nrightarrow <i>pwrem</i>	3.676	0.037

* \nrightarrow Does not Granger cause.

In this instance there is clear-cut evidence of rejection of the hypothesis that per capita GDP does not cause per worker remittances while in the other direction that per worker remittances does not cause per capita income is only marginally accepted. A further test was conducted for causality between the growth rate of total remittances (*remgr*) and output growth (*gdpg*) and results in Table 3.c show that growth may not cause remittances growth.

Table 3.c. Pair-wise Granger causality tests: Remittances and output growth

Causality flow	F-statistics	p-value
<i>remgr</i> \nrightarrow <i>gdpg</i>	6.604	0.017
<i>gdpg</i> \nrightarrow <i>remgr</i>	0.002	0.968

* \nrightarrow Does not Granger cause.

⁽⁵⁾ www.planning.gov.sa

3.1.2. Remittances and wages

As argued above, with added economic activity incomes – including wages - would rise leading to higher remittances abroad. On the other hand, added economic activity and rising wages could lead to more confidence in the domestic economy whereby workers would decide to retain their incomes locally instead of sending them abroad and their response would tend to be negative through this second channel. High wage earners are also more liable to be accompanied by their families in the host country and hence their remittances would tend to be relatively low. On the other hand, per worker remittances could depress output and future incomes levels in the host and hence serve to lower wages further in the future.

Table 3.d below presents the results with respect to the two variables per worker remittances and wages (*wage*) where we note that data is severely limited for this later variable. Due to this data paucity and unreliability, we used the wage rate in the private sector as recorded by the General Organization of Social Insurance (GOSI) for fully insured workers as a proxy for this variable.

Table 3.d. Pair-wise Granger causality tests: Per worker remittances and wages

Causality flow	F-statistics	p-value
<i>pwrem</i> \nrightarrow <i>wage</i>	0.850	0.452
<i>wage</i> \nrightarrow <i>pwrem</i>	11.136	0.002

* \nrightarrow Does not Granger cause.

In this instance the hypothesis that wages do not Granger-cause per worker remittances in the Saudi economy is rejected while that of per worker remittances not Granger-causing wages is accepted at 5% level.

3.1.3. Remittances and the interest rate

Links between remittances and domestic interest rates (*int*) could be thought of, where higher domestic interest rates will serve to discourage remittances abroad while massive capital flight will lead to pressures on the domestic interest rates to rise. Table 3.e presents the causality results where data on the interest rates were obtained from the Saudi Arabia Monetary Agency (SAMA) publications and pertain to short-run 3-month interest rates on deposits.

Table 3.e. Pair-wise Granger causality tests: Remittances and the interest rate

Causality flow	F-statistics	p-value
<i>rem</i> \nrightarrow <i>int</i>	5.426	0.023
<i>int</i> \nrightarrow <i>rem</i>	0.769	0.487

where the hypothesis of remittances not affecting interest rates is rejected for total remittances while that of interest rates not causing total remittances is duly accepted.

Overall, we see that pair-wise causality testing indicates no clear-cut directions in the case of output, while rejecting the hypotheses that wages do not cause remittances and that remittances do not cause interest rates. These results could serve as a precursor on the directions of impacts developed in the more structural model presented in the next section.

3.2. Determinants of KSA's foreign worker remittances

We proceed in this section to present the model explaining KSA remittances in terms of their various determinants. As far as the theoretical literature on the subject is concerned, two basic sets of determinants are usually offered with one consisting of the basic determinants of savings while the other comprising portfolio considerations of relative prices and special incentive policies followed in the labor-sending countries in order to entice remittance flows. The first basic set of variables contains the characteristics of the migrant labor force, its incomes, and its family attributes. The second set normally relates to differential rates of returns on portfolio investments between the host and home countries. Prices and interest rates comprise the main variables in this second set of determinants.

Elbadawi and Rocha [6] develop a synthesis of the two approaches where the first set of determinants relating to worker and family characteristics is seen to determine a "required" level of remittances dominated by income and demographic factors and much less influenced by economic policy, whereas within the second set of determinants relating to the portfolio approach, the macroeconomic environment in the home and host countries influence the residual level of remittances, i.e. the excess of "desired" over "required" remittances.

3.2.1. The model

The model used in this study is a version of the following:

$$pwrem_t = f(gdp_t, wage_t, int_t, int_t^*, inf_t, inf_t^*, exh_t, exh_t^*, zprf_t, zfrf_t, zerf_t)$$

where:

pwrem	remittances per worker in US dollars.
gdp	real GDP in US dollars.
wage	the wage rate in US dollars.
int	domestic interest rate.
int*	foreign interest rate.
inf	domestic inflation rate.
inf*	foreign inflation rate.
exh	domestic exchange rate.
exh*	foreign exchange rate.
Zprf	a vector of political risk factors.
Zfrf	a vector of financial risk factors.
Zerf	a vector of economic risk factors.

Prior expectations on the responses of the variables are that the relationship between per worker remittances $pwrem$ and gdp could flow either way. As argued above, with added economic activity reflected in higher GDP, incomes – including wages - would rise leading to higher remittances abroad. On the other hand, added economic activity and rising GDP could lead to more confidence in the domestic economy whereby workers would decide to retain their incomes locally instead of sending them abroad and their response would thus be negative through this second channel.

As far as the wage rate ($wage$) is concerned it is safe to argue that the response would be positive whereby higher wages would lead to higher remittances abroad. A negative relationship is stipulated between short-run domestic rates of returns (int) and remittances per worker whereby higher domestic returns would encourage workers to deposit their monies in the host's domestic economy instead of remitting abroad, and hence the dependent variable would tend to decline. On the other hand, the higher foreign rates of returns (int^*) would affect workers remittances positively where higher returns would result in higher remittances abroad in search of higher returns. Differential rates of return (int/int^*) were also used in this context where (int^*) is a weighted average of the interest rates in the five major labor sending countries to the Kingdom; the weights being the ratios of each country's workers to the total.

Prices were measured by the Consumer Price Index (CPI) obtained from SAMA and IFS sources and inflations – both domestic and foreign - were calculated as the annual rate of change for the CPI. Again, differential inflations ratios were also constructed and used as explanatories.

Returns variables were mainly interest rates variables in nominal and real, forms. These were also incorporated into interest parity terms and differential parity terms to arrive at a more comprehensive measure of returns. To compare the structure of interest rates in the KSA with other nominal interest rates in countries of worker origin, foreign rates of interests for a sample of countries including Bangladesh (BNG), Egypt (EGY), India (IND), Pakistan (PAK), and the Philippines (PHI), which represent by far the main countries of origin of workers in the KSA. In terms of the nationalities of foreign workers in the KSA, statistics show that the largest grouping is composed of Indians with an average number of 1.04 million over the period 1990-1997⁽⁶⁾. Egyptians were next with an average of 0.69 million over the same time period closely followed by Pakistanis with an average of 0.60 million. People from Bangladesh were 0.39 million and those from Indonesia were 0.22 million whereas the Philippines had 0.20 million. The rest of the nationalities had less numbers over the same time span.

Table 4 below shows some summary statistics related to these domestic interest rates:

⁽⁶⁾ Source: The Ministry of Labor and Social Affairs.

Table 4. Nominal domestic interest rates (%): Summary statistics

	KSA	BNG	Egypt	India	Pakistan	Philippines
Mean	6.49	10.50	11.11	10.76	8.61	13.36
Median	6.27	12.00	11.00	9.95	8.15	13.58
Maximum	9.14	12.05	12.00	19.35	12.10	21.17
Minimum	3.72	6.04	9.84	5.29	6.25	8.20
Std. Dev.	1.56	2.28	0.64	3.66	1.94	4.08
C.V.	0.24	0.22	0.06	0.34	0.23	0.31
Skewness	-0.11	-0.98	-0.22	0.86	0.47	0.58
Kurtosis	2.32	2.23	2.59	3.03	1.99	2.13

* Source: International Financial Statistics – International Monetary Fund; various issues.

where the nominal interest rates in the comparison group exceed by far those witnessed in the KSA. This is, however, attributable – at least in part – to the different inflationary experiences in the respective countries. Most of the countries of worker origin witnessed higher rates of inflation during the sample period. It would thus be more informative to conduct the comparisons in the rate structures with respect to the real rates not the nominal ones.

Inflation rates are needed to construct actual and expected real rates of return in domestic markets and abroad. Table 5 below shows some summary statistics related to the domestic inflation rates in the KSA and the group of comparison countries.

Table 5. Inflation rates (%): Summary statistics

	KSA	BNG	Egypt	India	Pakistan	Philippines
Mean	0.46	7.03	14.23	9.19	8.64	12.27
Median	0.56	7.65	15.74	8.96	8.70	9.00
Maximum	4.87	11.05	24.06	13.82	14.65	46.41
Minimum	-3.20	-0.11	4.19	5.45	3.54	-0.23
Std. Dev.	2.36	3.45	6.10	2.45	3.17	11.01
C.V.	5.16	0.49	0.43	0.27	0.37	0.90
Skewness	0.38	-0.58	-0.27	0.35	0.16	2.10
Kurtosis	2.80	2.26	2.02	2.43	2.08	7.34

* Source: International Financial Statistics – International Monetary Fund; various issues.

The KSA had a low average inflation rate over the sample period with less than one half of one percent. Compared to that Egypt and the Philippines recorded the highest average inflation rates. It should also be noted that these average inflation rates far exceed those witnessed in the KSA during the same time periods. This has direct repercussions on the structure of real returns in the KSA and the region of worker origin.

The real interest rates (*rint*) in the KSA over the respective sample periods are

obtained by application of the formula:

$$r = i - \pi \quad (1)$$

where r is the real interest rate, i is the nominal rate and π is the inflation rate computed as the yearly percentage change in the CPI.

Table 6 below reports on some summary statistics related to the real interest rates in the KSA.

Table 6. Real interest rates (%): Summary statistics

	KSA	BNG	Egypt	India	Pakistan	Philippines
Mean	5.24	3.43	-3.04	1.95	-0.14	1.03
Median	5.69	2.58	-3.91	1.75	0.08	1.02
Maximum	8.91	10.58	5.97	8.90	5.83	19.14
Minimum	1.40	0.58	-13.06	-7.89	-7.01	-32.83
Std. Dev.	2.45	2.80	5.98	4.28	3.47	11.02
C. V.	0.47	0.82	-1.96	2.20	-25.07	10.68
Skewness	-0.23	1.39	0.10	-0.48	-0.11	-1.75
Kurtosis	1.82	4.17	1.88	3.18	2.43	7.45

* Source: International Financial Statistics – International Monetary Fund; various issues.

where it is seen that the KSA had a mean value of 5.24% and a coefficient of variation of 0.47. The table also reports on the usual summary statistics relating to the real interest rates of the group of representative worker countries. Surprisingly enough, average real interest rates were low as compared to those of the KSA. Indeed in some cases – as of Egypt and Pakistan – the mean values were outright negative. Egypt's rates had a high spread over the sample period as gauged by the standard deviation. The mean real rate was highest for Bangladesh, while the Philippines had the highest variation in real rates of return over the sample period as judged by the coefficient of variation.

Differentials in real rates of interest taken alone may fail to explain adequately the variations noted in workers' remittance in the KSA. A simple modification could be affected on these variables to enable them to measure more adequately the structure of returns considered when deciding upon transfers and remittances. The modification is to generalize the definition by further incorporating the exchange rate depreciation expectations into the definitions thus obtaining a full interest parity condition.

Exchange rates are needed to construct actual depreciations in domestic and foreign currencies that are used in turn in the construction of the interest parity variables. Depreciations in the KSA riyal are calculated according to the formula:

$$\frac{E - E_{-1}}{E_{-1}} \quad (2)$$

where E is the exchange rate of the domestic KSA currency in terms of the dollar where it is seen that the KSA currency is rather stable with some low average depreciations over the period of the sample.

To construct the parity variable, which is to be used in the regressions, we use a weighted average of the exchange rates in the major labor-sending countries while another ready variable to use in this respect is the London Inter-bank Offer Rate (*libor*). The full parity condition (*par*) is:

$$r - \frac{E - E_{-1}}{E_{-1}} \quad (3)$$

while the differential parity terms is (*par/par**).

3.2.2. The conventional empirical results

The general model used to explain the variations in the KSA's worker remittances is:

$$\begin{aligned} pwrem_t &= f(\mathbf{X}, \mathbf{Z}) \\ &= f(\mathbf{xact}_t, \mathbf{xret}_t, \mathbf{zpr}_t, \mathbf{zfr}_t, \mathbf{zer}_t) \\ &= f(gdp_t, gdppc_t, gdprg_t, wage_t, int_t, int_t^*, inf_t, inf_t^*, par_t, par_t^*, \\ &\quad \mathbf{zpr}_t, \mathbf{zfr}_t, \mathbf{zer}_t) \end{aligned}$$

where \mathbf{X} is a vector of economic determinants with its two subcomponents \mathbf{xact} and \mathbf{xret} respectively, the first consisting of activity variables which would include the level of GDP in aggregate (*gdp*) or per capita forms (*gdppc*) and its growth rate (*gdprg*); and the wage rate (*wage*), while the second has the interest rate (*int*), inflation (*inf*) or the full parity condition (*par*) as arguments with the star denoting the same variable for labor-sending countries. \mathbf{Z} is a vector of risk variables where risks are mainly economic, sociological, and political with three subcomponents \mathbf{zpr} being a vector of political risk variables, \mathbf{zfr} a vector of financial risk variables, and \mathbf{zer} a vector of economic risk variables. The vector of return variables includes components pertaining to interest rates in their nominal i and real forms $(i - \pi)$, and interest parity conditions in nominal $i + \left\{ \frac{E - E_{-1}}{E_{-1}} \right\}$ and real forms $(i - \pi) + \left\{ \frac{E - E_{-1}}{E_{-1}} \right\}$. The vector of political risk variables \mathbf{zpr} includes the following:

<i>bur</i>	Bureaucracy quality.
<i>cor</i>	Corruption.
<i>dem</i>	Democratic accountability.
<i>eth</i>	Ethnic tension.
<i>ext</i>	External conflict.
<i>gst</i>	Government stability.
<i>itc</i>	Internal conflict.
<i>ivp</i>	Investment profile.
<i>law</i>	Law and order.
<i>mil</i>	Military in politics.
<i>rel</i>	Religion in politics.
<i>sec</i>	Socio-economic conditions.

Variables related to financial risks *zfr* include the following:

<i>cax</i>	Current account as percentage of exports of goods and services.
<i>dsr</i>	Debt service as a percentage of exports of goods and services.
<i>fdt</i>	Foreign debt.
<i>liq</i>	International liquidity.
<i>sec</i>	Socio-economic conditions.

while variables related to economic risks *zer* include the following :

<i>bud</i>	Budget balance.
<i>cac</i>	Current account as percentage of GDP.

Risk is measured by assigning points to a pre-set group of factors, termed the socio-political risk components relevant to the Kingdom's case. The subcomponents in the case of the KSA include government stability (*gst*) which is a measure both of the government's ability to carry out its declared programs, and its ability to stay in office; socio-economic conditions (*sec*) which cover a broad spectrum of factors ranging from infant mortality to housing and generally measures the degree of public satisfaction with the government; the investment profile (*ivp*) which is a measure of the government's attitude to inward investment as determined by four sub-components which are respectively the risk to operations, taxation, repatriation, and labor costs; corruption (*cor*) which is held to be a threat to foreign investment since it distorts the economic and financial environment, reduces the efficiency of government and business, and introduces an inherent instability into the political process; law and order (*law*) where the two are assessed separately, with the law sub-component being an assessment of the strength and impartiality of the legal system, while the order sub-component is an assessment of popular observance of the law; and bureaucracy quality (*bur*) since the institutional strength and quality of the bureaucracy tends to minimize revisions of policy. The data on these variables were obtained from the International Country Risk Guide (ICRG) published by the Political Risk Services (PRS) Group⁽⁷⁾ where the

⁽⁷⁾ For more on this, see the PRS [12].

minimum number of points that can be assigned to each component is zero; while the maximum number of points depends on the fixed weight that component is given in the overall political risk assessment. In every case the lower the risk point total, the higher the risk, and the higher the risk point total the lower the risk. Points are assigned by ICRG on the basis of a series of pre-set questions for each risk component, and Table 7 shows some summary statistics on those variables.

Table 7. The risk components: Summary statistics

	Maximum Score	Mean	Median	Maximum	Minimum	Std. Dev.	CV
BUR	4	2.53	3.00	3.00	2.00	0.52	0.20
COR	6	2.27	2.00	3.00	2.00	0.46	0.20
GST	12	7.60	7.00	11.00	6.00	1.64	0.22
IVP	12	6.87	7.00	9.00	5.00	1.36	0.20
LAW	6	4.33	4.00	5.00	3.00	0.72	0.17
SEC	12	7.00	7.00	9.00	6.00	1.13	0.16

* Source: ICRG, PRS; [12].

As can be seen from the table, the Kingdom's mean scores were relatively high with respect to the law (*law*) component and relatively low with respect to the bureaucracy (*bur*) one. In addition to that the performances of the indicators was generally stable as judged by the relatively low coefficients of variations (CV).

In our regressions we used the individual risk components as regressors in combination with the various economic determinants while in other cases we resorted to use two composite risk rating regressors constructed from the individual components. The method of computing the first composite socio-political risk ratings (*cpfr*) consists of simply summing the various political risk ratings where the highest overall rating indicates the lowest risk, and the lowest rating indicates the highest risk. The second composite risk rating (*spi*) makes use of an index constructed by Campos *et al.* [13]⁽⁸⁾ where the overall index is constructed on the basis of the following four indicators: dummy variable for civil war (*cvwar*), rebellions (*rebel*), coup d'état (*coup*), and a continuous measure of years in power of the chief executive (*yrpwr*). The four indicators were then aggregated into an overall instability index, *spi*, by a weighting scheme where the weights were calculated by the principal component method.

A large number of trials on the basic specification were tried. A log-linear specification was used for the economic variables and Table 8 below lists some results on individual regressions.

⁽⁸⁾ We are grateful to Professor Jeffrey Nugent for furnishing us with this index.

Table 8. Individual regressions: Static formulations

Var	1	2	3	4	5
<i>C</i>	-2.277	-1.341	-1.886	-2.103	1.451
<i>lgdp</i>	0.886 (7.468)				
<i>lgdppc</i>	-	1.122 (4.356)	1.161 (3.667)	1.150 (4.129)	0.734 (2.717)
<i>int</i>	-	-0.393 (-2.682)	-	-	-
<i>int/int*</i>	-0.262 (-0.981)	-	-1.005 (-2.719)	-	-0.193 (-1.330)
<i>inf</i>	-	0.049 (2.640)	-	-	-
<i>inf/inf*</i>	0.371 (2.506)				
<i>rint/rint*</i>	-	-	-	-0.094 (-3.686)	-
<i>par/par*</i>	-	-	-	-	-0.278 (-1.330)
R^2	0.869	0.773	0.627	0.711	0.799
\bar{R}^2	0.838	0.720	0.574	0.670	0.753
\hat{G}	0.124	0.162	0.200	0.176	0.153
F	28.626	14.719	11.791	17.227	17.243
DW	1.147	1.047	0.912	1.305	0.971

* An *l* preceding a variable indicates that the variable is in logarithmic form.

The fit of the obtained equations was generally good as judged by the conventional statistical criteria of coefficients of determinations and standard errors of regressions. The introduction of the GDP per capita variable (*gdppc*) into the regressions instead of its levels counterpart seems to have resulted in a fall in the overall fit of the regressions. The fall could readily be attributable to the fact that the trend component is less strong in the per capita variable as compared to its levels counterpart (*gdp*) which in turn would reflect itself in the noted fall in fit. The results obtained in estimation indicated that remittances per worker respond positively and according to prior expectations to the GDP variables in its aggregate and per capita forms. This is a robust result that remained true across the different estimation methods tried. Adding the differential interest rates in nominal and real terms to the list of explanatory variables also led to responses in the expected negative directions. The interest rate variable had negative signs throughout indicating that the higher interest rates differentials are, the lower are per capita remittances to abroad. On the other hand, the lower the differentials are, the higher are

per capita transfers to abroad. The results remained in the same directions – though with differing magnitudes - when the real interest rate differential was used instead of the nominal differential. The best performing equation was the one containing the income GDP variable, coupled with the nominal interest and inflation differentials (Model 1 in Table 8). Per capita remittances were also seen to be elastic with respect to the income variables with coefficients exceeding the value of one in magnitude.

To consider the possibility of an endogenous GDP variable in the per worker remittances formulations in which it appeared as an explanatory and in light of the theoretical a priori arguments made before, we applied the Hausman endogeneity test which gave the result that the coefficient on the first stage residuals in the second auxiliary regression of the test are not significantly different from zero, and hence the OLS results should be considered as consistent. Also, the Generalized Method of Moments (GMM) was used to account for any possible endogeneity problem. Results were largely similar to the OLS ones and hence we elected not to report the GMM estimates since the gains in consistency may not be that substantial due to the small sample used in the estimation process.

Adding the sets of socio-political variables to the specifications we obtained the following sets of results in Table 9:

Table 9. Individual risks

Var	1	2	3	4
<i>C</i>	-6.953	-3.222	-3.926	-1.986
<i>lgdp</i>	1.450 (5.724)	1.101 (5.887)	1.192 (6.198)	0.734 (1.835)
<i>lint</i>	-0.437 (-3.246)	-0.214 (-2.214)	-0.279 (-2.665)	-0.022 (-0.110)
<i>cor</i>	-	-0.264 (-3.900)	-0.244 (-3.624)	-
<i>gst</i>	-0.101 (-2.352)	-0.091 (-2.871)	-0.092 (-3.017)	-0.082 (-2.047)
<i>law</i>	-0.095 (-1.586)	-	-0.059 (-1.369)	0.437 (2.027)
<i>war</i>	-	-	-	0.852 (2.527)
R^2	0.880	0.936	0.945	0.917
\bar{R}^2	0.840	0.915	0.921	0.871
$\hat{\sigma}$	0.123	0.090	0.087	0.107
F	22.067	43.983	38.128	19.884
DW	1.360	2.221	2.196	2.193

The fit of the obtained equations remained good and again the Hausman test applied for all the above regressions rejected the possibility of an endogenous *gdp* variable in the regressions. As far as the results are concerned, there is a significant positive relationship between the level of GDP and that of remittances. Remittances increase in volume during booms and recede in volume during recessions. The variable used to measure returns – the short-run interest rate – had the expected negative sign in the reported trials and was mostly significant. As far as the risk variables are concerned, we notice that the degree of government stability *gst*, and the law and order variable *law* had the expected negative impacts on the levels of remittances.

Experimentation of the models using the composite socio-political instability, *cpfr* yielded the results reported in Table 10 below:

Table 10. Composite risks

Var	1	2	3	4
<i>C</i>	-1.781	-1.438	-1.853	-2.155
<i>lgdp</i>	-	0.826 (6.281)	-	-
<i>lgdppc</i>	1.240 (3.938)	-	1.164 (4.147)	1.189 (4.181)
<i>lint</i>	-0.478 (-2.397)			-
<i>libor</i>		-0.025 (-1.420)	-0.068 (-2.909)	-
<i>lint-libor</i>				0.081 (3.005)
<i>inf</i>	0.046 (2.337)	0.045 (3.392)	0.051 (2.925)	0.050 (2.841)
<i>cpfr</i>	-0.015 (-0.596)	-0.004 (-0.264)	-0.005 (-0.237)	-0.004 (-0.220)
R^2	0.769	0.893	0.811	0.805
\bar{R}^2	0.692	0.857	0.748	0.740
$\hat{\sigma}$	0.171	0.116	0.154	0.157
<i>F</i>	9.970	24.946	12.861	12.371
<i>DW</i>	0.981	1.189	1.044	1.071

The fit was also good for these types of formulations and the *gdp* variable appearing in the second regression did not give rise to an endogeneity problem as shown by application of the Hausman testing procedure to the formulation. Results show that there is a positive relationship between the income variable – be it in its total form or per capita form - and remittances. Inflation also had the predictable positive relationship with the remittances variable while the differential returns variable was unexpectedly positive. The used composite risk variable in this instance turned out to be negative but was insignificant through the different trials.

Using the second composite risk variable *spi* led to a much-improved statistical fit throughout the attempted trials as seen in Table 11 below.

Table 11. Composite risks

Var	1	2	3	4	5	6
<i>C</i>	2.372	-18.705	2.129	-17.584	5.446	-12.129
<i>lgdppc</i>	0.647 (2.705)	-	0.605 (2.522)	-	0.266 (1.281)	-
<i>lwage</i>	-	3.952 (3.502)	-	3.739 (3.153)	-	2.965 (3.618)
<i>lint</i>	-0.241 (-1.781)	-0.122 (-0.992)	-	-	-	-
<i>lint-lint*</i>	-	-	-0.227 (-1.716)	-0.125 (-1.021)	-	-
<i>inf</i>	0.050 (3.165)	0.024 (1.538)	-	-	-	-
<i>inf/inf*</i>	-	-	0.527 (2.940)	0.256 (1.446)	-	-
<i>par/par*</i>	-	-	-	-	-0.249 (-4.483)	-0.188 (-4.203)
<i>spi</i>	-0.030 (-1.826)	-0.096 (-5.320)	-0.031 (-1.939)	-0.093 (-4.788)	-0.040 (-3.366)	-0.078 (-6.151)
R^2	0.881	0.901	0.878	0.900	0.904	0.950
\bar{R}^2	0.834	0.861	0.829	0.859	0.878	0.936
$\hat{\sigma}$	0.121	0.111	0.123	0.112	0.104	0.075
<i>F</i>	18.570	22.663	17.921	22.392	34.622	69.297
<i>DW</i>	1.512	1.274	1.489	1.328	1.085	1.570

Responses were in the expected directions – wages and activity affected levels of per worker remittances in a positive fashion. The response of remittances to the per capita GDP variable was positive and significant. Wages – when used – also showed a robust positive and significant impact on per worker remittances. The interest return variable in nominal form affected the per worker remittances in a negative fashion. The same was true for the differential interest *lint-lint** and parity variables *par/par**. The relative response of remittances to changes in wages was elastic exceeding one in value while the response for relative variations in per capita incomes was inelastic. Results pertaining to the interest rate and parity variables largely showed an inelastic response on part of remittances to relative variations in parity returns.

The socio-political instability index, s_{pi} , was uniformly negative in trials confirming the expected relationship to the flow of remittances per worker and was mostly statistically significant at conventional levels. Thus, the higher the socio-political instability ensuing in the KSA, the lower the value of the index, and hence the higher the outflow of per worker remittances abroad.

3.2.3. The error correction models

The series were checked for stationarity. We performed initially the Augmented Dickey-Fuller (ADF) on the levels and first differences (i.e. rates of growth) of the variables. This was followed by the Phillips-Perron (PP) procedure. Results on these are given in Table A3 of the appendix.

Accordingly, we can accept the hypothesis that the variables appearing in the model are I(1) and hence their first difference are stationary at 5% level. The inflation series on the other hand was I(0).

Since the variables are I(1) stationary, we proceeded to estimate dynamic short-run ECMs versions of the remittance model. Results on these are listed in table (12) below:

Table 12. Error corrections

Var	1	2	3	4
C	-0.001	0.021	0.008	0.030
Δgdp	0.654 (2.649)	-	-	-
Δgdp_{ppc}	-	0.567 (2.597)	-	0.911 (4623)
$\Delta wage$	-	-	3.655 (3.157)	-
Δinf	-	-	0.019 (1.713)	-
$\Delta par/par^*$	-	-	-	-0.072 (-3.517)
Δspi	-0.034 (-1.108)	-0.035 (-1.188)	-0.076 (-2.955)	-
$\Delta cpfr$	-	-	-	-0.001 (-0.200)
ecm	-0.321 (-1.497)	-0.347 (-1.795)	-0.658 (-2.342)	-0.652 (-3.587)

Table 12. (Contd.)

Var	1	2	3	4
R^2	0.463	0.488	0.614	0.760
\overline{R}^2	0.348	0.378	0.495	0.673
$\hat{\sigma}$	0.116	0.113	0.102	0.073
F	4.028	4.444	5.167	8.708
DW	1.094	1.134	1.405	1.462

The coefficient on the disequilibrium ECM range in absolute value from 0.321 to 0.658 which reflects a stable ECM eventually converging to its long-run path. The per capita income and wage variables were positive and significant; the differential parity term was negative and significant in accordance with prior expectations; and risks were negative regardless of the measure used but with varying degrees of significance.

Conclusion

This study tried to determine some of the factors affecting the levels and rates of growth of foreign worker remittances from the KSA economy. Historical patterns and summary statistics on total and per worker remittances performances were discussed. Section 3 of the paper then discussed some empirical issues related to the topic; the first issue being a discussion on causality flows between remittances and other major variables of the KSA economy while the second issue concerned the identification of determinants of worker remittances in the KSA and estimation of their impacts. Variables used in the study as determinants of per worker remittances included the GDP activity variables of the Kingdom, wages per worker as measures of workers incomes, returns variables, risk indicators, and some composite indices pertaining to socio-economic instabilities in the KSA.

Results obtained generally point to a number of facts. There is a significant positive relationship between the level of per capita GDP variable and that of remittances per worker from the Kingdom. Remittances are thus seen to be pro-cyclical with activity in the Kingdom increasing during booms and rising incomes while receding during recessions and declining incomes. Wages also proved to be a significant positive determinant of the level of per worker remittances. The variables used to measure returns – including nominal and real interest rates plus differential parity conditions in the host versus the labor sending countries – mostly had the expected negative signs in the reported trials and were mostly significant. As far as the risk variables are concerned, results indicate that the degree of government stability, and the law and order indicators, affected remittances negatively where increasing risks on these are represented by lower index scores and would result in higher remittance outflows from the Kingdom. Experimentation of the models using composite socio-political instability indices were also undertaken and led to the expected responses whereby remittances having a negative relationship to instability; i.e. the higher the level of instability in the KSA, the lower the composite risk score and the higher the flight of remittances abroad.

Other results obtained in the different trials undertaken indicate that the per worker remittances were more elastic with respect to wages as compared to per capita incomes. Remittances were also interest inelastic in most of the trials conducted.

Acknowledgement. The author would like to thank the secretary-general of the GCC for providing crucial data on this study.

Appendix

Table A1. Worker remittances in the KSA: Historical patterns and annual growth rates

Year	KSA\$	Growth (%)
1975	554.35	-
1976	988.67	78.35
1977	1506.36	52.36
1978	2844.48	88.83
1979	3763.94	32.32
1980	4094.1	8.77
1981	5348.1	30.63
1982	5346.87	-0.02
1983	5236.26	-2.07
1984	5284.05	0.91
1985	5198.59	-1.62
1986	4803.78	-7.59
1987	4934.58	2.72
1988	6510.01	31.93
1989	8542.06	31.21
1990	11236.3	31.54
1991	13746.3	22.34
1992	13397.1	-2.54
1993	15717	17.32
1994	18102	15.17
1995	16616	-8.21
1996	15513.2	-6.64
1997	15034.4	-3.09
1998	14954.1	-0.53
1999	13976.8	-6.54
2000	15410.7	10.26
2001	15139.9	-1.76

Table A2. Per worker remittances: Historical patterns and annual growth rates

Thousands US\$		
Year	KSA	Growth (%)
1980	2670.65	-
1981	3268.41	22.38
1982	3086.54	-5.56
1983	2462.03	-20.23
1984	2163.54	-12.12
1985	1954.36	-9.67
1986	1566.74	-19.83
1987	1551.72	-0.96
1988	1916.92	23.54
1989	2364.71	23.36
1990	2920.04	23.48
1991	3345.88	14.58
1992	3054.78	-8.70
1993	3357.90	9.92
1994	3624.40	7.94
1995	3448.77	-4.85
1996	3268.26	-5.23
1997	3196.95	-2.18
1998	3233.45	1.14
1999	3619.98	11.95
2000	4117.35	13.74

Table A3. The stationarity tests

Series	ADF	5% Significance	PP	5% Significance
Levels:				
<i>ltotrem</i>	-2.572	-3.603	-3.170	-3.594
<i>lpwrrem</i>	-1.664	-3.029	-1.099	-3.020
<i>lgdp</i>	-2.845	-3.603	-2.088	-2.980
<i>lgdppc</i>	-2.642	-3.603	-2.063	-3.594
<i>hwaged</i>	-1.035	-3.029	-2.637	-3.011
<i>lint</i>	-1.956	-3.066	-1.861	-3.052
<i>libor</i>	-1.884	-2.985	-1.432	-2.980
<i>inf</i>	-2.773	-3.594	-2.884	-2.980
First difference:				
<i>ltotrem</i>	-2.402	-1.95	-2.984	-1.955
<i>lpwrrem</i>	-2.559	-1.961	-2.703	-1.960
<i>lgdp</i>	-3.205	-2.991	-3.002	-2.985
<i>lgdppc</i>	-3.119	-1.956	-3.035	-1.955
<i>hwaged</i>	-4.260	-1.960	-2.478	-1.959
<i>lint</i>	-2.795	-1.966	-2.422	-1.964
<i>libor</i>	-3.409	-1.956	-3.307	-1.955
<i>inf</i>	-7.202	-2.991	-5.786	-2.985

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(قدم للنشر في ١/٢٢/١٤٢٥هـ؛ وقبل للنشر في ٢/١٠/١٤٢٦هـ)

ملخص البحث. يتناول هذا البحث تحويلات العمالة الأجنبية في المملكة العربية السعودية. ويقوم البحث بتقصي مسارات التحويلات على المستويين الفردي والإجمالي في الفترات التاريخية السابقة، ثم يتناول محددات هذه التحويلات حيث تتضمن المحددات المؤثرة متغيرات اقتصادية تختص بمجم النشاط الاقتصادي في المملكة، والأجور، وفروق العوائد على مدخرات العمالة الأجنبية. كذلك تتضمن العوامل طائفة من المؤشرات الاقتصادية والاجتماعية، والسياسية، والمالية، تختص بعوامل المخاطر المختلفة في اقتصاد المملكة.

وتفيد نتائج البحث بأهمية متغير النشاط الاقتصادي المتلخص بالناتج المحلي الإجمالي وتأثيره الموجب على مستوى التحويلات الفردية للعمالة الأجنبية، كما تعكس الأجور نفس اتجاه التأثير. أما فيما يختص بفروق عوائد المتغيرات تفيد النتائج بتأثيرها السالب على التحويلات الفردية؛ في حين تفيد النتائج الخاصة بالمخاطر أن المؤشرات المتعلقة باستقرار الحكومات، وسيادة الأمن والنظام، لها تأثير معنوي على مستوى التحويلات. وباستعمال مؤشرات مركبة تفيد النتائج بأن المخاطر السياسية والاقتصادية والمالية تمارس تأثيراً سلبياً ومعنوياً على مستوى التحويلات الفردية للعمالة الأجنبية من المملكة العربية السعودية بمعنى أنه كلما تزايدت المخاطر المحلية كلما تسارعت وتيرة التحويلات نزوحاً من اقتصاد المملكة.