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# NEPAL

## SELECTED ISSUES

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INTERNATIONAL MONETARY FUND

# NEPAL

## SELECTED ISSUES

February 28, 2020

Approved By
**Asia and Pacific Department**

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**TABLES**

# THE EFFECT OF REMITTANCES ON HOUSEHOLD'S EXPENDITURE PATTERNS AND LABOR SUPPLY[1]

*This study measures the extent to which Nepal's households change their expenditure patterns and labor supply in response to remittances, using the Nepal Household Risk and Vulnerability Survey – 2016 and employing a propensity score matching method. The results show that remittances have supported greater consumption of productive goods (such as durable goods, education and health), without discouraging labor supply of remittance-receiving family members.*

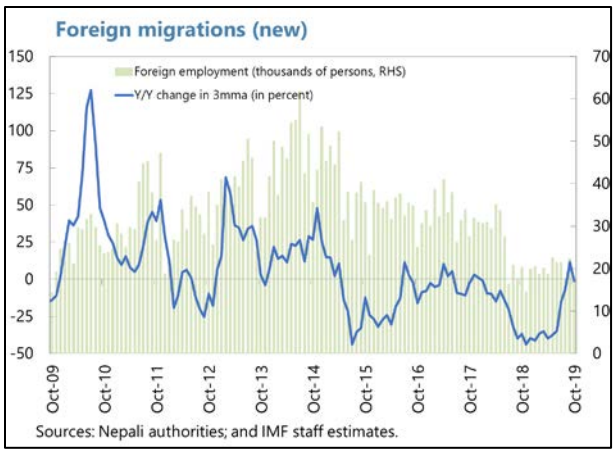
## A. Introduction

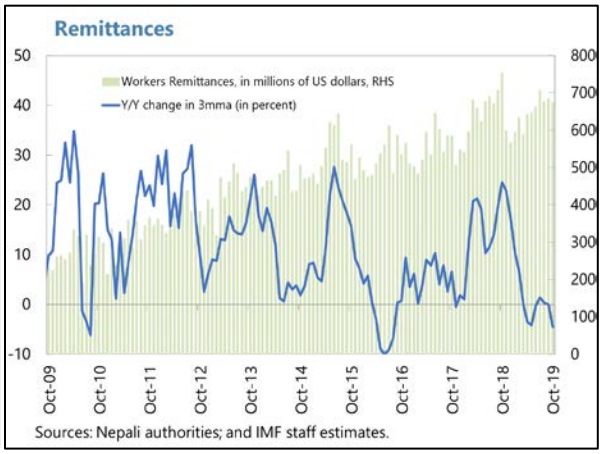
**1. Remittances play a core role in the Nepalese economy.** Since the early 2000s, Nepal's economy has been reshaped by the emigration of its workers—mainly to India, Gulf Cooperation Council (GCC) countries, and Malaysia—and the corresponding sharp growth of inbound remittances. Workers' remittances reached US$7.8 billion in FY2018/19. This corresponds to a quarter of total GDP, 3 times total exports of goods and services, and about ten times official foreign aid. It is the largest single component in the current account balance of Nepal, helping to offset the large trade deficit, and is the essential item propping up foreign reserves.

**2. Growing remittances have been critical to raising household (HH) income and reducing poverty**. The poverty headcount ratio at $1.9 a day fell by 31 percentage points between 2003 and 2010, and is likely to have fallen further. Remittances have also provided insurance against shocks, for instance supporting households in the aftermath of natural disasters. Moreover, remittances have contributed to human capital development when used for education opportunities and access to health care by left behind family members.

**3. Reliance on remittances, both at the macro and household levels, makes Nepal highly vulnerable to shifts that could diminish remittance inflows.** The slowdown in growth of remittances has been significant since 2016, owing to weak economic performance in major remittance-sending economies and less outward migration. The annual growth rate of workers' remittances has decreased to an average of 7.5 percent over the past three years, from 23 percent in the 2000s. The number of official monthly new emigrant workers fell to 18 thousand in October 2019, compared to a peak of 62 thousand in July 2014. The outlook for remittances is uncertain, in light of the completion of major infrastructure projects, such as those in preparations for the 2020 Dubai World Expo and the 2022 FIFA World Cup in Qatar.

[1] Prepared by Kyung-Seol Min.




**4. This study provides stylized facts on migrant workers and remittance-recipient households, and then analyzes the effect of remittances on HHs' expenditure patterns and labor supply.** This study uses the Nepal Household Risk and Vulnerability Survey – 2016 (NRVS-2016), compiled by the World Bank, and employs a propensity score matching (PSM) method to solve methodological problems such as selectivity and reverse causality. It used more updated data compared to previous studies (Thapa and Sanjaya, 2017) that relied on the Nepal Living Standard Survey 2010/11 (NLSS-2010/11), capturing changes since the 2015 earthquakes and trade disruptions.

## B. Stylized Facts

***Migrant workers***

**5. Migrant workers are typically young, male, from rural areas, and have been abroad for two years**. Close to 10 percent of total individuals in the HH roster in the survey are recorded to be away from home, of which 21 percent are working in other domestic cities and 79 percent abroad. Broken down further for foreign migrants by the destination country, the GCC region accounts for the highest share of workers with 42 percent, followed by India[2] with 30 percent, Malaysia with 22 percent, and other countries such as South Korea and Japan with 6 percent. Almost all migrants are male (95 percent), and two-thirds of them are from rural areas in Nepal, with these values slightly lower in the case of workers going abroad. The average age of migrants is 29.6 years. Their average stay in other cities or countries is 23 months.

**6. Foreign migrants obtain higher incomes and remit more money to their families, but also face higher costs than those migrating domestically (Table 1).** The average monthly income of the migrants who responded in this survey[3] is NPR 31,376 (about US$295), which is 4.6 times the monthly per capita GDP in 2016 (NPR 82 thousand). However, there is a wide difference between domestic and foreign workers. The average monthly income of foreign migrants (NPR 34,871, or

[2] This survey is likely to underestimate the number of migrant workers to India because of informality.

[3] 70 percent of total migrants in the survey (2,742) provided information on monthly income.

US$328) is almost twice that of domestic migrants (NPR 17,653). Almost all foreign migrants paid a significant amount for their emigration, at NPR 107,342 (US$1,009) on average, which corresponds to three months of their foreign income. In contrast, the average cost for domestic migration is less than a third of their average monthly income. A much higher proportion (84 percent) of foreign migrants remit money to their family/relatives or friends, also to pay back their higher migrating costs. Comparisons by the destination country (GCC, India, Malaysia, and others) are also included in Table 1.

**Table 1. Descriptive Statistics of Migrants 1/**

| | All migrants | Domestic | Foreign | India | Malaysia | GCC | Others | Rural | Urban |
|---|---|---|---|---|---|---|---|---|---|
| Domestic migrants | 20.7% | 100% | | | | | | 21.6% | 18.9% |
| Foreign migrants | 79.3% | | 100% | | | | | 78.4% | 81.1% |
| to India | 30.4% | | 30.4% | | | | | 33.2% | 24.6% |
| to Malaysia | 22.3% | | 22.3% | | | | | 23.0% | 20.9% |
| to GCC | 41.5% | | 41.5% | | | | | 38.2% | 48.2% |
| to other countries | 5.8% | | 5.8% | | | | | 5.6% | 6.3% |
| From rural areas | 67.4% | 71.0% | 67.4% | 73.6% | 69.5% | 62.2% | 64.6% | 100% | |
| From urban areas | 32.6% | 29.0% | 32.6% | 26.4% | 30.5% | 37.8% | 35.4% | | 100% |
| Male | 95.3% | 89.8% | 96.8% | 99.2% | 98.2% | 96.0% | 84.3% | 95.5% | 94.9% |
| Female | 4.6% | 10.0% | 3.1% | 0.8% | 1.8% | 3.8% | 15.7% | 4.4% | 5.0% |
| Age (years) | 29.6 | 29.2 | 29.7 | 28.8 | 28.4 | 31.0 | 30.8 | 29.2 | 30.4 |
| Duration (months) | 22.8 | 21.0 | 23.2 | 29.1 | 22.0 | 19.4 | 24.4 | 23.1 | 22.1 |
| Pay cost for migrating | 91.3% | 68.7% | 97.2% | 94.1% | 99.1% | 99.2% | 91.6% | 90.2% | 93.6% |
| Cost value | 85,991 | 4,260 | 107,372 | 4,641 | 124,824 | 108,546 | 568,983 | 81,456 | 95,700 |
| Remitting | 79.8% | 63.5% | 84.0% | 71.6% | 88.7% | 91.0% | 80.9% | 76.9% | 85.9% |
| Remittance (NRP, 1 year) | 158,088 | 57,319 | 178,025 | 64,794 | 200,914 | 193,416 | 482,200 | 153,945 | 166,023 |
| Monthly income (NPRs) | 31,376 | 17,653 | 34,871 | 16,367 | 31,899 | 36,897 | 122,097 | 29,956 | 34,235 |

Source: Nepal Household Risk and Vulnerability Survey (2016), and IMF staff calculations.
1/ Observations: total migrants (2,742), domestic migrants (592), foreign migrants (2,150).

***Remittance-Receiving Households***

**7. The share of domestic remittance-receiving HHs has decreased noticeably over the past 5- 6 years.** Table 2 shows that 29 percent of HHs in the survey (NRVS-2016) receive remittances either locally or internationally, which is significantly lower than 52 percent in the previous survey (NLSS-2010/11). This reflects fewer HHs receiving domestic remittances in 2016 (4 percent), compared to 18 percent in 2010. HHs receiving foreign remittances increased by one percentage point to 25 percent. This may reflect limits on the expansion of foreign migration given restrictions in destination countries.

**8. Heads of household in remittance-receiving HHs tend to be female and have a lower level of education compared to HHs that do not receive remittances.** They also are more likely to be work in agriculture or have no job. Similar results are found in the 2016 and 2010/11 surveys.

**Table 2. Descriptive Statistics of Households**

| | NRVS-2016 | | | | | | | NLSS-2010/11 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | All HHs | | Remittance recipients | | Remittance non-recipients | | | All HHs | Remittance recipients | Remittance non-recipients |
| | Mean | Std. Err. | Mean | Std. Err. | Mean | Std. Err. | diff[1/] | Mean | Mean | Mean |
| **HH characteristics** | | | | | | | | | | |
| Share of children 0-6 | 11.2% | 0.2% | 12.7% | 0.4% | 10.5% | 0.002 | >>> | 13.0% | 13.0% | 12.0% |
| Share of children, ages 7-15 | 18.7% | 0.3% | 17.5% | 0.5% | 19.2% | 0.003 | <<< | 21.0% | 21.0% | 21.0% |
| Share of adults, ages 16-64 | 60.9% | 0.3% | 58.4% | 0.6% | 61.9% | 0.004 | <<< | 59.0% | 58.0% | 60.0% |
| Share of elders, age 65+ | 7.1% | 0.2% | 6.3% | 0.4% | 7.4% | 0.003 | << | 7.0% | 8.0% | 7.0% |
| Household size | 4.878 | 0.028 | 4.698 | 0.054 | 4.952 | 0.032 | <<< | 4.75 | 4.61 | 4.94 |
| Dependency ratio | 86.5% | 1.2% | 99.2% | 2.7% | 81.3% | 0.012 | >>> | 42.0% | 40.0% | 45.0% |
| Migration from VDC's (%) 2/ | 11.2 | 0.087 | 13.6 | 0.161 | 10.1 | 0.099 | >>> | 6.65 | 6.81 | 6.45 |
| Rural area | 68.5% | 0.7% | 66.6% | 1.2% | 69.3% | 0.008 | < | 65.0% | 71.0% | 59.0% |
| Urban area | 31.5% | 0.7% | 33.4% | 1.2% | 30.7% | 0.008 | > | 35.0% | 29.0% | 41.0% |
| Remittance receiving HH | 29.3% | 0.6% | 100% | | 0% | | | 53.0% | | |
| Domestic remit-receiving HH | 4.4% | 0.3% | 15.1% | 0.9% | 0% | | | 18.0% | | |
| Foreign remit-receiving HH | 25.4% | 0.6% | 86.8% | 0.8% | 0% | | | 24.0% | | |
| **HH head characteristics** | | | | | | | | | | |
| Female to male ratio | 1.331 | 0.013 | 1.622 | 0.028 | 1.211 | 0.014 | >>> | 1.03 | 1.01 | 1.04 |
| Age of HH head | 48.5 | 0.191 | 49.5 | 0.357 | 48.1 | 0.225 | >>> | 45.99 | 46.20 | 44.78 |
| Male of HH head | 0.813 | 0.005 | 0.597 | 0.013 | 0.902 | 0.005 | <<< | | | |
| No school (HH head education) | 0.408 | 0.007 | 0.464 | 0.013 | 0.385 | 0.008 | >>> | 0.44 | 0.49 | 0.39 |
| Primary school | 0.260 | 0.006 | 0.277 | 0.012 | 0.253 | 0.007 | > | 0.14 | 0.13 | 0.15 |
| Secondary school | 0.128 | 0.005 | 0.104 | 0.008 | 0.137 | 0.006 | <<< | 0.13 | 0.12 | 0.13 |
| High school | 0.161 | 0.005 | 0.118 | 0.008 | 0.179 | 0.006 | <<< | 0.11 | 0.10 | 0.13 |
| University + | 0.040 | 0.003 | 0.033 | 0.004 | 0.043 | 0.003 | < | 0.17 | 0.16 | 0.19 |
| Ariculture (HH head occupation | 0.589 | 0.007 | 0.674 | 0.012 | 0.554 | 0.008 | >>> | 0.44 | 0.50 | 0.37 |
| Non-agriculture | 0.263 | 0.006 | 0.128 | 0.009 | 0.319 | 0.008 | <<< | 0.44 | 0.36 | 0.53 |
| No job | 0.143 | 0.005 | 0.195 | 0.010 | 0.122 | 0.005 | >>> | 0.12 | 0.14 | 0.10 |

Sources: Thapa and Acharya (2017), Nepal Household Risk and Vulnerability Survey (2016), and IMF staff calculations.
1/ The difference between the two groups is statistically significant at 1 % (>>>, <<<), at 5% (>>, <<), and at 10% (>, <).
2/ VDC: Village Development Committee.

**9. Migrants' remittances have been an essential source of income for their family in Nepal.** The average annual income of remittance-receiving HHs before remittances was only 60 percent of that of non-recipient HHs in 2016. But, when remittances were added, total income increases significantly, reaching as high as 1.5 times that of non-recipients. The increase was even higher for foreign remittance recipients.

**Table 3. HHs' Income and Remittances (2016)**

| | Remittance recipients | Foreign remittance recipients | Domestic remittance recipients | Remittance non-recipients |
|---|---|---|---|---|
| Total annual income (NPRs) | 125,706 | 123,785 | 138,464 | 205,526 |
| Remittances (1 year, NPRs) | 204,782 | 222,390 | 97,736 | |
| Income + remittances (NPRs) | 330,489 | 346,175 | 236,200 | 205,526 |

Source: Nepal Household Risk and Vulnerability Survey (2016).

**10. Remittance values have increased considerably in recent years.** Table 4 shows the change in annual remittance values between 2010/11 and 2016, comparing them as a share of per capita GDP. Foreign remittances increased from 60 percent of per capita GDP in 2010 to 67 percent

in 2016. Domestic remittances increased from 34 percent of per capita GDP in 2010 to 41 percent in 2016. The increase in foreign remittance values is mainly related to a higher share of migrations in recent years to GCC, Japan, and Korea that have higher wage levels than those in India and Southeast Asian countries. This also explains why there has been a growth of inbound remittances despite recent slowdown in the number of foreign migrants.

**Table 4. Comparison of Remittance Value**

| | NRVS-2016 | | | NLSS-2010/11 | | |
|---|---|---|---|---|---|---|
| | **Remittance recipients** | Foreign remittance | Domestic remittance | **Remittance recipients** | Foreign remittance | Domestic remittance |
| Per Capita HH remittances (A, NPRs) | 53,047 | 55,606 | 34,075 | 25,323 | 28,553 | 16,160 |
| Per Capita nominal GDP (B, NPRs) | 82,644 | 82,644 | 82,644 | 47,379 | 47,379 | 47,379 |
| Ratio (A/B) | 0.642 | 0.673 | 0.412 | 0.534 | 0.603 | 0.341 |
| Growth of ratio (%) | 20.1% | 11.6% | 20.9% | | | |

Source: Thapa and Acharya (2017), Nepal Household Risk and Vulnerability Survey (2016), and IMF staff calculations

## C. Effects of Remittances on HHs' Economic Activities

***Methodological Issues***

**11. There are a couple of methodological issues that need to be addressed in order to assess the effect of remittances on the economic activities of HHs**. The literature stresses the importance of solving the problems of selection bias and reverse causality. Selection bias occurs when there is a different selectivity of HHs or people in comparing characteristics between the two groups (treatment vs. control groups). For example, as was explained in the previous section, remittance-receiving HHs tend to have more cases of female HH head. In this case, remittance-receiving HHs' expenditure patterns are not only affected by remittances but also from different expenditure patterns of female heads. Reverse causality is also a problem. International remittances may help reduce poverty in developing countries, but it is also possible that the level of poverty influences the amount of remittances.

**12. To address these problems, this analysis employs a propensity score matching (PSM) method.** The propensity score is the probability of receiving treatment (in this case, getting remittances), conditional on the covariates (HH and HH head characteristics), and is applied to correct the estimation of treatment effects controlling for the existence of the confounding factors. It is based on the idea that the selectivity bias is reduced when the comparisons of outcomes are performed by matching each treated unit with a non-treated unit of similar characteristics using the propensity score.

**13. The propensity score matching is set up as follows**.

1) Construct a logit model with remittance-receiving HHs as a binary dependent variable with other variables that might affect receiving remittances as independent variables (share of

children/adults/elders, household size, rural area based, HH head age, male HH head, HH head education),

2) Find the propensity score for each HH from the logit/probit model (the probability of getting remittances),

3) Formulate an artificial control group of HHs by matching each remittance-receiving HH with a non-receiving HH of the similar propensity score,

4) Implement the balancing test to check for similarity in distribution of the covariates between groups after matching,

5) Get the effect of treatment (getting remittances) on the outcomes (HH expenditure patterns and labor supply) by contrasting treated and control groups.[4]

***Effect on Households' Expenditure Patterns***

**14. Table 5 shows the main results.** This study focuses on the analysis of foreign remittances, given that most migrant workers are abroad.

- The effect of foreign remittances on the HH expenditure patterns is negative and highly significant for the consumption of food, while the share of expenditure on non-food daily consumer goods such as fuel, clothes, public transportation service, and entertainment is positive and statistically significant.

- The shares of expenditure on durable goods and education, which are associated more with medium-term investments at the HH level, are higher for remittance recipients.

**15. The results show a positive effect, albeit small, of remittances on HH's expenditure that contribute to human capital development.** Remittances are found to contribute to slightly higher spending on education and access to health care, compared to non-recipient HHs. However, the total share of the productive consumption (durable goods, education, and health) was still low at less than 15 percent of total spending.

[4] HHs' expenditure patterns entail the food consumption ratio, non-food daily consumption ratio, durable goods consumption ratio, education-related consumption ratio, health-related consumption ratio, and other consumption ratio. HHs' labor supply refers to the unemployment (no job) ratio of male HH heads and female HH heads.

**Table 5. Comparison of HHs' Expenditure Pattern**

| | NRVS-2016 | | | NLSS-2010/11 | | |
|---|---|---|---|---|---|---|
| | **Foreign remittance recipients** | **Remittance non-recipients** | diff[1/] | **Foreign remittance recipients** | **Remittance non-recipients** | diff 1/ |
| **Expenditure pattern** | | | | | | |
| Food consumption | 56.7% | 61.0% | <<< | 58.0% | 58.5% | |
| Non-food daily consumption | 25.6% | 23.7% | >>> | 14.0% | 13.0% | |
| Durable goods | 2.7% | 2.2% | >> | 4.0% | 3.0% | >>> |
| Education | 6.3% | 5.3% | >>> | 6.0% | 7.0% | |
| Health | 3.8% | 3.7% | | 7.0% | 6.0% | > |
| Utilities, rent | 4.9% | 4.1% | >>> | 15.0% | 16.0% | >> |

1/ The difference is statistically significant at 1 % (>>>, <<<), at 5% (>>, <<), and at 10% (>, <).

Source: Thapa and Acharya (2017), Nepal Household Risk and Vulnerability Survey (2016), and IMF staff calculations.

**16. The results suggest that HHs are treating remittances as temporary income[5]**. According to the permanent income hypothesis, changes in permanent income, rather than changes in temporary income, are what drive changes in consumer expenditure patterns. Using this hypothesis, studies[6] also state that the marginal propensity to invest (or more broadly "save") out of temporary income is higher than the marginal propensity to consume out of temporary income in order to smooth/enhance lifetime consumption or to guard against declines in future income. The expenditure on productive goods (investment) should contribute positively to increases in future income. This hypothesis is instrumental in explaining the above results. With an increase in temporary income (remittances), HHs' marginal propensity to invest gets higher (statistically higher share of expenditure on productive goods). However, the share of total expenditure between consumer and productive goods does not change significantly without noticeable changes in permanent income (domestic wages).

***Effect on HHs' Labor Supply***

**17. This study also analyzes the effect of remittances on labor market participation of left behind household heads, using a propensity score matching method.** In addition, in order to identify the labor supply effect by gender, this study carries out the comparisons separately for HHs with male and female heads, which has not been tried in other studies.

**18. Table 6 shows that there is no significant difference in unemployment of household heads between remittance recipient and non-recipients.** The results are different from previous

[5] Adams and Cuecuecha (2010)

[6] Paxson (1992), Adams and Cuecuecha (2010)

empirical studies[7] which have the findings that remittances reduce labor market participation. It is interesting that the statistically significant difference before propensity score matching (20 percent for remittance recipients vs. 13 percent for non-recipients) disappears after the matching. The PSM method, not used in the previous studies, can be viewed as instrumental in removing noise factors (bias) in comparing HHs' labor supply. The findings of no difference in labor supply can be effectively explained by the view that HHs regard remittances as temporary income. So, HH heads may want to keep their current job even after receiving remittances for fear of the difficulties in reemployment after the return of migrants.

**Table 6. Comparison of HHs' Labor Supply (2016)**

| | Foreign remittance recipients | Remittance non-recipients |
|---|---|---|
| **Labor market participation** | | |
| Male head | | |
| Agriculture | 68.0% | 67.8% |
| Non-agriculture | 12.4% | 13.2% |
| No job | 19.4% | 18.2% |
| Female head | | |
| Agriculture | 66.7% | 66.0% |
| Non-agriculture | 17.7% | 18.5% |
| No job | 15.5% | 14.8% |
| | | |
| Non-agriculture | 17.7% | 18.5% |
| No job | 15.5% | 14.8% |

Source: Nepal Household Risk and Vulnerability Survey (2016), and IMF staff calculations.

## D. Conclusions

**19. Remittances have been a key stabilizer of Nepal's weak external sector, but they also have direct/indirect benefits to HHs.** They have improved recipients' standard of living and provided a cushion for economic shocks in Nepal. This study, using the NRVS-2016 survey and a propensity score matching method, analyzed the effect of remittances on HHs' expenditure patters and labor supply in Nepal. The stylized facts in the survey indicates that typically young male migrants (30 years old and from urban areas) have been abroad for two years. Heads of remittance-receiving HHs tend to be female with a low education level. They also tend to work in agriculture or have no job. Remittances are an essential source of income to the family. This study finds that remittance-receiving households spend less on consumer goods (food) but more on productive goods (durable goods, education, and health). This suggests that remittances are being treated as temporary income. Unlike other research, this study shows that remittance-receiving HHs do not decrease their labor supply in Nepal.

**20. Several studies have explored options to reap more benefits from remittances.** These include lowering foreign migrating costs[8], and creating incentives so that more remittances flow through formal channels[9]. To reduce vulnerability to sudden declines in remittances and the return of foreign migrants, measures are needed to strengthen domestic quality employment opportunities. It will be critical to incentivize greater private investment, including by removing constraints to FDI, more and better infrastructure investment, greater competition in product and services markets, and reducing red-tape.

[7] Cabegin (2006), Funkhouser (2006), Kim (2007)
[8] Dhakal and Maharjan (2018), Kharel (2011), WB (2016), ADB (2018, 2019), UNCTAD (2009)
[9] Hagen-Zanker (2014), Bjuggren, Dzanzi and Shukur (2010), Dhakal and Maharjan (2018), Kharel (2019), Sapkota (2013), WB (2011), ADB (2018)

# References

Adams, R. (2011) "Evaluating the economic impact of international remittances on developing countries using household surveys: A literature review" Journal of Development Studies 47:6, 809-828

Adams, R. and Cuecuecha, A. (2010) "Remittances, household expenditure an investment in Guatemala" World Development 38(11). Pp. 1626-1641

ADB (2018) "Migration and remittances for development in Asia" Asian Development Bank: Manila

ADB (2019) "Cutting Remittance Costs in a Click" Asian Development Bank, https://development.Asia/explainer/cutting-remittance-costs-click

Bjuggren, P., Dzansi, J. and Shukur, C. (2010) "Remittance and Investment" Working paper Series in Economics and Institutions of Innovation, No. 216

ADB (2019) "Cutting Remittance Costs in a Click" Asian Development Bank, https://development.Asia/explainer/cutting-remittance-costs-click

Cabegin, E. (2006) "The effect of Filipino overseas migration on the non-migrant spouse's market participation and labor supply behavior." Institute for Study of Labor Discussion Paper 2240, Germany.

CBS (2011), "Nepal Living Standard Survey 2010/11" Central Bureau of Statistics, National Planning Commission Secretariat, Government of Nepal

Dhakal, N. and Mharjan, A. (2018) "Approaches to the productive use of remittances in Nepal" International Centre for Integrated Mountain Development, Kathmandu

International Monetary Fund (2018) "Are Remittances good for labor markets in LICs, MICs, and fragile states? Evidence from cross-country data" Washington: IMF WP/18/102

Kharel, P. (2011) "Remittances as a development resource: the experience of Nepal" downloaded from https://www.sawtee.org/Research_Reports/R2011-02.pdf

Kim, N. (2007) "The impact of remittances on labor supply: the case of Jamaica." World Bank Policy Research Working Paper 4120, World Bank, Washington, DC

Lokshin, M., Bontch-Osmolovski, M. and Glinskaya, E. (2010) "Work-related migration and poverty reduction in Nepal" Review of Development Economics, 14(2), pp. 323-332

Paxson, C. (1992) "Using Weather Variability to Estimate the Response of Savings to Transitory Income in Thailand" The American Economic Review, Vol. 82, No. 1, pp. 15-33

Sapkota, C. (2013) "Remittances in Nepal: Boon or bane" The Journal of Development Studies, pp. 1313-1331

Thapa, S. and Acharya, S. (2017) "Remittances and household expenditure in Nepal: Evidence from cross-section data" MDPI

United Nations, Department of Economic and Social Affairs (UNDESA), Population Division (2019). World Urbanization Prospects: The 2018 Revision (ST/ESA/SER.A/420). New York: United Nations.

World Bank. 2010-18. "Migration and remittance factbook 2010-2018" Washington: World Bank

World Bank. 2016. "Nepal development update – Remittances at risk" Washington: World Bank

World Bank. 2016. "Remittance prices worldwide" Washington: World Bank

World Bank. 2017. "Nepal household risk and vulnerability survey -2016" Washington: World Bank

Yang, D. and Choi, H. (2007) "Are remittances insurance? Evidence from rainfall shocks in the Philippines" World Bank Economic Review, 21(2), pp. 219-248

# INFRASTRUCTURE DEVELOPMENT AND GROWTH[1]

*Scaling up quality infrastructure investment can support Nepal's growth objectives by expanding access to basic services, jobs, and markets, as well as boosting private sector productivity. If Nepal were to achieve the average coverage and quality of infrastructure among lower-middle income economies in Asia, its annual growth rate could rise more than 4 percentage points.*

**1. Infrastructure plays a vital role for sustained economic growth.** In fast developing Asia, studies have found that physical capital accumulation boosted growth, much more than observed in other regions (WEO, 2006). Infrastructure investments in particular have a positive effect on growth beyond the effect of the capital stock because of economies of scale and significant spillover externalities. Several studies have found significant total factor productivity effects of infrastructure for Japan, East Asia, and India (Nishimizu and Hulten 1978; Hsieh 1999; Haulten et al. 2010).

**2. Enhancing infrastructure is a key developmental priority in Nepal.** Electricity shortages and an inadequate transportation network, among others, have been highlighted as main constraints to potential growth (World Bank, 2018). Electricity consumption is a just a twentieth of the global average, and load shedding cost the economy about 7 percent of GDP per year during 2008-2016 until Nepal achieved 24-hour electricity supply in 2018 (Timilsina et al. 2018). With substantial increase in hydroelectric capacity anticipated, Nepal now envisions to generate substantial revenues from exporting electricity. Transportation costs are high due to poor road quality, raising prices for goods and services. The road network does not adequately connect tourism areas and the only international airport has exceeded capacity (World Bank 2018). Improving transportation infrastructure will boost competitiveness of Nepalese products by improving access to markets and reducing transaction costs, and will help support the tourism sector (World Bank 2018, 2019). The government recognizes the urgent need to improve and has made infrastructure development a priority of the Nepal national development plan.

## A. Infrastructure in Nepal Compared to Regional Peers

**3.** The analysis focuses on three types of physical infrastructure measures that have been found as important factors for growth in the literature (Calderon and Servén, 2004 and 2008):[2] utility infrastructure proxied by electricity generating capacity (in megawatt per 1000 workers), transportation infrastructure proxied by the length of roads (in kilometer per square meter of land area), and telecommunications infrastructure proxied by internet access (percent of households with

[1] Prepared by Jiae Yoo.

[2] The analysis uses physical measures of infrastructure rather than monetary ones such as public expenditure. Public expenditure tends to be less accurate as it is affected by efficiency and government procurement practices and does not reflect the increasing public sector participation in infrastructure development. Further, we focus on power, transportation, and telecommunications as these factors have been found to be among the most important for growth, and their data are more widely available.

access to internet).[3] In addition to these infrastructure quantity measures, we also pay attention to the quality aspect of infrastructure using available objective indicators that allow a broad country coverage: the share of electricity losses in transmission and distribution as a proxy for the quality of electricity provision (with high share of losses suggesting a low quality), the share of paved road to total road network as a proxy for road quality, and the international internet bandwidth per internet user (bit/s) as a proxy for telecommunications (internet) infrastructure. For both quantity and quality indicators, energy related data are from the UN Energy Statistics, road statistics from the International Road Federation, and telecommunication data from the International Telecommunication Union.

**4. Nepal has made important progress expanding infrastructure, but it remains low compared to middle-income economies in Asia in several areas (Chart 1).**

- Utilities: Electricity generating capacity in Nepal has increased significantly from 261 Megawatts to about 1100 Megawatt between 1990 and 2017. Notwithstanding the improvement, the current generating capacity per worker remains low, at less than 10 percent of the average capacity among middle-income economies in Asia. The efficiency in electricity provision has improved, with the significant reduction in electricity transmission and distribution losses especially in recent years.

- Transportation: The road network was expanded significantly from about 7,000 kilometers in early 1990s to about 30,000 in 2017 (paved and unpaved in total). Despite the fast expansion, the road density in Nepal remains below the average among middle-income economies in Asia. Further, there is significant room to improve road quality, as less than two thirds of roads are paved.

- Telecommunications: While the penetration of telecommunication was low in Nepal in the 1990s, the expansion of phone lines and internet access have been explosive. The share of households with internet access reached 34 percent in 2017 from 0.2 percent in 2000.

**5. To aggregate the variations in these different types of infrastructure, we construct aggregate synthetic indices based on the approach in Calderon and Servén (2004).** The aggregate indices are constructed as the first principal component of the underlying individual measures.[4] The measures of different infrastructure types tend to be highly correlated among each

[3] Previous studies used the number of telephone lines normalized as per capita or worker as a single proxy for infrastructure (Easterly, 2001; Loyaza et al., 2005) and as a proxy for telecommunication infrastructure (Calderon and Servén 2004, 2008) while considering different types of infrastructure. They found that it contributes significantly to growth. In this study, we use access to internet as a proxy for telecommunication infrastructure. While the two measures show high correlation historically, the latter has better data coverage for the period considered in this study and provides more stable estimates.

[4] The index of infrastructure stock is constructed as the first principal component (PC) of the data on the electricity generating capacity (E, in Megawatts per 1000 workers), the length of road network (R, in kilometers per a square meter of land area) and the internet access (T, share of households with internet access), with all variables are in logs

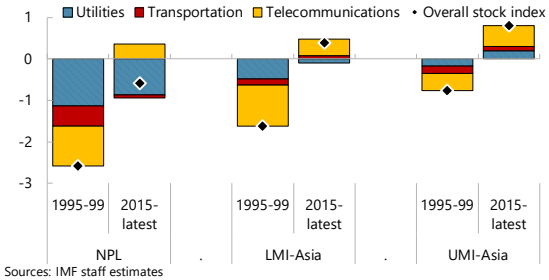
other, and such high correlation can render regression analysis estimates rather unreliable.[5] Therefore, the aggregate indices are useful to obtain more reliable estimates when assessing the relationship between infrastructure and growth in the regression analysis below.

**6. Chart 1 shows how the aggregate infrastructure indices summarize the evolution of the underlying infrastructure measures.** The indices capture well the observations made earlier based on the individual measures. Overall, the indices suggest that, though there has been marked improvement starting from a rather low level, further efforts are needed to catch up with middle-income economies in Asia. Specifically, Text Figure 1 captures that: 1) the increase in infrastructure has been mostly driven by the telecommunication penetration and to some extent by the expansion of transportation infrastructure; 2) a significant gap remains between Nepal and middle-income economies in Asia, with the largest gap being in the utilities sector; and 3) while the utilities quality indicator shows an improvement led by the recent significant reduction in electricity losses, transportation quality in Nepal still falls far below the average level among middle-income economies in Asia.

**Text Figure 1. Infrastructure Aggregate Indices – Quantity and Quality**

**Infrastructure Quantity**

(Index: first principal component of quantity measures expressed in logs and standardized)

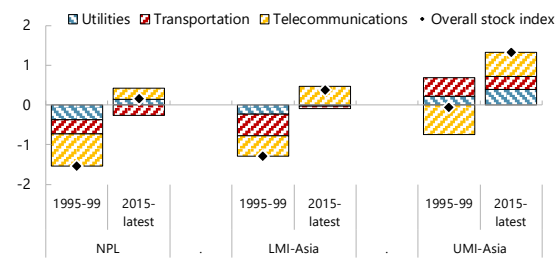



Sources: IMF staff estimates

Note: The indices are constructed as the first principal component of the data on electricity generating capacity, road length, and the internet access of 80 economies for 1990-latest, in logs and standardized. Each bar represents the period average among the countries in the relevant group.

**Infrastructure Quality**

(Index: first principal component of quality measures expressed in logs and standardized)




Sources: IMF staff estimates

Note: The indices are constructured as the first principal component of the data on electricity transmission and distribution losses, the share of paved roads, and internet bandwidth per user, rescaled to 0-1 range with 1 being highest quality, expressed in logs, and standardized, of 80 economies for 1990-latest. For Nepal, the year '2015-latest' refers to the year 2017.

## B. Infrastructure and Growth

**7. This analysis gauges the growth benefit of improving infrastructure.** Several studies have assessed gaps in infrastructure investment needs (i.e., how much it would cost to reach a certain desirable level of infrastructure quantity or coverage). This type of analyses would require

(continued) and normalized. The first PC gives weights 0.61, 0.54, and 0.58 on electricity, transport, and telecommunication variables, respectively, and capture 67 percent of the overall variation with high correlation to each underlying variable (ranging 0.75–0.83). The index for quality is constructed as the first PC of the data on the share of electricity transmitted and distributed to consumers (one minus the losses in the process), the share of paved roads to total, and the measure of internet bandwidth per user rescaled to take value between 0 and 1. The first PC gives weights 0.59, 0.61, and 0.53 on the quality measures electricity, transport, and telecommunication variables, respectively, and capture 51 percent of the overall variation with high correlation to each underlying variable (ranging 0.7–0.8).

[5] The bilateral correlations in the dataset used in this analysis range between 0.5 to 0.9.

assumptions on costing, financing and execution efficiency. Studies have found that Nepal and South Asia region would need to invest about 8-12 percent of GDP per year (Andres et al., 2014; IIDS and CNI, 2019)[6] in order to reach the infrastructure level that is required to meet the increasing demand and/or deliver a healthy growth. We take a different approach and look at the growth benefit of expanding infrastructure quantity as well as improving its quality. While abstracting from the cost side of investment needs, we (1) attempt to estimate the relationship between infrastructure and growth based on a cross-country regression analysis and (2) gauge the growth benefit of improving Nepal's infrastructure up to the average level observed in regional peers (middle-income Asian economies).

**8. We estimate an aggregate production function augmented with the infrastructure variables, drawing on Calderon and Servén (2004 and 2008):**

$$y_{it} - y_{it-1} = \rho y_{it-1} + \alpha X_{it} + \beta K_{it} + \theta_i + \tau_t + \varepsilon_{it},$$

where $y_{it}$ is aggregate output per worker for a country $i$ in period $t$ in logs; $X_{it}$ includes control variables typically used in the literature such as human capital (secondary enrollment in percent of total with the age above 15, from Barro and Lee, 2013), financial development (domestic credit to private sector in percent of GDP), trade openness (trade in percent of GDP), inflation, government burden (government final consumption expenditure in percent of GDP), institutional quality (ICRG Political Risk Index, aggregate index, a widely used indicator to capture institutional and political risk), terms of trade and their changes, and the size of the modern (non-agricultural) sector in terms of value added, all expressed in logs.[7] The variable $K_{it}$ captures the infrastructure measures, the aggregate quantity and quality infrastructure indices discussed earlier. Time effects are included to account for unobservable common factors, and fixed effects are included to account for cross-country heterogeneity. We estimate this equation using a panel of 80 countries for the period of 1990–2017. Since we are interested in a longer-term trend rather than short-term business cycle, we use the non-overlapping 5-year period averages for estimation.

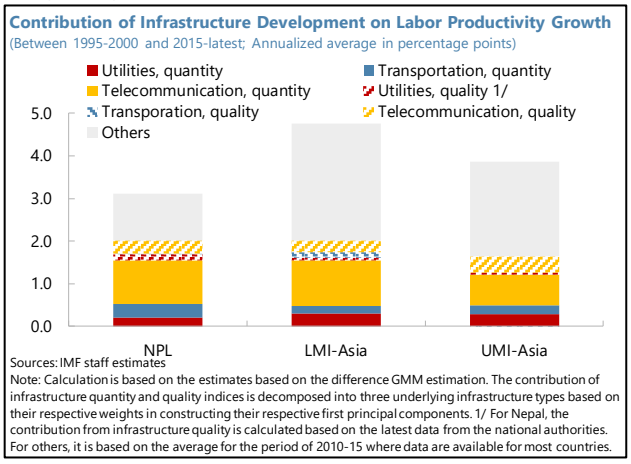
**9. Panel regression analyses confirm that infrastructure is an important factor for growth.** Table 1 reports the estimation results. Various estimation methods are considered, including the GMM estimation developed by Arellano and Bond (1991) to alleviate the endogeneity issues and bias stemming from the correlation between the lagged dependent variable and fixed

[6] IIDS and CNI (2019) estimate that, in order to maintain annual growth rate at 5-10 percent for the period of 2018-30, Nepal needs to invest about 8-9 percent of GDP per year to increase infrastructure quantity, of which a large share in transport. In the past, Andres et al. (2014) estimated investment needs at 8.2-11.8 percent of GDP per year for the period of 2011-20.

[7] The data source of most control variables is the World Bank World Development Indicators unless otherwise specified.

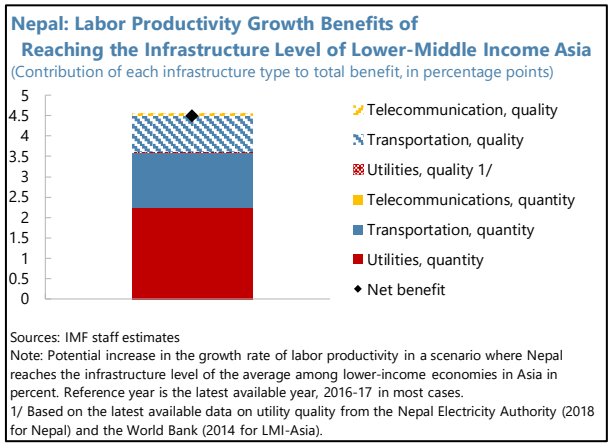
effects in the error term. The results confirm that infrastructure indices, both the quantity and quality, have a positive and significant relationship with growth.[8]

**10. In Nepal, infrastructure expansion, quantity more so than quality, has significantly contributed to higher growth in the past.** The estimates (based on the results shown in the column (6) in Table 1) together with the historical data suggest that the improvement in infrastructure has been the top contributor to the higher growth rate in Nepal since the mid-1990s. The explosive penetration of telecommunications during this period in particular explains a significant share of the contribution of infrastructure to higher growth rates, followed by the expansion of the road network and increase in electricity generating capacity. In terms of infrastructure quality, improvement in the efficiency of electricity provision has made a positive contribution. Beyond the infrastructure variables, the results also suggest that lower-middle economies made a significant leap in terms of economic growth largely through industrialization (proxied by the increase in the share of manufacturing and service sector), which has not yet materialized in Nepal.




Sources: IMF staff estimates
Note: Calculation is based on the estimates based on the difference GMM estimation. The contribution of infrastructure quantity and quality indices is decomposed into three underlying infrastructure types based on their respective weights in constructing their respective first principal components. 1/ For Nepal, the contribution from infrastructure quality is calculated based on the latest data from the national authorities. For others, it is based on the average for the period of 2010-15 where data are available for most countries.

**11. The results suggest that if Nepal were to achieve the average quantity and quality of infrastructure among lower-middle income economies in Asia, its annual growth rate could rise more than 4 percentage points.**[9] The significant increase would need to come from improvements in those sectors where Nepal is furthest behind its peers, in particular in the utilities sector in terms of the electricity generating capacity per worker, as well as the expansion of road network. Improving the quality of road network would also enhance growth. Furthermore, improving infrastructure would have growth-enhancing effects that are not directly captured in this exercise. For instance, better infrastructure would enable faster




Sources: IMF staff estimates
Note: Potential increase in the growth rate of labor productivity in a scenario where Nepal reaches the infrastructure level of the average among lower-income economies in Asia in percent. Reference year is the latest available year, 2016-17 in most cases.
1/ Based on the latest available data on utility quality from the Nepal Electricity Authority (2018 for Nepal) and the World Bank (2014 for LMI-Asia).

[8] In addition to the infrastructure variables, the result shows that education and the share of modern sectors (non-agriculture sector) have significant positive relationship with economic growth—consistent with the variables that Sala-i-Martin (1997) found to have a robust relationship with growth.

[9] Such an improvement in infrastructure would entail a large investment effort over a number of years. The results are in line with other studies. Calderon and Serven (2014) estimated a growth improvement of 3- 4 percentage points for countries in Africa if they were to reach the level of infrastructure development of the regional leader (Mauritius).

industrialization, which the analysis revealed as another important contributing factor enabling a growth leap among lower-middle income economies.

## C. Conclusion

**12. Efficient public investment management would be important to unlock the maximum benefit of infrastructure development.** The analysis shows that scaling up quality infrastructure development would provide a significant boost to growth and help Nepal achieve its growth ambitions. This, however, would entail a large ramp up of infrastructure investment. The growth benefits will therefore also depend crucially on how additional infrastructure spending is financed and how it is managed. It is important to assess the trade-offs and risks involved when greater infrastructure spending is financed by tax increases, government borrowing, or public-private partnerships. It is also critical to improve public investment management to raise public investment efficiency and reduce fiscal risks. Countries with less efficient public investment tend to get a lower growth boost from infrastructure spending (IMF, 2015).

## Table 1. Infrastructure and Growth

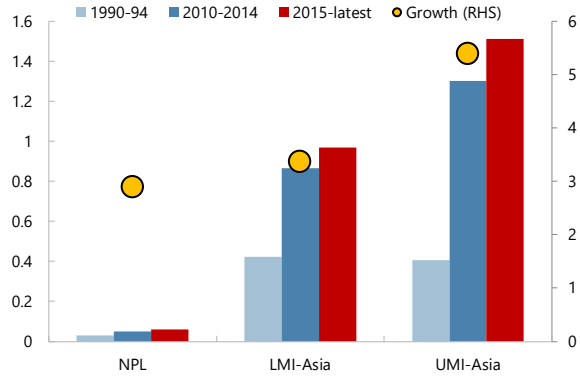
| Dependent variable: GDP per worker (log difference) | (1) Pooled OLS | (2) Panel with time effects | (3) Within estimator | (4) Difference GMM | (5) Pooled OLS | (6) Panel with time effects | (7) Within estimator | (8) Difference GMM |
|---|---|---|---|---|---|---|---|---|
| Lag. Output | -0.061*** | -0.106*** | -0.377*** | -0.379*** | -0.103*** | -0.116*** | -0.385*** | -0.372*** |
| | (0.010) | (0.015) | (0.033) | (0.077) | (0.012) | (0.016) | (0.051) | (0.122) |
| Education | 0.043*** | 0.025 | -0.023 | -0.064 | 0.048*** | 0.046*** | 0.008 | 0.000 |
| | (0.012) | (0.018) | (0.028) | (0.081) | (0.013) | (0.017) | (0.031) | (0.070) |
| Financial development | 0.001 | -0.013 | -0.002 | 0.001 | -0.000 | -0.008 | 0.002 | 0.001 |
| | (0.008) | (0.009) | (0.010) | (0.011) | (0.008) | (0.008) | (0.010) | (0.010) |
| Government burden | -0.024 | -0.013 | -0.054 | 0.007 | -0.016 | -0.013 | -0.088* | -0.055 |
| | (0.017) | (0.023) | (0.033) | (0.072) | (0.018) | (0.023) | (0.050) | (0.086) |
| Trade openness | -0.001 | -0.009 | -0.005 | -0.017 | -0.002 | 0.001 | 0.036 | 0.091 |
| | (0.010) | (0.015) | (0.024) | (0.053) | (0.010) | (0.014) | (0.033) | (0.066) |
| Institutional quality | 0.021 | 0.044 | 0.065 | 0.094 | 0.016 | -0.037 | -0.014 | -0.061 |
| | (0.046) | (0.055) | (0.069) | (0.165) | (0.056) | (0.064) | (0.093) | (0.196) |
| Inflation | 0.003 | -0.003 | -0.007 | -0.011 | 0.015 | 0.007 | -0.000 | 0.025 |
| | (0.008) | (0.008) | (0.009) | (0.019) | (0.009) | (0.010) | (0.012) | (0.020) |
| Modern sector share | -0.081 | 0.001 | 0.611*** | 0.271 | 0.389*** | 0.457*** | 0.696*** | 1.010** |
| | (0.067) | (0.083) | (0.181) | (0.522) | (0.100) | (0.125) | (0.223) | (0.446) |
| Terms of trade | 0.013 | 0.010 | -0.061*** | -0.120** | 0.005 | 0.015 | -0.038 | -0.048 |
| | (0.022) | (0.021) | (0.022) | (0.051) | (0.027) | (0.023) | (0.026) | (0.046) |
| Terms of trade shocks | 0.010 | 0.042 | 0.142* | 0.190* | 0.080 | 0.134 | 0.137 | 0.099 |
| | (0.120) | (0.087) | (0.080) | (0.099) | (0.135) | (0.101) | (0.100) | (0.092) |
| Infrastructure Quantity | 0.034*** | 0.068*** | 0.151*** | 0.216*** | 0.023** | 0.042*** | 0.141*** | 0.155** |
| | (0.009) | (0.013) | (0.025) | (0.052) | (0.010) | (0.012) | (0.031) | (0.062) |
| Infrastructrue Quality | | | | | 0.023*** | 0.020** | 0.031** | 0.055** |
| | | | | | (0.007) | (0.008) | (0.013) | (0.025) |
| N. observations | 367 | 367 | 367 | 270 | 249 | 249 | 249 | 161 |
| N. countries | | 97 | 97 | 92 | | 88 | 88 | 78 |
| N. Instruments | | | | 54 | | | | 47 |
| Arellano-Bond test for AR(2) | | | | 0.10 | | | | 0.27 |
| Hansen test | | | | 0.24 | | | | 0.42 |

Source: IMF staff estimates

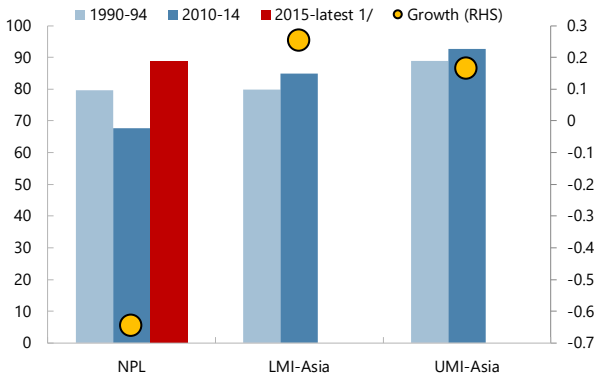
Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, and * p<0.1. Period dummies & constants are not reported.

## Figure 1. Infrastructure Quantity and Quality: 1990-2015

### Utility Infrastructure: Electricity Generating Capacity
(Megawatt per 1000 workers; simple average within a group)

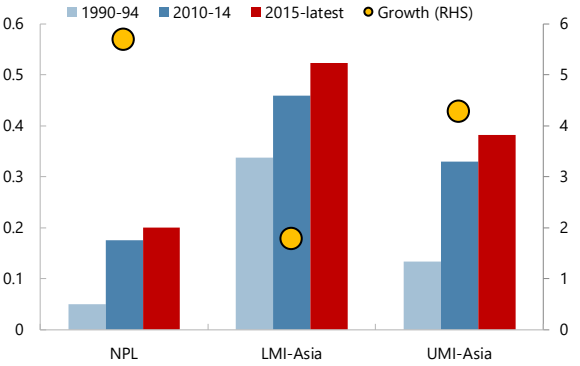



### Utility Infrastructure: Quality
(Electricity transmitted & distributed to consumers in percent of total production)

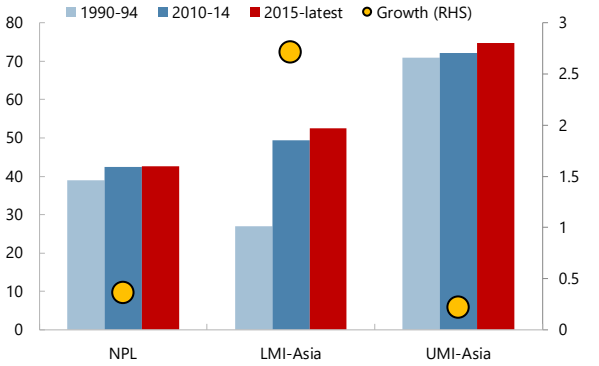



1/ Data for Nepal is based on the estimate from the Nepal Electricity Authority for FY 2018/19.

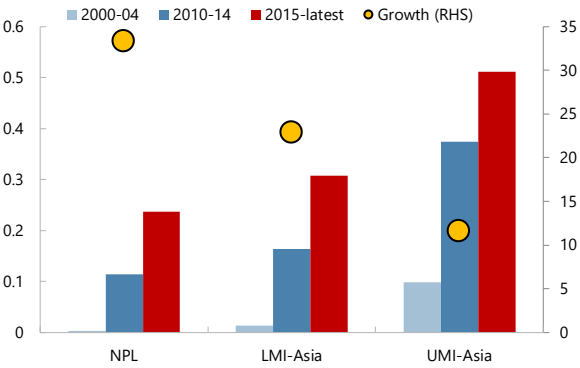
### Transport Infrastructure: Road Length
(Kilometers per square meter; simple average within a group)



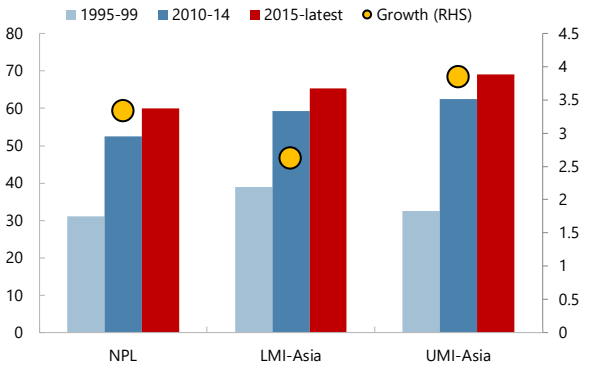

### Transport Infrastructure: Quality
(Share of paved roads in percent total road length)




### Telecommunication Infrastructure: Internet Access
(Percent of households with internet access; simple average within a group)




### Telecommunication Infrastructure: Quality
(International internet bandwidth per internet user (bit/s))




Source: UN Energy Statistics, The World Bank, International Road Federation, International Telecommunication Union, Nepal Electricity Authority, and IMF staff calculations.
Note: LMI- and UMI-Asia refers to lower-middle and upper-middle income countries, respectively, according to the World Bank classification in Asia. Each bar shows the relevant period average among the countries in the relevant group.

# References

Arellano, M., and S. Bond. 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. Review of Economic Studies 58: 277–297

Arellano, M., and O. Bover. 1995. Another look at the instrumental variable estimation of error-components models. Journal of Econometrics 68: 29–51

Barro, Robert and Jong-Wha Lee, 2013, "A New Data Set of Educational Calderon, Cesar A. and Servén, Luis, The Effects of Infrastructure Development on Growth and Income Distribution (September 2004). World Bank Policy Research Working Paper No. 3400. Available at SSRN: https://ssrn.com/abstract=625277

Blundell, R., and S. Bond. 1998. Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics 87: 115–143.

Calderon, Cesar A. and Servén, Luis, The Effects of Infrastructure Development on Growth and Income Distribution (September 2004). World Bank Policy Research Working Paper No. 3400. Available at SSRN: https://ssrn.com/abstract=625277

Calderon, Cesar A. and Servén, Luis, Infrastructure and Economic Development in Sub-Saharan Africa (September 1, 2008). World Bank Policy Research Working Paper Series, Vol., pp. -, 2008. Available at SSRN: https://ssrn.com/abstract=1265484

Hsieh, Chang-Tai, 1999. ''Productivity and Factor Prices in East Asia.'' American Economic Review 89(2):133–8.

Hulten, Charles R., Esra Bennathan and Sylaja Srinivasan, 2006. "Infrastructure, Externalities, and Economic Development: A Study of the Indian Manufacturing Industry," World Bank Economic Review, World Bank Group, vol. 20(2), pages 291-308.

Institute for Integrated Development Studies and Confederation of Nepalese Industries, 2019, "Nepal Infrastructure 2030: investment and Financing Needs"

International Country Risk Guide (ICRG) Researchers, 2013, "International Country Risk Guide Researchers Dataset"

International Monetary Fund, 2006,"Asia Rising: Patterns of Economic Development and Growth," World Economic Outlook, Chapter 3

International Monetary Fund, 2015, "Making Public Investment More Efficient," IMF Policy Paper

International Monetary Fund, 2018,"Nepal's Potential Growth and Comparison to Peers," Box I, IMF Country Report No. 19/60

International Road Federation, 1990-2018, "World Road Statistics"

International Telecommunication Union, 2019, "World Telecommunication/ICT Indicators Database"

Nishimizu, Mieko, and Charles Hulten. 1978. ''The Sources of Japanese Economic Growth, 1955–71.'' Review of Economics and Statistics 60(3):351–61.

Roodman, David, 2009. "How to do xtabond2: An introduction to difference and system GMM in Stata," Stata Journal, StataCorp LP, vol. 9(1), pages 86-136, March

Sala-I-Martin, Xavier X., 1997, "I Just Ran Two Million Regressions," The American Economic Review Vol. 87, No. 2, Papers and Proceedings of the Hundred and Fourth Annual Meeting of the American Economic Association (May, 1997), pp. 178-183

Timilsina, Govinda R.; Sapkota, Prakash Raj; Steinbuks, Jevgenijs. 2018. How much has Nepal lost in the last decade due to load shedding? an economic assessment using a CGE model (English). Policy Research working paper; no. WPS 8468. Washington, D.C.: World Bank Group.

United Nations Statistics Division, "UNSD Energy Statistics Database"

World Bank, 2018, "Nepal: Systematic Country Diagnostic"

World Bank, 2019, "Nepal Infrastructure Sector Assessment: Private Sector Solutions for Sustainable Infrastructure Development"

World Development Indicators. Washington, D.C.: The World Bank, Available at http://data.worldbank.org/data-catalog/world-development-indicators

# FINTECH IN NEPAL[1]

*Fintech offers several key advantages to Nepal, such as helping to overcome geographical barriers and promoting greater mobile payments by tourists. Policies and regulations should be tailored to support healthy development of the fintech sector. Measures are also needed to raise financial literacy and consumer protection to build widespread trust in the use of digital services.*

**1. The financial sector has long applied technological innovations to enhance delivery of financial services.** In payment services, debit and credit cards could reduce the need for carrying cash by purchasers. Most of teller functions traditionally offered at bank branches were obviated by the expansion of ATMs. Machine learning and artificial intelligence have enabled analysis of large and diverse data in credit decisions and identifying fraudulent activities in payments.[2]

**2. A new wave of technology-enable financial services, called Fintech, has made a substantial effect on increasing financial inclusion particularly in emerging economies.** Fintech uses technological innovations to offer various financial services, including payments, savings, credit and insurance (He et al., 2017). At its most basic form, fintech payments build on the large network of cellular service to facilitate sending and receiving payments—the so-called "mobile money". Expansion of mobile-money payments have successfully increased financial inclusion in several emerging countries (Sahay et al, forthcoming).[3] Khera et al (forthcoming) develop financial inclusion indices via traditional and fintech channels and find that fintech has been a key driver of financial inclusion in recent years. In a cross-country empirical study of digital credit, Bazarbash and Beaton (forthcoming) find that fintech lending emerges in countries where the depth of traditional credit market is lower thereby increasing access to finance where banks have failed to reach the underserved population and businesses. Enabling conditions for development of fintech credit are large access to reliable internet, strong legal rights, and access to credit information.

**3. Once widely adopted, mobile-money payments offer greater convenience, mobility, and security, which could reduce poverty and facilitate greater travel and tourism expenditure in Nepal.** Mobile money is an attractive channel for rural families with some members working at urban areas to send money to their families. Easy, reliable and swift transfer of money by such families could have a prime effect on the family's tolerance for income shocks. This way, expansion of mobile money could increase financial inclusion in Nepal[4] by overcoming geographical

[1] Prepared by Majid Bazarbash (MCM).

[2] For a discussion of the advantages of using machine learning in credit analysis, see Bazarbash (2019).

[3] For example, in Kenya, mobile money services pioneered by the country's largest telecom company Safaricom, was a key driver of financial inclusion raising it from 27 percent in 2006 to 83 percent in 2019 (Central Bank of Kenya, 2019).

[4] For a discussion of status of financial inclusion in Nepal and government policies see 2018 Article IV Selected Issues Paper.

barriers[5] and reduce poverty. Moreover, as mobile money makes spending easier and it enables mobility, it is a favorable method of payment for tourists.[6] Nepal is looking to expand tourism as an important source of growth, and in this context mobile money can facilitate expenditure by foreign, as well as domestic, tourists.

**4. Fintech industry in Nepal has great potential for increasing financial inclusion but it is still at an incipient stage.** As of January 2020, 18 fintech payment companies—comprising 10 payment system providers and 8 payment system operators—have been granted license by the Nepal Rastra Bank. Among these companies, three international companies including Visa and Mastercard are licensed to operate as payment service providers in Nepal.

**5. Basic infrastructure to support fintech payments are developing in Nepal.** Electricity supply is increasing and becoming more reliable as hydropower projects come to fruition. Cellular network is expanding to rural areas, with the number of Nepalese owning cellular lines exceeding 100 percent. The slow speed of cellular data does not appear to be a hinderance for operation of mobile money.

**6. Fintech payment methods have largely been used for making invoice payments.** More than 9 million Nepalese use fintech payment for making transactions. Making payments against invoices through mobile money and electronic payments is not subject to any limitations, which has made utility payments the main use of mobile payments in Nepal.

**7. The authorities could use the Bali Fintech Agenda developed by the IMF and the World Bank as a framework to guide their policies in promoting fintech to enhance financial inclusion while mitigating potential risks.** The Bali Fintech Agenda (IMF, 2018) brings together key considerations for policymakers and the international community into twelve elements arising from the experience of member countries. Regulations should be supportive of responsible fintech developments, along with addressing the potential risks that may arise, such as those relating to financial integrity. Interoperability across service providers and banks should be facilitated. Consumer protection should be strengthened, and financial literacy programs should be widely available. Regulations should be in line with the Financial Action Task Force (FATF) standard and tailored to support the development of Fintech, which may include provisions to allow e-filing and digital verification as part of customer due diligence measures.

**8. Data gaps should be addressed to better assess the progress in expansion of fintech.** Currently, reliable data to evaluate the status of using fintech solutions for financial services does not exist, which precludes assessment of policies and regulations. As fintech is an evolving field, it is important for authorities to have a clear and timely view of the expansion and challenges introduced

[5] According to the World Bank's Global Findex database, in 2017, one-fifth of adults in Nepal did not have accounts because of the long distance to bank branches.

[6] See 2019 report by World Travel and Tourism Council.

by fintech in Nepal's environment. To evaluate the benefits of fintech for financial inclusion, data on active usage of formal financial services should be gathered, identifying dormant accounts.

**9. A national digital ID could be an important enabler for expending fintech industry in Nepal.** Identification of users is currently a challenge in Nepal, which is one of the hinderances of the growth of fintech from payment services to more advanced services such as credit and insurance. Moreover, a national digital ID could substantially decrease the paperwork burden, enable using digital data from various sources (via APIs), reduce the cost and time of AML/CFT customer due diligence checks, and allow for interoperability across digital financial service providers.[7]

[7] The FATF 2012 "International Standards on Combating Money Laundering and the Financing of Terrorism and Proliferation: the FATF Recommendations" constitute the international AML/CFT standard and set out specific requirements in relation to customer due diligence measures. The implementation of technology in relation to the identification and verification of customers should be aligned with these requirements. The FATF is further developing guidance to clarify how digital identity systems can be used for customer due diligence.

# References

Bazarbash, M. (2019). FinTech in Financial Inclusion: Machine Learning Applications in Assessing Credit Risk. International Monetary Fund. Working Paper 19/109

Bazarbash, M. and K. Beaton (forthcoming). Filling the Gap: Digital Credit and Financial Inclusion. International Monetary Fund Working Paper.

Central Bank of Kenya (2019) FinAccess Survey of Households, available at https://fsdkenya.org/finaccess/

Demirgüç-Kunt, A., L. Klapper, D. Singer, S. Ansar, and J. Hess. 2018. The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution. World Bank: Washington, DC.

He, M.D., M.R.B. Leckow, M.V. Haksar, M.T.M. Griffoli, N. Jenkinson, M.M. Kashima, and H. Tourpe (2017). "Fintech and financial services: initial considerations." International Monetary Fund Staff Discussion Note SDN/17/05.

International Monetary Fund (2019) Nepal: Selected Issues. Country Report No. 19/61, available at https://www.imf.org/en/Publications/CR/Issues/2019/02/15/Nepal-Selected-Issues-46623

_____ (2018). "The Bali Fintech Agenda." October, available at https://www.imf.org/en/Publications/Policy-Papers/Issues/2018/10/11/pp101118-bali-fintechagenda

Khera, P., S. Ng, S. Ogawa, and R. Sahay (forthcoming). Can FinTech Unlock Financial Inclusion in Emerging and Developing Economies? International Monetary Fund Working Paper.

Sahay, R., U. Eriksson von Allmen, A. Lahreche, M. Bazarbash, K. Beaton, P. Khera, and S. Ogawa (forthcoming). "The Promise of Fintech: Financial Inclusion" International Monetary Fund Staff Discussion Note.

World Travel and Tourism Council (March 2019) Mobile Payments in Travel & Tourism: Unlocking the Potential, available