"Hollowing Out the Middle? Remittances and Income Inequality in Nigeria[^]"

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Abstract: This paper investigates the impact of remittances on poverty and inequality in Nigeria. In contrast to the existing literature, our methodology of instrumental variable quantile regression (IVQR) explicitly demonstrates the differential marginal impact of remittances for households at different levels of the conditional expenditure distribution. Furthermore, in tracing this heterogeneous impact, we are able to address the effect of remittances on poverty and inequality simultaneously in a unified econometric model. Our results reveal a positive marginal impact of remittances at all but the very highest quantiles of the conditional distribution of household expenditure, with the impact being the greatest up to the 12th quantile. While this unambiguously supports the poverty alleviation role of remittances hypothesized in the literature, the distributional impact is more nuanced: The marginal effect of remittance is seen to follow an approximate U-shape over the household expenditure distribution until the 89th quantile, whereupon it drops sharply. As such, households lying between the 13th to the 35th quantile gain far less from receiving remittances than households outside of this range.

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I. Introduction

Despite ranking among the top ten recipient countries for remittances in terms of dollar value for each of the last four years and, in fact, the top African destination;[4] the distributional impact of remittance receipts in Nigeria has remained relatively underexplored, there being a particular dearth of studies based on the analysis of household survey data. The present study is an attempt to address this void.

The limited literature investigating the impact of remittances on poverty and the income distribution in Nigeria has painted a positive picture: Treating remittances as endogenous to household income and utilizing data from the National Living Standard Survey (NLSS) of 2004, Odozi et al. (2010) compare the actual income of migrant households with the counterfactual scenario of what it would have been in the absence of migration to find that remittances significantly improve both poverty and inequality. Based on the same data and an improved methodology for constructing the counterfactual scenario based on propensity score matching, Chukwuone et al. (2012) confirm the significant poverty alleviation impact of remittances. Using the accumulation of consumption and durable assets as measures of poverty and treating remittances as exogenous to household income, Ajaero et al. (2017) use more recent data from the Migration Household Survey (2009) conducted by the World Bank to find a significant positive impact of remittances on household welfare.

In line with the above contributions, we find a positive marginal impact of receiving remittances at all but the highest quantiles of the conditional distribution of household expenditure, with the impact being the greatest up to the 12th quantile. While this confirms the role of remittance income as a key determinant of poverty alleviation in Nigeria, we reach a more equivocal conclusion regarding its distributional impact: The marginal effect of remittance receipts follows an approximate U-shape over the household expenditure distribution until the 89th quantile, whereupon it drops sharply, becoming negative at the 97th quantile. This reveals that households lying between the 13th to the 35th quantile gain far less from receiving remittances than households outside of this range. While it is true that the poorest households gain the most from access to remittance income, reducing the Gini Coefficient (and virtually any summary measure of income

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[4] See the Migration and Remittances Factbook 2016 published by the World Bank. The full document is available at: http://www.knomad.org/sites/default/files/2017-03/9781464803192_0.pdf

inequality that weighs the lowest income groups sufficiently highly), one should be cautious in classifying the distributional impact of remittances income as *unambiguously* favorable.

At the methodological level, our study is among the first to employ to apply instrumental variable quantile regression (IVQR) to investigate the impact of remittances on poverty and inequality at the household level.[5] Since the marginal impact of remittances almost always differs for households at different points of the conditional expenditure distribution, and the highly positively skewed distribution (as can be seen from the kernel estimates presented in Figure 1), estimates of the impact of remittances on household expenditure evaluated at the conditional mean would not be representative of the sample as a whole. As a result, quantile regression emerges as a better method of analysis in this case (Koenker, 2005).

It also provides a more complete picture of the distributional impact of remittances than the conventional strategy of decomposing a summary measure of inequality such as the Gini coefficient. Following Stark et al. (1986), first generation studies assume remittance receipts to be an *exogenous* source of household income, obtaining the direct impact of remittances by decomposing the Gini coefficient of the household income distribution into parts accounted for by each alternative source of income, including remittances.[6] The limitation of this method is the fact that remittances are essentially *endogenous* to household income, since the incentive to migrate is determined by constraints on income generation imposed by a lack of liquidity and the imperfection of credit and insurance markets, which also exacerbate the impact of unanticipated shocks (Taylor and Wyatt, 1996).

In view of this critique, the more recent literature treats remittances as endogenous, accounting for both the direct impact on household income and the indirect impact operating via the alleviation of liquidity, credit, and insurance constraints. Following Barham and Boucher (1998) and Rodriguez (1998), this is typically accomplished by constructing the counterfactual scenario of what the Gini coefficient of the household income distribution would be in the absence of migration and comparing it to that of the factual distribution with migration. While the first generation studies do not control for selection bias in the access to migration (McKenzie and

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[5] To the best of our knowledge, Bang et al. (2016) is the first study to use the method to analyze household level survey data from Kenya. Also see Nguyen et al. (2007) who use quantile regression methods to compare the inequality in household welfare between rural and urban Vietnam, exploring among other factors the role of remittances in reducing the welfare gap.

[6] Also see Wouterse (2010) as a recent contribution focusing on Burkina Faso.

Rapoport, 2007), subsequent research does so – typically using instrumental variables (Lokshin et al., 2010; Adams and Cuecuecha, 2013) to address the problems of simultaneity, reverse causality and selection bias that plague household level inquiries on the poverty and inequality impact of remittances (Adams, 2011).

While our study is similar to the second body of research in explicitly addressing the endogeneity of remittances and household income with appropriate instruments, IVQR provides a deeper understanding of the distributional impact of remittances by tracing the heterogeneous marginal effect of such transfers over the entirety of the conditional household expenditure distribution rather than demonstrating changes to summary measures of the distribution. This allows us to address the poverty and inequality impacts of remittances in a unified empirical model.

The paper is structured as follows: Section II outlines the conceptual foundations of our analysis. Section III introduces the empirical model and provides a brief description of our estimation method of IVQR. Section IV contains a discussion of our results, while Section V concludes the paper by noting the policy implications of our analysis and indicating directions for further research.

II. Conceptual Foundations

The need for an empirical inquiry into the distributional impact of remittances arises from the fact that the question is theoretically indeterminate. In its simplest form, the distributional impact of remittances can be tied to the question of migrant selection, originally posed in the context of the neoclassical model of migration.[7] If we believe that international migration is characterized by negative selection (Borjas, 1987), whereby relatively greater expected marginal returns from migration make the unskilled more likely to emigrate, it is clear that remittances should reduce inequality, since the unskilled are likely to be drawn from the lower range of the domestic income distribution. On the other hand, if we accept the position that the substantial costs of migration (Chiswick, 1999) and international transfers (Freund and Spatafora, 2008) rule out the option of migrating and sending money for all but the highest skilled, then remittances should increase inequality in the country of origin.

A more nuanced perspective on the distributional impact of remittances comes from the New Economics of Labor Migration (NELM), whereby migration is regarded as a household decision

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[7] See Massey et al. (1993) for a critical review of this and other theories of migration.

undertaken to insure against unanticipated negative shocks (Stark and Lehvari, 1982) that destroy livelihoods given imperfect credit and insurance markets and the lack of liquid assets. More generally, it is undertaken to mitigate constraints on household income generation imposed by these same structural characteristics (Stark, 1982). As observed by Taylor and Wyatt (1996), the theoretical ambiguity regarding the distributional consequences of remittances arises primarily from two factors. The first is the fact that while a poor household is necessarily subject to more binding credit, insurance, and liquidity constraints on income generation, the same resource constraints make it less able to defray the sizeable costs of migration as compared to the rich. The second is that these poor households may experience a greater marginal impact of remittances if such transfers are available. As such, the net distributional impact of remittances remains unclear.

The ambiguity is compounded by the fact that remittances have both a direct effect on household income and an indirect effect that operates by mitigating the liquidity, credit and insurance constraints on household production – it is theoretically unclear if the latter will indeed be greater for relatively poor households. Taylor and Wyatt (1996) point out that the indirect impact of remittances on household income depends substantially on the composition of the household asset portfolio. In particular, the initial portfolio may contain essentially illiquid assets whose ownership does not provide access to credit or insurance in itself, but which yield significant returns conditional on complementary investment.[8] Since remittances help to finance such investment and insure against the associated risk, it follows that the indirect impact of remittances on household income should be higher for households with relatively greater holding of such assets. The aggregate distributional impact of remittances will therefore depend on whether such assets are more likely to feature prominently in the portfolios of the rich or the poor, which is ultimately an empirical question.

Note further that the presumption that remittance income would necessarily alleviate the credit, insurance, and liquidity constraints facing the household may not be true (Chami et al., 2005): If migration is indeed a strategy to diversify sources of household income to insure against negative income shocks, then the household can be regarded as a financial intermediary which, by definition, operates in an environment of asymmetric information. As such, the impact of

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[8] Taylor and Wyatt (1996) provide the example of nontradable *ejido* lands in Mexico which are communally owned but assigned to individual households for cultivation. While the household has property rights over the agricultural output it generates from the land, it cannot sell its right to cultivate that land to others. In other words, there is a separation of ownership and control rights.

remittances on household income is subject to moral hazard, though the magnitude of the problem may be less for remittances than other transfers due to relatively closer monitoring by family members who send money home (De and Ratha, 2012).

We end this section by noting that the limited evidence from Nigeria has unambiguously revealed a positive investment impact of remittances, though the aggregate distributional impact of remittances remains theoretically indeterminate: Using a matched dataset of 112 migrant households in the United States and 61 families in Nigeria, Osili (2004) finds that on the average, a 10% increase in the income of an immigrant significantly increases the probability of the immigrant investing in housing in their home communities in Nigeria by approximately three percentage points. Interestingly, the investment is motivated as much by the direct market returns on the housing asset as it is by the fact that it acts as a signal of the resources possessed by the migrating member and his or her commitment to the family. This enhances the access of remaining family members to formal and informal credit and insurance markets by reducing the perceived risk of default.

Based on the nationally representative Migration Household Survey (2009) which also provides the data for the present study, Ratha et al. (2011) find that the share of international remittance income used for the purpose of investment in physical assets and entrepreneurship is approximately 40%, with an additional 27% being invested in education and health. Finally, a more recent study by Fonta et al. (2015) based on survey data from two contiguous states from the south-eastern part of Nigeria finds that on the average about 36% of international remittance income is invested in acquiring physical capital and entrepreneurship – the share of health and educational investment again being approximately 27%. Intriguingly, both studies report a relatively lower share of internal remittances being used for investment in physical and human capital.

III. Methodology

As stated previously, our analysis is based on the nationally representative Migration Household Survey of 2009 sponsored by the World Bank.[9] The original dataset consists of 2251 households,

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[9] See Plaza et al. (2011) on the methodology and main findings. The survey is available as part of the World Bank Microdata Library at http://microdata.worldbank.org/index.php/catalog/402.

including 875 households with at least one international migrant, 813 with at least one internal migrant and 813 without a migrating member.

- Dependent Variable

As is standard in the remittance literature given concerns about the definition and measurement of household income in developing societies, we identify the poverty and distributional impact of remittances in terms of how they affect household expenditure. Following Bang et al. (2016), our dependent variable is the natural logarithm of the sum of per capita expenditure of the household on food (sum of the answers to items 5.23.1 and 6.12.1 in the questionnaire) and other items (sum of items 5.23.2 to 5.23.11 and 6.12.2 to 6.12.11) over the last 12 months.

- Variable of Interest

Consistent with the literature (Adams and Cuecuecha, 2010; 2013; Bang et al., 2016), the variable of interest is an indicator variable equal to one if the household under observation received any remittances in the last 12 months, and equal to zero if it did not. The variable is coded as 1 if at least one of the following is true: (a) the household currently has a member living outside the household (item 5.1) and the member sent money back in the last 12 months (item 5.17); or (b) the household received any money or goods from a non-household migrant member (item 6.1) in the same period.

We should clarify that what we are modelling is the marginal impact of having access to remittances rather than the impact of receiving an additional Naira of remittance income. As mentioned previously, the documentation of household income in a country like Nigeria is subject to considerable measurement error. The problem is compounded by the fact that some households, especially the very poorest, receive much of their "remittance income" in the form of durable goods brought back to the family by return migrants, despite the lower rates of return migration observed in Nigeria relative to other Sub-Saharan countries.

- Other Control Variables

We control for a number of household characteristics that have been documented as affecting the impact of remittances on household expenditure, both generally and in the specific context of Nigeria (Ajaero et al., 2017). These include (1) the location of the household as captured by an

indicator variable which is equal to 1 if the household is located in a rural area and 0 otherwise; (2) the number of individuals currently living in the household (item 1.1); (3) the age of the head of the household (item 1.4) and its square; (4) the gender of the head (item 1.3) as captured by dummy variable which is equal to 1 if the head is male and 0 otherwise; (5) years of schooling completed by the head (item 1.10); and (6) the occupation of the head, as captured by a set of 12 dummies distinguishing between managers, professionals, technicians and associate professionals, clerical support workers, service and sales workers, agriculture, forestry and fishery workers, workers in crafts or related trades, plant and machine operators, elementary occupations, armed services, and individuals who did not answer the question (item 1.13).[10] The final sample came to 1846 households, with 81 households (about 4.4% of the original dataset) being lost due to missing values. Summary statistics for all variables have been presented in Table 1. The econometric specification is as follows:

$$\ln(Expenditures\_per\_Capita_i) = \beta_0 + \beta_1 Remittances_i + \beta_2 Age_i + \beta_3 Age_i^2 + \beta_4 Education_i + \beta_5 Size_i$$
$$+ \beta_6 Gender_i + \beta_7 Rural_i + \sum_j \delta_j Occupation_{ij} +$$
$$\sum_k p_j Ethinicity_{ik} + \varepsilon_i$$

- Empirical Strategy

We estimate the impact on remittances on household expenditure using the IVQR methodology developed by Chernozhukov and Hansen (2005). Since this is a relatively recent entrant to the remittance literature, we provide a brief outline of the estimator, directing the reader to the original reference for a more detailed exposition.

Let $r \in \{0,1\}$ be a treatment variable representing remittances, where $r = 1$ denotes household access to remittances and $r = 0$ the lack thereof. The realization of the natural log of household expenditure (Y) under the treatment r is denoted by Y_r. Note that our interest lies in comparing the distributions of Y_r conditional on the vector of exogenous household characteristics X, under the alternate treatments of receiving and not receiving remittances. To this end, denote the τ -th quantile of Y_r, conditional on the treatment r and the realized values $X = x$ of the exogenous household characteristics, as $q(x, r, \tau)$.

Since Y is continuous, we can represent the realization of Y under the treatment r as

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[10] This last category was created to minimize the number of observations lost due to missing data.

$$Y_r = q(x, r, u_r),\qquad(1)$$

where $\tau \to q(x, r, \tau)$ is the conditional quantile function of Y_r and u is an unobserved random variable distributed uniformly over [0, 1]. To interpret (1), note that Y_r describes the expenditure impact of receiving and not receiving remittances on a household with observed characteristics x and an unobserved or latent characteristic u, such as unreported asset holdings. In specifying (1), we are essentially allowing the impact of receiving remittances on household expenditure to vary according to the unobserved asset position of the household. Note that u may also be regarded as the structural error term.

If r is endogenous, the standard moment restrictions

$$P[Y \le \theta(r, X, \tau) \,|\, r, X] = \tau \ \text{a.s.},$$

would no longer be appropriate for identifying the conditional impact of r on Y. Given appropriate assumptions (Chernozhukov and Hansen, 2005), this can be accomplished by nonlinear conditional moment restrictions of the form

$$P[Y \le q(r, X, \tau) \,|\, X, Z] = \tau \ \text{a.s.},\qquad(2)$$

where Z is a vector of instruments that affects r but not Y. Our implementation of the Chernozhukov and Hansen (2005) IVQR estimator follows Kwak (2010). The procedure involves three steps: The first step regresses the endogenous variable r on the vector of exogenous covariates X and the identifying instruments Z. The predicted values of r are then used to estimate the $\tau^{\text{-th}}$ quantile of Y. Finally, estimates that minimize the objective functions of both stages at τ are obtained by conducting a grid search around the values estimated in step 2.

- Instruments for Remittances

The instruments used to control for endogeneity in the access to remittances include mobile phone ownership and the absolute value of latitude, both variables relating to the costs of migrating and sending money. Mobile money transfers have become increasingly popular as a means for transmitting formal remittances and cell phone ownership is modeled as a dummy variable equal to one if the household owns a cell phone and zero if it does not. Latitude is a distance variable that captures the costs of moving from the less developed north to the more developed southern states or alternatively the costs of accessing the major departure point for international travel,

namely, Lagos, which is located on the Southern coast of the country. Following is our econometric specification:

IV. Empirical Results and Discussion

Table 2 displays the results from the instrumental-variable quantile regressions for the 10th, 25th, 50th, 75th, and 90th percentiles. Among the controls, the results that show statistical significance align with our expectations: higher education correlates with more expenditure; whereas more household members, rural locations, and whether it is headed by a woman correlate with lower expenditure. The remainder of this section will focus on the patterns with respect to whether a household received remittances.

Overall, our results support the view that remittances improve households' welfare by increasing capacity to consume. Controlling for access to migration, remittance-receiving households obtained higher capacities for expenditures than otherwise-similar households that did not receive remittances *by an economically important and statistically significant margin* at nearly all levels of the distribution. This alone underscores the crucial role of remittances as a vehicle for alleviating poverty and stimulating development for a country like Nigeria.

Moreover, we see the greatest impact from remittances at the lowest levels of the expenditure distribution. Controlling for access to migration and other factors, the 10th percentile of the expenditure distribution was about *seven times higher* for remittance-receiving households in our sample than for non-remittance-receiving households.[11] The impact drops to about three-fold at the 25th percentile before rising to approximately five-fold at the 50th percentile and six-fold at the 75th percentile. The effect drops again to about two-fold at the 90th percentile.

Figure 2 demonstrates this result more clearly. In fact, the impact of remittances peaks at the 1st percentile, where remittance-receiving households possessed a capacity for expenditures nearly fourteen times that of similar households that did not receive remittances, even after controlling for asymmetries in the access to migration. The effect drops sharply to about two-fold between the 15th and 20th percentiles before gradually rising again to about seven fold just below

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[11] Since we have taken logs of the expenditure variable, the coefficient represents a proportional change in expenditures for a given unit change (switch from no remittances to remittances): $\frac{d \ln(expend.\ p.c.)}{d\ remit} = \frac{\frac{d\ expend\ p.c.}{expend\ p.c.}}{d\ remit} = 7.156$.

the 90th percentile, where the effect drops sharply again to about two-fold, and then to about zero at the 98th and 99th percentiles.

These results suggest a sort of "hallowing out of the middle" from remittances: the benefits of remittances appear to concentrate at the poorest levels of the distribution and among upper-middle class households. Lower-middle and middle class households still gain, but substantially less than households on either side of them in the distribution. The richest households, meanwhile, do not seem to gain much, but this may be an artifact of the concentration of resource rents among wealthy households in a country like Nigeria.

Our findings – especially the finding that poor households gain the most – also coincide closely with our previous findings with respect to Ethiopia. By contrast, they disagree somewhat with other studies that find a harmful impact from remittances on income distribution. We attribute the departure of our results from previous studies to two factors: First, we consider individual households as our primary unit of observation rather than communities or regions, instead of decomposing aggregate measures of inequality; and second, and perhaps more importantly, we account for individual differences in access to migration between very poor households and those that are relatively wealthy. Our results suggest that expanding migration (and hence remittance) possibilities would have a tremendous impact in alleviating the joint problem of poverty and income inequality in Nigeria.

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Tables

Table 1: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
HH Annual Expenditures p.c.	201,528.800	304,272.200	1,026.67	4,639,500.00
ln(Expend. p.c.)	11.719	0.947	6.93	15.35
Received Remittances	0.302	0.459	0	1
Age	47.880	12.594	17	97
Age^2	2,450.999	1,258.691	289	9,409
Education	2.641	1.176	1	5
Household Size	6.081	3.348	1	24
Household Type				
Urban	0.472	0.499	0	1
Rural	0.528	0.499	0	1
Household Head: Gender				
Male	0.902	0.297	0	1
Female	0.098	0.297	0	1
Household Head: Occupation				
Managers	0.096	0.295	0	1
Professional	0.123	0.328	0	1
Technicians & Assoc. Prof.	0.096	0.295	0	1
Clerical & Support	0.033	0.179	0	1
Service & Sales	0.148	0.356	0	1
Agriculture, Forest, & Fishery	0.269	0.443	0	1
Craft & Related Trades	0.105	0.306	0	1
Plant & Machine Operators	0.016	0.124	0	1
Elementary Occupations	0.070	0.255	0	1
Armed Forces	0.007	0.084	0	1
Others	0.037	0.188	0	1
Household Head: Ethnicity				
Yoruba	0.256	0.437	0	1
Ibo	0.233	0.423	0	1
Efik/Ibibio	0.070	0.255	0	1
Ijaw	0.037	0.188	0	1
Nupe	0.045	0.207	0	1
Bini/Esan	0.047	0.212	0	1
Other	0.100	0.300	0	1
None Reported	0.001	0.023	0	1
Number of observations	1,846			

Table 2: Instrumental Variable Quantile Regression Results (Dependent Variable = ln(Annual Household Expenditures per Capita)

#VARIABLES	(1) 0.10	(2) 0.25	(3) 0.50	(4) 0.75	(5) 0.90
Remittances	7.156***	3.011***	5.063***	5.776***	1.828***
	(1.968)	(0.719)	(1.022)	(1.298)	(0.639)
Age	-0.0330	-0.0567**	0.0538	0.00985	-0.0301
	(0.0673)	(0.0246)	(0.0350)	(0.0444)	(0.0219)
Age^2	0.000205	0.000194	-0.000837**	-0.000122	0.000318
	(0.000660)	(0.000241)	(0.000343)	(0.000436)	(0.000214)
Education	0.0684	0.0964*	0.0287	0.0794	0.134***
	(0.144)	(0.0528)	(0.0750)	(0.0953)	(0.0469)
Household Size	-0.0983**	-0.109***	-0.0625***	-0.0724**	-0.0704***
	(0.0444)	(0.0162)	(0.0231)	(0.0293)	(0.0144)
Female	-0.131	-0.610***	-1.082***	-0.244	-0.309*
	(0.539)	(0.197)	(0.280)	(0.356)	(0.175)
Rural	-0.244	-0.136	-0.224	-0.404*	-0.471***
	(0.338)	(0.124)	(0.176)	(0.223)	(0.110)
Constant	7.045***	13.27***	11.15***	12.97***	14.59***
	(1.771)	(0.648)	(0.920)	(1.169)	(0.575)
Observations	1,846	1,846	1,846	1,846	1,846

Standard errors in parentheses

#Additional controls for occupation and ethnicity are included.

*** p<0.01, ** p<0.05, * p<0.1

Figures

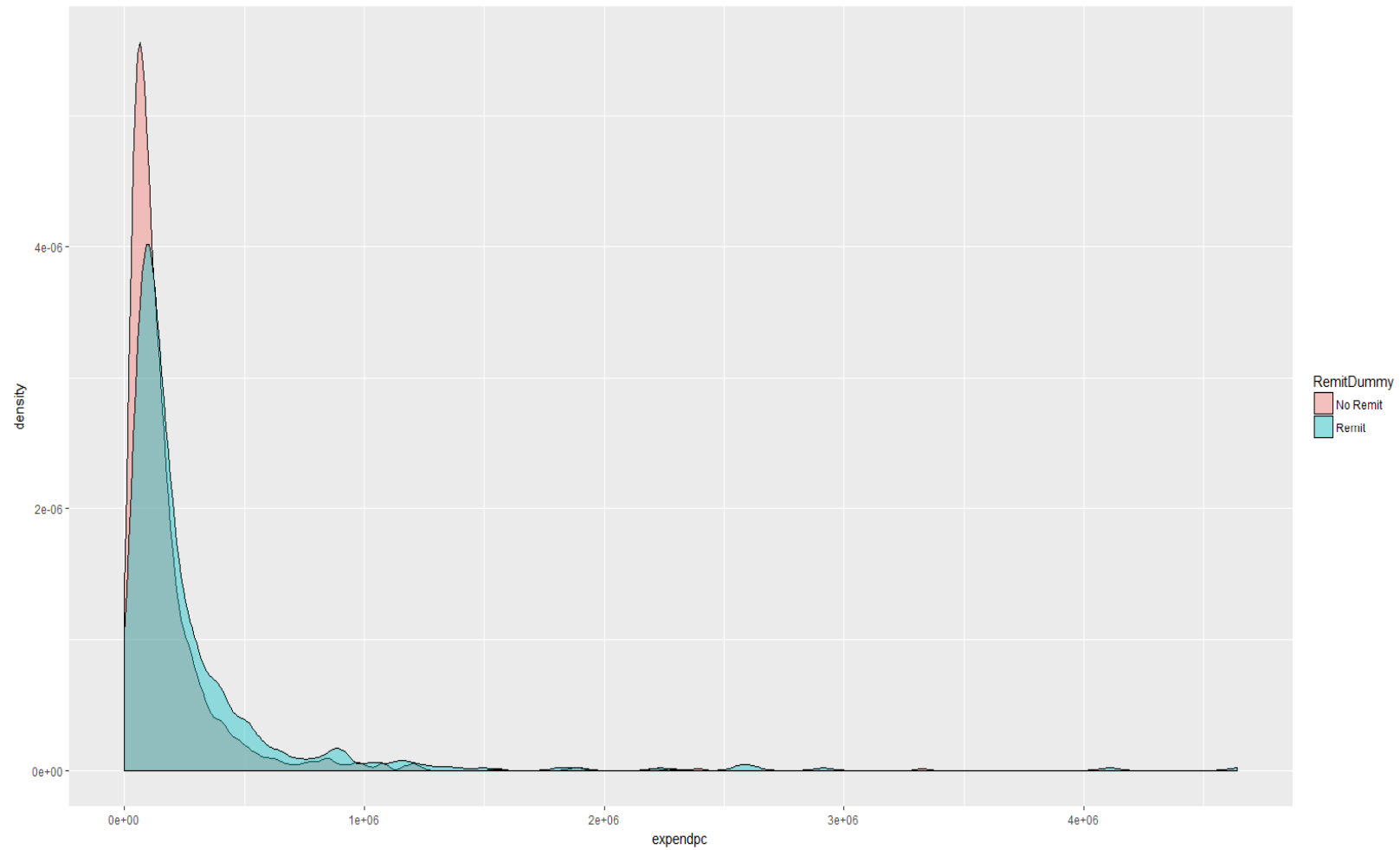Figure 1: Kernel Estimate of the Expenditure Distribution

Figure 2: Impact of Receiving Remittances on Expenditures vs. Expenditure Quantile