IN THIS ISSUE:

Analytical framework on credit risks for financing small and medium-sized enterprises in Asia

Indo-Nepal economic cooperation: a subregional perspective

Contribution of the urban poor: evidence from Chennai, India

Regional disparities in Sri Lanka: an empirical analysis

The challenge of betel nut consumption to economic development: a case of Honiara, Solomon Islands
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<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytical framework on credit risks for financing small and medium-sized enterprises in Asia</td>
<td>Naoyuki Yoshino and Farhad Taghizadeh-Hesary</td>
<td>1</td>
</tr>
<tr>
<td>Indo-Nepal economic cooperation: a subregional perspective</td>
<td>Neetu Choudhary and Abhijit Ghosh</td>
<td>23</td>
</tr>
<tr>
<td>Contribution of the urban poor: evidence from Chennai, India</td>
<td>Kala Seetharam Sridhar and A. Venugopala Reddy</td>
<td>53</td>
</tr>
<tr>
<td>Regional disparities in Sri Lanka: an empirical analysis</td>
<td>Deeptha Wijerathna, Jayatileke S. Bandara, Christine Smith and Athula Naranpanawa</td>
<td>77</td>
</tr>
<tr>
<td>The challenge of betel nut consumption to economic development: a case of Honiara, Solomon Islands</td>
<td>Stephen Pratt</td>
<td>103</td>
</tr>
</tbody>
</table>
Explanatory notes

References to dollars ($) are to United States dollars, unless otherwise stated.

References to “tons” are to metric tons, unless otherwise specified.

A solidus (/) between dates (e.g. 1980/81) indicates a financial year, a crop year or an academic year.

Use of a hyphen between dates (e.g. 1980-1985) indicates the full period involved, including the beginning and end years.

The following symbols have been used in the tables throughout the journal:

Two dots (..) indicate that data are not available or are not separately reported.

An em-dash (—) indicates that the amount is nil or negligible.

A hyphen (-) indicates that the item is not applicable.

A point (.) is used to indicate decimals.

A space is used to distinguish thousands and millions.

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ANALYTICAL FRAMEWORK ON CREDIT RISKS FOR FINANCING SMALL AND MEDIUM-SIZED ENTERPRISES IN ASIA

Naoyuki Yoshino and Farhad Taghizadeh-Hesary*

Small and medium-sized enterprises (SMEs) account for the major share of employment and dominate the Asian economies. These economies are often characterized as having bank-dominated financial systems and underdeveloped capital markets, in particular venture capital. Hence, offering new methods for financing SMEs is crucial. Hometown investment trust funds are a form of financial intermediation that was started recently and has since been adopted as a national strategy in Japan. In the present paper, the authors explain the importance of SMEs in Asia and describe hometown investment trust funds. They then provide a scheme for credit rating of SMEs, employing two statistical analysis techniques, principal component analysis and cluster analysis to analyse the credit risks of a sample of Asian SMEs by using their financial variables. This comprehensive and efficient method would enable banks, to group their SME customers based on their financial health, adjust interest rates on loans and set lending ceilings for each group. Moreover, this method is applicable to hometown investment trust funds around the world.

JEL Classification: G21, G23, G24, G32.

Key words: SME credit rating, SME financing, hometown investment trust fund.

I. INTRODUCTION

Small and medium-sized enterprises (SMEs) are the backbone of the economies in Asia. Over the period 2007-2012, they accounted for 98 per cent of all

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enterprises and 38 per cent of the gross domestic product (GDP) on average and employed 66 per cent of the national labour force (statistics in this paragraph from ADB, 2014). They also play a significant role in trade. Thirty per cent of total export value was accounted for by SMEs in Asia on average during the above-cited period. In China, SMEs accounted for 41.5 per cent of total export value in 2012, up 6.8 per cent year-on-year, while in Thailand, they accounted for 28.8 per cent of total export value, growing 3.7 per cent year-on-year. SMEs that are part of global supply chains have the potential to promote international trade and mobilize domestic demand.

Owing to the significance of SMEs to Asian national economies, it is important to find ways to provide them with stable finance. Asian economies are often characterized as having bank-dominated financial systems and capital markets that are not well developed, particularly in the area of venture capital. Consequently, banks are the main source of financing. Although the soundness of the banking system has improved significantly since the 1996 Asian financial crisis, banks have been cautious about lending to SMEs, even though such enterprises account for a large share of economic activity. Start-up companies, in particular, are finding it increasingly difficult to borrow money from banks because of strict Basel capital requirements. Riskier SMEs also face difficulty in borrowing money from banks (Yoshino, 2012). Hence, an efficient credit rating scheme that rates SMEs based on their financial health would help banks lend money to SMEs in a more rational way, while at the same time reduce their risk.

Various credit-rating indices, such as Standard and Poor’s, rate large enterprises. By looking at a large enterprise’s credit rating, banks can decide to lend them up to a certain amount. However, for SMEs, the issue is more complicated as there are no comparable ratings. The obstacles for setting up an SME credit rating facility are lack of data and difficulties in accessing the data to an authentic SME database. Nevertheless, there is a useful model in Japan. In a government-supported project, 52 credit guarantee corporations collected data from Japanese SMEs. These data are stored at a private corporation called the Credit Risk Database, which contains data from 14.4 million SMEs, including default data from 3.3 million corporations and sole proprietors. If similar systems could be established in other parts of Asia to accumulate and analyze credit risk data, and to accurately measure the credit risk of each SME, then banks and other financial institutions could use it to categorize their SME customers based on their financial health. SMEs would also benefit as they could raise funds from banks more easily and gain access to the debt market by securitizing their claims. Having a centralized SME database, such as the Credit Risk Database, is needed in other Asian countries and could be the long-run target for governments. In the short run, there are a number of available databases that can be used for credit rating. For example, the financial statements of SME
customers of governmental and private institutions could be used for credit rating of bank customers or the extensive databases of SMEs held by tax bureaux of the ministries of finance could be used as a database for the credit rating of SMEs.

In addition to banks, the creation of regional funds (or hometown investment trust funds) will help promote lending to start-up companies and riskier borrowers, such as SMEs. Selling these regional trust funds through branch offices of regional banks, post offices, credit associations and large banks will open up additional sources for SMEs to raise funds.

In the present paper, section II contains a description of the importance of SMEs and their difficulties in raising money. In section III, the advantages of preparing a complete SME database in each country is explained. This is followed by a discussion on an alternative way to provide stable financing for SMEs in Asia (hometown investment trust funds). In section IV, the authors propose a way of establishing SMEs' credit ratings using statistical techniques and financial ratios. This takes into account the characteristics of SMEs, including leverage, liquidity, profitability, coverage and activity. The method can be used by banks around the world to do the following: group SMEs based on their financial health; adjust interest rates on loans; and set lending ceilings for each group. Moreover, this method is applicable for hometown investment trust funds. Section V contains concluding remarks.

II. IMPORTANCE OF SMALL AND MEDIUM-SIZED ENTERPRISES AND THEIR DIFFICULTIES TO RAISE FUNDS

Bank-dominated financial systems and the economic importance of small and medium-sized enterprises in Asia

Figure 1 shows the size of the equity and bond markets and bank loans in Asia.

As indicated in figure 1, bank loans comprise the main share of the financial market in most Asian economies, and capital markets are not well developed in most parts of the continent. This means that banks are the main source of SME financing.

Regarding the importance of SMEs in Asia, according to a survey conducted by the Asian Development Bank (ADB) (2014) on 14 countries from the five ADB regions: (a) Kazakhstan (Central Asia); (b) China and the Republic of Korea (East Asia); (c) Bangladesh, India, and Sri Lanka (South Asia); (d) Cambodia, Indonesia, Malaysia, the Philippines, Thailand, and Viet Nam (South-East Asia); and (e) Papua New Guinea and Solomon Islands (Pacific), SMEs, together with microenterprises, account for more than 90 per cent of total enterprises in each country.
Figure 1. Size of financial markets in Asia

Equity, bonds, and bank loans, as shares of total


Figure 2. Small and medium-sized enterprises contribution to gross domestic product

Note: Republic of Korea SME contribution to gross value added in manufacturing.
SMEs, including microenterprises, contributed to 59.1 per cent of nominal gross domestic product (GDP) in Indonesia in 2012, a figure that is gradually increasing (figure 2). SMEs and microenterprises in Thailand contributed to 37.0 per cent of nominal GDP in 2012, and in Malaysia, 32.7 per cent of real GDP in the same year. Thailand targeted an increase of the SME contribution to GDP to 40 per cent or more in its country strategy of 2012. In Kazakhstan, the nominal GDP of SMEs tended to increase but their contribution to GDP decreased over the period 2010-2012, and was 17.3 per cent in 2012.

The extent of employment by SMEs varies by country (figure 3). The share of SME employees to total employment ranged between 28.0 per cent (Kazakhstan) and 97.2 per cent (Indonesia) in 2012.

Figure 3. Employment by small and medium-sized enterprises


Notes: CAM = Cambodia, CHI = China, INO = Indonesia, KAZ = Kazakhstan, ROK = Republic of Korea, MAL = Malaysia, PHI = Philippines, THA = Thailand, VIE = Viet Nam.
SME = small and medium-sized enterprise.
Data as of 2012 in China, Indonesia, Kazakhstan, Malaysia, Thailand and Viet Nam.
Data as of 2011 in Cambodia, Republic of Korea, and the Philippines.
Small and medium-sized enterprises face difficulties to raise funds

In comparison to large enterprises, SMEs find it more difficult to raise funds. This is because banks are reluctant to lend to them, even though these enterprises account for a large share of the economic activity in their respective countries.

Figure 4 shows the results of survey on access to funding conducted by the Bank of Japan. The two lines show how difficult or how easy it is to raise money from the markets. The thick line shows the difficulty faced by small enterprises and the thin line shows the same for the large enterprises. Data points below zero indicate that companies are finding it difficult to raise money from banks or the capital markets. Small enterprises appear to be finding it more difficult to raise money in comparison with large firms.

**Figure 4. Access to financing by small and medium-sized enterprises and large firms in Japan**


Notes: DI = diffusion index; CY = calendar year.
III. SMALL AND MEDIUM-SIZED ENTERPRISE DATABASE AND STABLE FINANCE

Considering the importance of SMEs to many dimensions of Asian economic activity, further efforts need to be made to offer them access to finance. Their financial and non-financial accounts are often difficult to assess. The Credit Risk Database in Japan, however, is being used to rate SMEs based on financial and non-financial data. Extensive data on SMEs were collected for the Database and then used to rate SMEs based on statistical analysis.

Database provided by the Credit Risk Database

The Credit Risk Database was founded in March 2001 as a membership organization to collect financial and non-financial data, including default information, on SMEs. It began as a voluntary association consisting of 52 credit guarantee corporations in Japan. The Database was established with the objective to help streamline the process for obtaining SME financing and make it more efficient by assessing business conditions based on data and measuring credit risks related to SME financing.

As its membership and data collection expanded, the Credit Risk Database became the source of data on SMEs. In April 2005, it obtained corporate status as a limited liability intermediate corporation and officially became the CRD Association. In June 2009, its status changed to a general incorporated association, as a result of the enforcement of the act on general incorporated associations and general incorporated foundations. The CRD Association collects financial data on SMEs from its members, namely credit guarantee corporations throughout Japan and government-affiliated or private financial institutions involved in SME business. The Association provides members with assessments of SMEs’ business situations through a credit risk measurement model, which is based on the large amount of collected data (CRD website).1

The Credit Risk Database covers SMEs exclusively. As of March 2010, it included data on more than 50 per cent of the SMEs in Japan, covering more than 14 million corporations and about 1.7 million sole proprietors, making it by far the largest database for SMEs in Japan. The database for enterprises in default covered 3,289,000 corporations and sole proprietors. Before the Credit Risk Database was formally established, the Government of Japan invested 1.3 billion Japanese yen (¥) ($12,000,000) from the supplementary budgets for fiscal years 1999 and 2000 to

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1 www.crd-office.net.
finance the setting up of the Credit Risk Database computer system and other operational costs. The Association provides sample data and statistical information, as well as scoring services. Members of the CRD Association provide financial/non-financial data and default information on SMEs with whom members have relationships (the names of SMEs are encoded so that they cannot be specified) to the Database, which, in turn, returns to members a variety of services by utilizing the accumulated data (figure 5).

Figure 5. Structure of Credit Risk Database

![Diagram of Credit Risk Database]

Source: Credit Risk Database of Japan website.

Establishing similar systems in other countries of Asia to accumulate and analyze credit risk data and to measure credit risks of SMEs accurately would enable them to raise funds from the banking sector and give them access to the debt market by securitizing their claims.

Governments throughout Asia could set as a long-term target the development of a centralized SME database. In the interim, there are a variety of accessible databases that could be used for credit rating, such as the financial statements of SME customers held by governmental and private institutions or the extensive database of SMEs at the tax bureaux of the ministries of finance. In fact, data used for credit analysis in section IV of the present paper is for a group of SMEs that are customers of an Iranian bank.
Hometown investment trust funds

Given that the financial systems in Asia are dominated by banks, the creation of regional funds (or hometown investment trust funds)\(^2\) to promote lending to start-up companies and riskier borrowers, such as SMEs, would help maintain the soundness of the banking sector, as banks would not be exposed to the risks that lending to such companies inevitably poses. Selling those regional trust funds through branch offices of regional banks, post offices, credit associations, and large banks would increase funding sources for regional companies.

Such trust funds would not be guaranteed by a deposit insurance corporation and the associated risks would be borne by investors. The terms of a trust fund would have to be fully explained to investors, such as where their funds would be invested and what the risks associated with the investment would be, in order to strengthen potential investors' confidence and help expand the trust fund market (Yoshino, 2013). Examples of such funds in Japan include wind power generators and musicians' funds. In the first example, to construct 20 wind power generators, private-public partnerships were launched with investment of $1,000-5,000 by local residents in a fund. They receive dividends every year through the sales of electricity by each wind power generator that they had invested in. Musicians' funds gather many small investors buying units for $150-500. If the musicians become successful and their DVDs sell well, the sales generate a high rate of return for the fund.

Examples of both successful and failed funds can be cited. Project assessors play a key role in evaluating each project to limit the number of non-performing investments and losses by investors. Some of the funds set up in Japan are regarded as charities, with some investors viewing them as a way to invest in their region to support new business ventures.

Such new ventures pose a problem for banks, as although some will have high expected rates of return, the high risks involved make it difficult for banks to finance them. However, if the projects are financed by hometown investment trust funds rather than by deposits transformed into bank loans, they will not create non-performing loans for banks. Banks can still benefit and compete with each other by selling the trust funds through their branch offices, although it has to be made clear that an investment in those funds is not guaranteed. If a bank sells successful hometown investment trust funds, it will be able to attract more investors while on the other hand, if it sells loss-making funds, it will lose investors in the future. Competition

\(^2\) Hometown investment trust funds were only recently established and now have been adopted as a national strategy in Japan (Yoshino and Taghizadeh-Hesary, 2014a).
will improve the quality of projects and enhance the risk-adjusted returns for investors.

Figure 6 shows how trust funds can increase investment in riskier projects.

**Figure 6. Bank-based small and medium-sized enterprise financing and hometown investment financing to riskier borrowers**

A hometown investment trust fund has three main advantages. First, it contributes to financial market stability by lowering information asymmetry. Individual households and firms have direct access to information about the borrowing firms, mainly SMEs. Second, it is a stable source of risk capital. The fund is project driven. Firms and households decide to invest by getting to know the borrowers and their projects. In this way, the fund distributes risk, but not so that it renders risk intractable, which has been the problem with the “originate and distribute” model. Third, it contributes to economic recovery by connecting firms and households with SMEs that are worthy of their support. It also creates employment opportunities at the SMEs as well as for the pool of retirees from financial institutions who can help assess the projects (Yoshino, 2013; Yoshino and Taghizadeh-Hesary, 2014b; 2014c).

### IV. ANALYSIS OF SMALL AND MEDIUM-SIZED ENTERPRISE CREDIT RISK USING ASIAN DATA

In this section an efficient and comprehensive scheme for credit rating of SMEs is presented. Various financial ratios that describe the characteristics of SMEs and enable banks to categorize their SME customers into different groups based on their financial health are examined. This method is also applicable for hometown
investment trust funds. The data for this statistical analysis were provided by an Iranian bank for 1,363 SMEs.

This method could be also used for credit rating even in the non-SME sector. For a recent study, Yoshino, Taghizadeh-Hesary and Nili (2015) used this method for credit rating and classifying 32 Iranian banks. Based on the results, the banks were classified into two groups and rated based on their soundness.

Selection of the variables

A number of possible ratios have been identified as useful in predicting a firm’s likelihood of default. Chen and Shimerda (1981) show that out of more than 100 financial ratios, almost 50 per cent of them were useful in at least one empirical study. Some scholars have argued that quantitative variables are not sufficient to predict SME default and that including qualitative variables, such as the legal form of the business, the region where the main business is carried out and the industry type, improves the models’ predictive power (for example, Lehmann, 2003; Grunert, Norden and Weber, 2004). However, the data used here are based on firm’s financial statements, which do not contain such qualitative variables.

For this study, the author’s followed Altman and Sabato (2007), who proposed five categories to describe a company’s financial profile: liquidity; profitability; leverage; coverage; and activity. For each of those categories, they created a number of financial ratios identified in the literature. Table 1 shows the financial ratios selected for this survey.

In the next stage, two statistical techniques are used: principal component analysis; and cluster analysis. The underlying logic of both techniques is dimension reduction, namely summarizing information on multiple variables into just a few variables, which is achieved in different ways. Principal component analysis reduces the number of variables into components (or factors). Cluster analysis reduces the number of SMEs by placing them in small clusters. In this survey, components (factors) resulting from the principal component analysis are applied and then the cluster analysis is carried out in order to group the SMEs.

Principal component analysis

Principal component analysis is a standard data reduction technique that entails extracting data, removing redundant information, highlighting hidden features and visualizing the main relationships that exist between observations. This analysis

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3 Principal component analysis is also referred to as the Karhunen–Loève Transform (named after Kari Karhunen and Michel Loève.)
is a technique for simplifying a data set by reducing multidimensional data sets to lower dimensions for analysis. Unlike other linear transform methods, principal component analysis does not have a fixed set of basis vectors. Its basis vectors depend on the data set. The principal component analysis has the additional advantage of indicating what is similar and different about the various models created (Bruce-Ho and Dash-Wu, 2009). Through this method, the 11 variables listed in table 1 were used to determine the minimum number of components that can account for the correlated variance among SMEs.

<table>
<thead>
<tr>
<th>No.</th>
<th>Symbol</th>
<th>Definition</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Equity_TL</td>
<td>Equity (book value)/total liabilities</td>
<td>Leverage</td>
</tr>
<tr>
<td>2</td>
<td>TL_Tassets</td>
<td>Total liabilities/total assets</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cash_Tassets</td>
<td>Cash/total assets</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>WoC_Tassets</td>
<td>Working capital/total assets</td>
<td>Liquidity</td>
</tr>
<tr>
<td>5</td>
<td>Cash_Sales</td>
<td>Cash/net sales</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>EBIT_Sales</td>
<td>EBIT/sales</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Rinc_Tassets</td>
<td>Retained earnings/total assets</td>
<td>Profitability</td>
</tr>
<tr>
<td>8</td>
<td>Ninc_Sales</td>
<td>Net income/sales</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>EBIT_IE</td>
<td>EBIT/interest expenses</td>
<td>Coverage</td>
</tr>
<tr>
<td>10</td>
<td>AP_Sales</td>
<td>Account payable/sales</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>AR_TL</td>
<td>Account receivable/total liabilities</td>
<td>Activity</td>
</tr>
</tbody>
</table>

Notes: Retained earnings = the percentage of net earnings not paid out as dividends, but retained by the company to be reinvested in its core business or to pay debt. It is recorded under shareholders’ equity in the balance sheet. EBIT = earnings before interest and taxes. Account payable = an accounting entry that represents an entity’s obligation to pay off a short-term debt to its creditors. The accounts payable entry is found on a balance sheet under current liabilities. Account receivable = money owed by customers (individuals or corporations) to another entity in exchange for goods or services that have been delivered or used, but not yet paid for. Receivables usually come in the form of operating lines of credit and are usually due within a relatively short time period, ranging from a few days to a year.

In order to examine the suitability of these data for factor analysis, the Kaiser-Meyer-Olkin (KMO) test and Bartlett’s test of sphericity were performed. KMO is a measure of sampling adequacy that indicates the proportion of common variance that might be caused by underlying factors. High KMO values (larger than 0.60) generally indicate that factor analysis may be useful, which is the case in this study: KMO = 0.71. If the KMO value is less than 0.5, factor analysis would not be useful. Bartlett’s test of sphericity indicates whether the correlation matrix is an identity
matrix, indicating that variables are unrelated. A significance level less than 0.05 indicates that there are significant relationships among the variables, which is the case in this study: significance of Bartlett’s test < 0.001.

Next, the number of factors to be used in the analysis was determined. Table 2 reports the estimated factors and their eigenvalues. Only those factors accounting for more than 10 per cent of the variance (eigenvalues > 1) were kept in the analysis. As a result, only the first four factors were finally retained (table 2).

Taken together, Z1 through Z4 explain 71.06 per cent of the total variance of the financial ratios.

Table 2. Total variance explained

<table>
<thead>
<tr>
<th>Component</th>
<th>Eigenvalues</th>
<th>% of variance</th>
<th>Cumulative variance %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z1</td>
<td>3.30</td>
<td>30.00</td>
<td>30.00</td>
</tr>
<tr>
<td>Z2</td>
<td>2.19</td>
<td>19.90</td>
<td>49.90</td>
</tr>
<tr>
<td>Z3</td>
<td>1.25</td>
<td>11.38</td>
<td>61.28</td>
</tr>
<tr>
<td>Z4</td>
<td>1.08</td>
<td>9.78</td>
<td>71.06</td>
</tr>
<tr>
<td>Z5</td>
<td>0.94</td>
<td>8.56</td>
<td>79.62</td>
</tr>
<tr>
<td>Z6</td>
<td>0.75</td>
<td>6.79</td>
<td>86.41</td>
</tr>
<tr>
<td>Z7</td>
<td>0.56</td>
<td>5.09</td>
<td>91.50</td>
</tr>
<tr>
<td>Z8</td>
<td>0.48</td>
<td>4.36</td>
<td>95.86</td>
</tr>
<tr>
<td>Z9</td>
<td>0.32</td>
<td>2.87</td>
<td>98.73</td>
</tr>
<tr>
<td>Z10</td>
<td>0.13</td>
<td>1.14</td>
<td>99.87</td>
</tr>
<tr>
<td>Z11</td>
<td>0.09</td>
<td>0.13</td>
<td>100.00</td>
</tr>
</tbody>
</table>

To run the principal component analysis, the direct oblimin rotation was used. Direct oblimin is the standard method to obtain a non-orthogonal (oblique) solution — that is, one in which the factors are allowed to be correlated. In order to interpret the revealed principal component analysis information, the pattern matrix must then be studied. Table 3 presents the pattern matrix of factor loadings by use of the direct oblimin rotation method in which variables with large loadings, absolute value (> 0.5) for a given factor, are highlighted in bold.
As evident in table 3, the first component, Z1, has four variables with an absolute value (> 0.5), of which two are positive (EBIT/sales and net income/sales) and two are negative (cash/net sales and account payable/sales). For Z1, the variables with large loadings are mainly net income and earnings, hence, Z1 generally reflects the net income of an SME. As this factor explains the most variance in the data, it is the most informative indicator of the overall financial health of an SME. Z2 reflects short-term assets. This component has three major loading variables: (a) liabilities/total assets which is negative and means an SME has few liabilities and mainly relies on its own assets; (b) working capital/total assets which is positive and, means an SME has short-term assets; (c) retained earnings/total assets, which is positive and means an SME has earnings, which it reinvests in the company. These three variables indicate an SME that has small borrowing and sizeable working capital and retained earnings, and therefore, has plenty of short-term assets. Z3 reflects the liquidity of SMEs. This factor has two variables with large loadings (cash/total assets and EBIT/interest expenses), both with positive values, which shows an SME that is cash-rich and has high earnings, hence, it mainly reflects the liquidity conditions of an SME. The last factor, Z4, reflects capital. It has two variables with large loading, both with positive values, equity (book value)/total liabilities and account receivable/total liabilities and indicates an SME with few liabilities that has sizeable equity.

### Table 3. Factor loadings of financial variables after direct oblimin rotation

<table>
<thead>
<tr>
<th>Variables</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>(financial ratios)</td>
<td>Z1</td>
</tr>
<tr>
<td>Equity_TL</td>
<td>0.009</td>
</tr>
<tr>
<td>TL_Tassets</td>
<td>-0.032</td>
</tr>
<tr>
<td>Cash_Tassets</td>
<td>-0.034</td>
</tr>
<tr>
<td>WoC_Tassets</td>
<td>-0.05</td>
</tr>
<tr>
<td>Cash_Sales</td>
<td>-0.937</td>
</tr>
<tr>
<td>EBIT_Sales</td>
<td>0.962</td>
</tr>
<tr>
<td>Rinc_Tassets</td>
<td>0.014</td>
</tr>
<tr>
<td>Ninc_Sales</td>
<td>0.971</td>
</tr>
<tr>
<td>EBIT_IE</td>
<td>0.035</td>
</tr>
<tr>
<td>AP_Sales</td>
<td>-0.731</td>
</tr>
<tr>
<td>AR_TL</td>
<td>0.009</td>
</tr>
</tbody>
</table>

*Note:* The extraction method was principal component analysis. The rotation method was direct oblimin with Kaiser normalization.
Table 4 shows the correlation matrix of the components. It indicates that there is no correlation between these four components. This means a regular orthogonal rotation approach could have been used to force an orthogonal rotation. In this survey, an oblique rotation method is used. This method still provides basically an orthogonal rotation factor solution because these four components are not correlated with each other and are distinct entities.

Table 4. Component correlation matrix

<table>
<thead>
<tr>
<th>Component</th>
<th>Z1</th>
<th>Z2</th>
<th>Z3</th>
<th>Z4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z1</td>
<td>1.00</td>
<td>0.037</td>
<td>-0.031</td>
<td>-0.005</td>
</tr>
<tr>
<td>Z2</td>
<td>0.037</td>
<td>1.00</td>
<td>0.106</td>
<td>0.102</td>
</tr>
<tr>
<td>Z3</td>
<td>-0.031</td>
<td>0.106</td>
<td>1.00</td>
<td>0.033</td>
</tr>
<tr>
<td>Z4</td>
<td>-0.005</td>
<td>0.102</td>
<td>0.033</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note: The extraction method is principal component analysis. The rotation method is direct oblimin with Kaiser Normalization.

Figure 7 shows the distribution of the four components (Z1, Z2, Z3, and Z4) for group A, financially sound SMEs, and group B, non-sound SMEs.

It is clear from the six graphs in this figure that group A (sound) SMEs can generally be found in the positive areas of the graphs and group B SMEs in the negative areas, or in inferior places in most cases when compared to the sound group. This shows that these four defined components (Z1, Z2, Z3, and Z4) are able to separate SMEs. It means that these components could be a good measure for showing the financial healthiness of SMEs.

Cluster analysis

In this section, the four components that were obtained in the previous section are reviewed to identify SMEs that have similar traits. Clusters were then generated and SMEs were placed in distinct groups. To do this, cluster analysis is undertaken. In cluster analysis, a set of data is organized into groups so that observations from a group with similar characteristics can be compared with those from a different group (Martinez and Martinez, 2005). In this case, SMEs were organized into distinct groups according to the four components derived from the principal component analysis used in the previous section. Cluster analysis techniques can themselves be broadly grouped into three classes: hierarchical clustering, optimization
Figure 7. Distribution of factors for groups A and B of small and medium-sized enterprises

Notes: Group A = sound SMEs, group B = non-sound SMEs. The firms considered to be non-sound in this study have risk-weighted assets greater than their shareholders’ equity.
clustering, and model-based clustering. For this study, the most prevalent method in the literature, hierarchical clustering was used. This produces a nested sequence of partitions by merging (or dividing) clusters. At each stage of the sequence, a new partition is optimally merged (or divided) from the previous partition according to some adequacy criterion. The sequence of partitions ranges from a single cluster containing all the individuals to a number of clusters (n) containing a single individual. The series can be described by a tree display called the dendrogram (figure 8). Agglomerative hierarchical clustering proceeds by a series of successive fusions of the n objects into groups. By contrast, divisive hierarchical methods divide the n individuals into progressively finer groups. Divisive methods are not commonly used because of the computational problems they pose, see Everitt, Landau and Leese (2001) and Landau and Chis Ster (2010). Below, the average linkage method, which is a hierarchical clustering technique, is used.

**The average linkage method**

The average linkage (AL) method defines the distance between clusters as the average distance from all observations in one cluster to all points in another cluster. In other words, it is the average distance between pairs of observations, where one is from one cluster and one is from the other. The average linkage method is relatively robust and also takes the cluster structure into account (Martinez and Martinez, 2005; Feger and Asafu-Adjaye, 2014). The basic algorithm for the AL method can be summarized in the following manner:

- N observations start out as N separate groups. The distance matrix \( D = (d_{ij}) \) is searched to find the closest observations, for example, Y and Z.
- The two closest observations are merged into one group to form a cluster (YZ), producing \( N - 1 \) total groups. This process continues until all the observations are merged into one large group.

Figure 8 shows the dendrogram that results from this hierarchical clustering.

---

4 The main difference between the hierarchical and optimization techniques is that in hierarchical clustering, the number of clusters is not known beforehand. The process consists of a sequence of steps during which two groups are either merged (agglomerative) or divided (divisive) according to the level of similarity. Eventually, each cluster can be subsumed as a member of a larger cluster at a higher level of similarity. The hierarchical merging process is repeated until all subgroups are fused into a single cluster (Martinez and Martinez, 2005). Optimization methods on the other hand do not necessarily form hierarchical classifications of the data as they produce a partition of the data into a specified or predetermined number of groups by either minimizing or maximizing some numerical criterion (Feger and Asafu-Adjaye, 2014).
The resultant dendrogram (hierarchical average linkage cluster tree) provides a basis for determining the number of clusters by sight. In the dendrograms shown in figure 8, the horizontal axis shows 1,363 SMEs. Owing to their large number, SMEs have not been identified by number in the dendrogram, although this is how SMEs are identified in this survey. Rather, the dendrogram categorizes the SMEs in three main clusters (groups 1, 2, and 3), but it does not show which of those three clusters contain the financially healthy SMEs, which contains least healthy or risky SMEs, and which contain intermediate SMEs, hence, there is one more step to go.

Figure 8 shows the 1,363 SMEs categorized into three major clusters. Using their components, which were derived from the principal component analysis, the distribution of factors for each member of the three major clusters can be plotted. Figure 9 shows the distribution of Z1-Z2 for these three cluster members separately.5

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5 The dendrogram shows us the major and minor clusters. One of useful features of this tree is that it identifies a representative SME of most of the minor groups, which has the average traits of the other members of the group. Hence for simplification, in figure 9, there is only used data from these representative SMEs, which explains the whole group’s traits. This is why the total number of observations in figure 9 is lower than the 1,363 observations in this survey.
As indicated in figure 9, group 1 consists of the healthiest SMEs, group 3 contains the SMEs with the lowest healthiness and group 2 are those that are in-between. Interestingly, when this grouping is carried out by using the other components (Z1-Z3, Z1-Z4, Z2-Z4, Z2-Z3, and Z3-Z4), in most cases, the grouping is similar. This implies that this analysis is an effective way of grouping SMEs.

V. CONCLUDING REMARKS

SMEs play a significant role in Asian economies as they are responsible for very high shares of employment and output in all Asian countries. However, they have limited access to finance compared to large enterprises. Banks dominate the financial systems in Asia and as a consequence are the main source of financing for SMEs. Besides banks, the creation of regional funds (or hometown investment trust funds) to promote lending to riskier customers, such as SMEs, would be the second choice of financing.
For financial institutions, it is crucial to recognize healthy SMEs from the non-healthy SMEs, in order to avoid accumulation of non-performing loans. This is possible by applying statistical analysis techniques on financial variables of SMEs.

In this research, 11 financial variables of 1,363 SMEs that are customers of an Asian bank are used for the analysis. These variables are subjected to principal component analysis and cluster analysis. The results showed that four variables (net income, short-term assets, liquidity and capital) are the most important for describing the general characteristics of SMEs. Three groups of SMEs were then differentiated based on the financial health of those 1,363 SMEs.

The policy implications of this paper are that it is crucial for the governments to collect SME data and prepare a rich database, such as the Credit Risk Database of Japan. This will help governments formulate economic policies and facilitate a path towards developing an efficient credit rating mechanism. Since establishing a credit risk database takes time, in the short-run, governmental or private financial institutions could apply similar credit rating techniques on SME customers' balance sheet information, and recognize healthy SMEs. Under such a scenario: (a) financially healthy SMEs could borrow much more money from banks at lower interest rates because of their lower default risk; (b) SMEs in poor financial health would have to pay higher interest rates on their borrowing from the financial institutions and have a lower borrowing ceiling than healthy SMEs; and (c) banks could reduce the amount of their accumulated non-performing loans to SMEs. Also of note, if the hometown investment trust funds were to be sold through regional banks, post offices, credit associations, or even large banks, these financial institutions could apply the aforementioned credit rating analysis, and decide on the closure or continuing of such funds.
REFERENCES


The present paper explores how a subregional engagement with bordering regions can stimulate economic cooperation among countries in the context of low levels of trade within the South Asian subregion. With special reference to shared historical legacy and culture-driven interaction — formal and informal — between Nepal and the state of Bihar in India, the paper develops a SWOT (strength, weakness, opportunity and threat) framework to rationalize and reflect on the need for a subregional perspective towards promotion of regional cooperation. With complementary applications of secondary data and field research, it shows how irrespective of formal country-level initiatives, Nepal and Bihar have engaged in successful economic partnerships and argues that those existing nodes represent the potential for greater subregional and regional economic cooperation. The paper also offers insights into formal and informal challenges and policy imperatives associated with the operationalization of the new perspective.

JEL Classification: F100, F140, F150, F420.

Key words: Nepal, Bihar, informal, trade, subregional perspective, economic cooperation.
I. INTRODUCTION

Since the end of the Second World War the world has witnessed an accelerated movement towards greater global integration among economies. This integration has brought greater prosperity and increased consumer satisfaction in many economies, but the openness associated with it has also been linked to accentuated poverty and inequality. Many countries have gained economic openness, while others, particularly developing ones, have not benefited from the greater international economic integration. This implies that openness is a necessary but not the sufficient condition for successful economic development (Shrestha, 2013). One of the reasons behind the varying achievements of countries undergoing a trade-driven development process is the high costs attached to international trade. Tariffs are no longer seen as the main obstacle to trade following substantial reductions of them over the last 60 years. Since the 1970s, major non-tariff barriers to trade, such as import quotas or voluntary export restraint agreements, have also declined significantly (Nabi, 2010). Yet, international trade remains rather costly and consequently; it remains very low within South Asia. This issue has caught much attention, with several regional initiatives being undertaken to promote trade and broader economic cooperation among countries of South Asia in the past few years. In fact, the South Asian Association for Regional Cooperation (SAARC) was established in 1985 with the agenda to promote greater integration and trade within countries of South Asia. However, it has failed to significantly boost intra-SAARC trade; trade with the Association continues to be one of the lowest among regional trade blocks in the world (Sharan, 2010). Even the establishment of South Asian Preferential Trading Arrangements, which are aimed at lowering trade barriers, has failed to stimulate intra-South Asia trade to desired levels (Taneja, 2001).

One aspect that could stimulate trade among neighbouring countries of South Asia, but remains relatively unexplored, is the identification and promotion of economic cooperation across bordering regions of neighbouring South Asian countries. This, in turn, can be linked further to the promotion of regional integration and particularly have spillover effects in the case of geographically large countries, such as India. However, only limited research has been conducted on potential of this type of cooperation. The present report assesses the current status and potential of greater integration between India and Nepal through a subregional perspective involving the state of Bihar. A lot of research has been conducted on regional trade in South Asia in general and Indo-Nepal trade in particular (Shrestha 2013; Taneja and Chowdhary, 2011; Rajkarnikar, 2011; Sharan, 2010; Pandey, 2010), but little has been done from the subregional perspective from the bordering region. Several studies have looked at bordering states (Chanda, 2013; Kansakar, 2012; Pohit and Taneja, 2000), but the objective has been to capture the dynamics of cross-border informal
trade rather than explore the potential in those regions for catalysing cooperation. This paper therefore presents the subregional perspective of the Indo-Nepal economic relationship by focusing on the state of Bihar. At the same time, it also identifies areas and scope for potential cooperation that can be linked to enhance regional cooperation in South Asia.

Bihar as an important transit point at the India-Nepal border, owing to its direct connection to the metropolitan cities of India, the state is likely to continue to be of geopolitical and economic significance to Nepal. Additionally, among the states of India, Bihar shares a unique historical and cultural proximity with Nepal, which renders a self-sustaining cycle of interaction and transaction between the areas. It is this interaction and economic transaction — formal as well as informal — ongoing through borders in Bihar, that this paper looks at. It is observed that this natural advantage between Bihar and Nepal at a subregional level can be translated into enhanced economic cooperation among the countries and within South Asia. The ostensible objective is to understand the existing structure of interaction and based on that, to identify the potential for and barriers to enhancing Indo-Nepal economic and regional cooperation by leveraging subregional dynamics that already exist, though largely at the informal level, and the policy imperatives for the promotion of it. Based on a strength, weakness, opportunities and threats (SWOT) analysis using secondary data along with field visits to four transit towns in Bihar, the paper presents the existing formal networks of exchanges and transactions. It also captures the legacy of informal mechanisms existing since time immemorial due to natural and self-sustained affinity between Bihar and Nepal. In the process, it is observed that the informal networks are a reflection of the close relation between the two countries’ border regions, but also present challenges when incorporating the framework on cooperation.

The paper is organized in six sections. It begins with an introduction in section I. Section II sets the subregional perspective on Indo-Nepal economic cooperation. Section III deals with the methodological framework and section IV consists of a discussion on the strength and opportunities associated with the Indo-Nepal economic relationship with reference to Bihar. Section V attempts to identify weaknesses in the current Indo-Nepal engagement and contains a discussion on the factors that obstruct cooperation from a subregional perspective. Finally, the paper winds up with concluding inferences drawn from the SWOT framework, developed in the process.
II. SETTING THE SUBREGIONAL PERSPECTIVE ON ECONOMIC COOPERATION

Indo-Nepal cooperation, economic or otherwise, is a natural fixture, given the long border the two countries share with each other. Nepal, which is landlocked, borders five states of India, namely West Bengal, Sikkim, Bihar, Uttar Pradesh and Uttarakhand. As a consequence of the close geographical and historical connections between the two counties, their relationship is “taken for granted” to the point that efforts to enhance cooperation have frequently been undermined. Starting in 1950, a number of treaties and agreements have been entered into by India and Nepal relating to trade and cooperation. With the gradual transition to a freer bilateral trade regime, including extra proportional trade considerations on the part of India, trade between the two countries has been growing over the years. India enjoys a trade surplus with Nepal, which is unavoidable given the varying size, economic development levels and export bases of the two countries (Sharan, 2010).

Apart from the size of the economy, Nepal has the lowest saving and investment ratio to gross domestic product (GDP) — a key indicator of macro-economic well-being — among South Asian countries (World Bank, 2012). The country is also very weak in terms of availability of infrastructure, such as access to electricity, road density and a mobile phone network (World Bank, 2012). In fact, most of the South Asian countries lag behind East Asian countries with regard to major macroeconomic indicators (Shrestha, 2013).

In terms of geographical area, Nepal is much smaller than India and in fact, is only slightly larger than the state of Bihar, whereas the population of Bihar is more than four times larger than Nepal. The population density of Nepal is half of India, but the population density of Bihar is 10 times higher than that of Nepal. GDP per person in Nepal is much lower as compared to India, but it is relatively higher when compared to the state of Bihar (see table 1). The literacy rate at around 57 per cent is also lower in Nepal than in Bihar, despite the latter being among the underdeveloped regions of India. However, life expectancy in Nepal is considerable higher as compared to Bihar and India.

Despite the visible asymmetries between India and Nepal, the two countries have maintained close historical ties. Notably, more than seven million ethnic Nepalese currently live and work in India, apart from those engaged as short-term workers (Pandey, 2010). One of the unique characteristics of Indo-Nepal interaction, which is also reflective of the potential of economic partnership, is the direct cultural affinity between some of the states of India with Nepal with or without an alignment with national strategies. As mentioned above, Bihar is one such state that shares a unique cultural legacy and to some extent economic characteristics with Nepal,
which may not necessarily overlap with rest of India. These natural and cultural commonalities between Bihar and Nepal are fundamental to economic and non-economic connections and interactions between them irrespective of a formal Indo-Nepal framework. It is this context that justifies a subregional perspective towards expanding and strengthening formal cooperation between India and Nepal, which, in turn, may be linked to other South Asian countries to the extent feasible. Interestingly, despite the absence of a strategic effort at the Indo-Nepal relationship level, partnership between the state of Bihar and Nepal has already been taking place. One concrete example in this regard is the efficient engagement of the Bihar State Milk Cooperative Federation Limited with Nepal through trading of milk, which is discussed later in detail. This cooperative effort espouses the potential of a subregional perspective on cooperation between India and Nepal.

### III. METHODOLOGICAL APPROACH, DATA AND SAMPLE

Methodologically, the paper has adopted a SWOT approach. Developed originally for business and industry, SWOT analysis is now widely applied in the field of development research and policy and is helpful in being realistic during the planning process.¹ It is an established method to assist in the formulation of strategy and resource-based planning (Dyson, 2004). The SWOT framework is particularly helpful in demarcating external and internal factors — both positive and negative — associated with a given situation, while also providing a mechanism to work on take-off strategies.


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**Table 1. Key indicators on Nepal, India and the state of Bihar**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Nepal ¹</th>
<th>India²</th>
<th>Bihar³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (“000” sq.km.)</td>
<td>147.20</td>
<td>3 287.30</td>
<td>94.20</td>
</tr>
<tr>
<td>Literacy rate</td>
<td>65.90</td>
<td>74.04</td>
<td>61.80</td>
</tr>
<tr>
<td>Sex ratio</td>
<td>1 061.00</td>
<td>940.00</td>
<td>918.00</td>
</tr>
<tr>
<td>Population (in million)</td>
<td>26.50</td>
<td>1 210.19</td>
<td>103.80</td>
</tr>
<tr>
<td>Population density (per sq.km.)</td>
<td>180.00</td>
<td>382.00</td>
<td>1 106.00</td>
</tr>
<tr>
<td>GDP (current US$ billion)⁴</td>
<td>19.27</td>
<td>1 858.75</td>
<td>–</td>
</tr>
<tr>
<td>GDP per person (current US$)</td>
<td>699.00</td>
<td>1 503.00</td>
<td>1 019.00⁵</td>
</tr>
<tr>
<td>Life expectancy at birth</td>
<td>68.00</td>
<td>66.00</td>
<td>61.60 (2006)</td>
</tr>
</tbody>
</table>

The paper makes use of both secondary and primary sources of information. Important secondary sources include, but are not limited to, various departments under the Government of India and the government of Bihar, research and development institutions, such as the Indian Council for World Affairs, the Nepal Council of World Affairs, institutes of higher education and local non-governmental organizations, especially those from the bordering areas. Also, available documents and interviews of concerned representatives of various public institutions have been important sources of data.

There are ten Indo-Nepal transit points spread across the seven districts of Bihar that border Nepal (see table 2). Four of those districts, namely East Champaran, Sitamarhi, Araria and Kishanganj, were covered under field visits at their respective transit point of Raxaul, Bairgania, Jogbani and Galgalia (see figure 1). The selection of Raxaul and Jogbani for field research was based on their importance as trade transit points between India and Nepal. Bairgania and Galgalia were selected due to their relative proximity to Raxaul and Jogbani, respectively. In addition to being less significant in official trade, greater possibility of informal transactions through Bairgania and Galgalia was expected.

Table 2. Districts of Bihar and Nepal bordering each other, along with their respective transit point

<table>
<thead>
<tr>
<th>Bihar Districts</th>
<th>Transit points/towns</th>
<th>Nepal Districts</th>
<th>Transit points/towns</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Champaran</td>
<td>Raxaul</td>
<td>Parsa</td>
<td>Birgunj</td>
</tr>
<tr>
<td>Sitamarhi</td>
<td>Sursand</td>
<td>Mahottari</td>
<td>Jaleswar</td>
</tr>
<tr>
<td></td>
<td>Sonbarsa</td>
<td>Sarlahi</td>
<td>Malangawa</td>
</tr>
<tr>
<td></td>
<td>Bairgania</td>
<td>Rautahat</td>
<td>Gaur</td>
</tr>
<tr>
<td>Madhubani</td>
<td>Jaynagar</td>
<td>Siraha</td>
<td>Siraha</td>
</tr>
<tr>
<td></td>
<td>Laukaha</td>
<td>Dhanusa</td>
<td>Thadi Jhijha</td>
</tr>
<tr>
<td>Supaul</td>
<td>Bhimnagar</td>
<td>Setobandha</td>
<td>Sunsari</td>
</tr>
<tr>
<td></td>
<td>Kunauli</td>
<td>Saptari</td>
<td>Rajbiraj</td>
</tr>
<tr>
<td>Araria</td>
<td>Jogbani</td>
<td>Murang</td>
<td>Biratnagar</td>
</tr>
<tr>
<td>Kishanganj</td>
<td>Galgalia</td>
<td>Jhapa</td>
<td>Bhadrapur</td>
</tr>
</tbody>
</table>
Six custom staff members in total (selected randomly) were interviewed from the four selected customs land stations, mentioned above. No structured survey was conducted, however, group discussions were held with local traders and shop owners in transit areas. Spontaneous interviews of ten randomly selected individuals travelling across the border from either side were conducted. This was done in order to capture the unofficial transactions.

IV. BIHAR IN INDO-NEPAL ECONOMIC COOPERATION: STRENGTH AND OPPORTUNITY

The relationship between the two countries is based on the Treaty of Peace and Friendship between the Government of India and the Government of Nepal,
which was signed in 1950.² Under the provision of the treaty, Nepalese citizens avail all the facilities and opportunities at par with Indian citizens. The treaty provides reciprocal duty free and without any quantitative restrictions market access for 16 agriculture and primary products, including paddy, wheat, maize, rice, pulses and flour. With regard to manufacturing products, it grants duty free and quota free access to the Indian market for all articles manufactured in Nepal. India continues to be the largest trade partner of Nepal and source of foreign investment of tourist arrivals. India accounts for 46 per cent of total foreign investment in Nepal. Indian business ventures in Nepal cover diverse fields, such as manufacturing, services (banking, insurance, dry port, education and telecom), energy and tourism. In July 2012, bilateral trade between Nepal and India accounted for 65.1 per cent of the external trade of Nepal. India–Nepal trade amounted to $2.7 billion during 2010/11 while exports from India to Nepal gained 137.7 per cent from $927.4 million in 2006/07 to $2.2 billion in 2010/11.³ A significant proportion of this trade is carried out through the transit points in Bihar. On the Nepal side, trade with India in particular, is carried out through transit points in Kathmandu, Biratnagar, Birgunj and Nepalgunj; the first three towns account for trade between Nepal and Bihar.

Indo-Nepal legal trade through Bihar

Bihar accounts for a large part of border between India and Nepal. The Indo-Nepal border through Bihar has ten transit points, as listed in table 2. Of those towns, Raxaul and Jogbani, which are in the districts of East Champaran and Araria, respectively, account for the majority of Indo-Nepal trade through Bihar (figure 2).

For Raxaul and Jogbani, major items of export are petroleum goods, and iron and steel products. With the exception of Raxaul and Jogbani, revenue mobilization is negligible in the transit points, owing to a relatively miniscule level of trade. Figure 3 shows revenue mobilization from exports and imports at the Jogbani and Raxaul transit points. It is apparent that revenue mobilization from both exports and imports has been growing over the past few years, with revenue from exports through Jogbani and Raxaul considerably higher than imports. Clearly, Bihar is the most significant area with regard to India and Nepal in terms of trade and sharing a common border.

Figure 2. Volume of trade through Indo-Nepal transit points in Bihar, 2012-2013

Source: India, Office of the Commissioner of Customs, Patna.

Figure 3. Revenue mobilization from trade through Raxaul and Jogbani transit points

Source: India, Office of the Commissioner of Customs, Patna.
In fact, Raxaul and Jogbani in Bihar, are among the five most important transit routes between India and Nepal. The other three are Nautanwa and Nepalgunj in Uttar Pradesh and Naxalbari in West Bengal. Notably, the Raxaul (India) – Birgunj (Nepal) route is the most important one for bilateral trade between India and Nepal, as well as for trade carried out by Nepal with a third country (Pohit, 2009). Direct rail transport in Nepal is only possible through the Raxaul-Birgunj rail line. Furthermore, de Prabir and Khan (2010) found that of all Indo-Nepal transit points, Raxaul is the most efficient.

Road infrastructure in the bordering area, particularly in Bairgania and Raxaul, as observed during the field visits, is in a pathetic state. This calls for special attention. In fact, the whole transit infrastructure, including the management of transit traffic and number of daily clearances needs to be developed further. This is important not only for enhancing trade volume but also because of the strong implication it may have on the development status of the bordering areas of Bihar. As has been noted earlier, a little initiative on this front may change the picture considerably, resulting in a reduction in transaction costs (Sengupta, 2013; Rajkarnikar, 2011). Also, adequate modernization and development of all other transit points may shift pressure from Raxaul and Jogbani transit points, which appear to be overburdened. The extension of a broad gauge railway connecting Nepal with Jogbani is a very positive initiative in this context.

Bihar-Nepal economic and trade cooperation: the case of the Bihar State Milk Cooperative Federation Limited

The Bihar State Milk Cooperative Federation Limited was established by the government of Bihar in 1983 to promote and expand dairy development activities in the state. The Federation currently carries out activities related to production, procurement, processing and marketing of milk and milk products.

At the same time, the Federation also strives to promote allied activities. In the process, it has organized initiatives to strengthen and improve dairy farming techniques and practices with the objective to improve the lives and livelihoods of those engaged in such activities. As per data shared by its Patna office, the Federation’s milk procurement was 1,493,000.99 kilograms per day in the fiscal year 2013/14 and since the fiscal year 1996/97, it has been growing at compound annual rate of 12.7 per cent. Marketing of milk products under the brand name “Sudha” has expanded in terms of quantity and in geographical coverage. One of the remarkable achievements of the Federation has been its growing outreach to Nepal in the previous 8 to 10 years. The genesis of Bihar-Nepal milk trade cooperation lies in the complementary requirements of the two regions; between 2007 and 2010, the Federation suffered from constraints in milk procurement caused by a large-scale flood, while at the same time, Nepal had a sufficient supply of milk, but limited plant
capacity to process and then market the milk. In that context, the Federation started as a symbiotic relationship with regard to milk, but has evolved into a multi-faceted partnership in the dairy business. As per data of the Federation, in 2008/09, it procured milk from Nepal worth 18.5 million Nepalese rupee (Nr) ($183,000). Figure 4 shows the trend of milk sales by the Federation to Nepal since 2010/11. The volume of the Federation’s milk sales to Nepal increased by 2012, but declined afterwards. During 2013/14, the quantity of milk sold was 4,434,500 kilograms. The total value of milk sales in 2013/14 stood at 116.7 million Nr.

![Figure 4. Milk sales (in kilograms) to Nepal by the Bihar State Milk Co-operative](image)

Source: COMFED (2014).

The sustained and prospering involving milk and other dairy products between Bihar and Nepal represents current achievements as well as the unharnessed potential for economic cooperation and partnership in similar areas at the subregional-level between Bihar and Nepal, apart from Indo-Nepal foreign trade. During 2013/14, total milk exports from Bihar to Nepal were valued at approximately 120 million Nr, which is projected to double during 2014/15. The Federation engages in capacity-building and skill upgradation under a dairy development programme and accordingly, in addition to direct milk exports, the Federation is engaged in capacity-building and training in dairy farming for cooperatives in Nepal. This includes activities ranging from those in the initial stage of milk production, such as cattle rearing and
fodder management to storage, quality management, safety, standardization and packaging. Because of the multi-faceted partnership it has invoked over the period, the Bihar-Nepal dairy business is also a guiding example for possible cooperation in other areas, such as agriculture, small manufacturing, tourism and market-based skill development.

Informal transactions and the local economy: field reflections from the border

As noted earlier, one of the unique characteristics of the Indo-Nepal interaction, which is also reflective of the potential of economic partnership, is the direct cultural affinity between some of the states of India with Nepal irrespective of an alignment with national strategies. Cultural ties between the state of Bihar in India on one hand and Nepal, on the other, is a salient example in this regard. Bihar (India) shares an open border with Nepal, which allows easy movement of people across both sides. The open border has economically benefited the nationals inhabiting both sides of the border (Kansakar, 2012). Much of the economic activities in bordering areas of Bihar with Nepal have been driven by the historical connect and ethnic links, irrespective of any formal agreement between the areas. It is likely, therefore, that a considerable proportion of such an economic transaction remains unaccounted for. Trade at many of the crossings is not registered. This non-registered trade comprises a significant fraction of the trade between Indian states, including Bihar, and Nepal. According to an older estimate, informal trade between India and Nepal was 8 to 10 times the official trade between the two countries in as early as 1989, with much of this informal exchange taking place along the Nepal-Bihar border (Pohit and Taneja, 2000). This section reflects on this dimension on the basis of a field visit to the Galgalia transit point at the Bihar-Nepal border.

Of the four transit towns in Bihar, Raxaul and Jogbani account for a majority of formal trade between India and Nepal and as such are the busiest in terms of trade traffic. Consequently, customs land stations here are more vigilant and are relatively developed to deal with the intensive management of the flow of goods on the part of the Government of India. Therefore, informal or unaccounted movement of goods across the border is not very easy. In discussions during the course of the fieldwork, Indian customs officials at Jogbani, completely denied any possibility of illegal movements of items. At the same time, they mentioned that as the Indo-Nepal border is open, it is not possible to track all the movements that go across it. Similar opinions were expressed by officials at the Raxaul and Galgalia customs land stations. Moreover, as the Indo-Nepal treaty allows for free movement of persons across borders, there are no visa requirements. This makes personal trips a possible and preferred channel for information and transactions. At Galgalia, the custom officials shared that the porous border and long distances between two custom checkposts is
an incentive for unregulated trade between India and Nepal. However, the initiative to deploy Sashastra Seema Bal (SSB), armed border force between customs checkpoints, has reduced some of those activities across the border. A custom official at Galgalia further added that dumping of Chinese goods through Nepal has declined significantly since the Government of India reduced the duty on most of the items.

However, the issue needs to be looked at from various perspectives as not all unaccounted movements of goods are criminal in nature, even though the authorities refer to all of them as illegal. Trade in prohibited items, such as arms and ammunition, narcotics and human trafficking, which are treated as an illegal and punishable offence, can be differentiated from trade in items, which are not prohibited but are taken through illegal routes, especially in smaller quantities. How are these to be treated in a formal framework? Custom officials in Jogbani and Raxaul refused to share their opinion on this aspect. A field visit to another transit point in Bihar, Galgalia in Kishanganj district, threw some light on this particular dimension.

Cross-border price interaction and use of a human carrier

Galgalia provides transit access between India and Nepal through the district of Kishanganj in eastern Bihar. In terms of the magnitude and value of trade, Galgalia is a relatively small transit point. The most import trade activities are not undertaken through this transit point, but the export items from India to Nepal passes through this point. However, since exports to Nepal are duty free under the Indo-Nepal treaty, very little revenue is generated at the Galgalia transit. Export items transported through this transit point primarily include insecticides, garments and bicycle parts. The transport infrastructure at Galgalia transit is rather underdeveloped, with the use of motorized vehicles for transport negligible. Weak infrastructure is a salient reason behind low Indo-Nepal trade traffic and volume through this transit point of northeastern Bihar. Customs officials, however, mentioned that infrastructural improvement work had already been started in Galgalia, in conjunction with the ongoing construction of a flyover connecting India and Nepal. This is expected to propel the volume of trade from the Galgalia transit point. In addition, other procedural improvements have taken place recently, including an increase in number of customs working days to include Sundays for inspection at Galgalia land station. The transaction of goods across the Indo-Nepal border for non-commercial transaction is permitted. Bicycles are the common mode of transport for this purpose. At the Galgalia transit point, the non-commercial transaction of consumption items from India to Nepal appeared to be a significant characteristic of the local economy at the

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4 For example the distance between Jogbani check post and Galgalia customs checkpoint is about 150 kilometres.
Bihar-Nepal border. Interviews in the field revealed the dynamics of price interaction between the two sides of the border (see figure 5). Most of the consumption items, such as sugar, rice and pulses, are sold at a cheaper rate in the local market on the Indian side of the border. Consequently, residents of Nepal are inclined to cross the border to buy necessary items on short intervals (see figure 6). Since, customs regulations of India restrict trade in consumption items only for commercial purposes, individual consumers from Nepal can freely carry those items so long as they are for household consumption purposes. However, an issue that needs to be examined further, is whether those items are resold in Nepal at higher prices. One of travellers from Nepal, who participated in the research process on the condition of anonymity, while carrying goods, stated that many people were involved in the transport of cheaper items from Galgalia market to be sold in Nepal with considerable profit margins. How does this take place since one person cannot carry a huge amount in one go?

**Figure 5. Price difference at India and Nepal side of Galgalia transit**

![Price difference diagram]

*Source: Author.*
An interesting insight that came forth through further interaction with local people indicated that traders on both sides employ “human couriers” — both men and women — in large numbers to carry items and goods in relatively small quantities on the stated pretext that they were for household consumption. However, goods carried to Nepal by such agents, are pooled together by the trader and sold in commercial markets. This is apparently an organized activity, engaging a large number of human couriers, especially females, from the Nepal side of the Galgaliya border. These human couriers act on behalf of traders from both India and Nepal. As food and agricultural items are prohibited for trade purposes, this organized network allows an effective and relatively safe mode of leveraging price differences between both sides of the Galgaliya transit point. The activity has been so well networked that within less than one kilometre away from the Galgaliya border on the Indian side, a full-fledged local market has developed to cater to the buyers from the Nepal side. Interestingly, there is no residential neighbourhood around this market, which further reinforces the possibility that the market primarily caters to demand from the Nepal side of the Galgaliya transit point. For consumers from the Nepal side, the items of

Figure 6. Human carrier movement at Galgaliya transit of Bihar at Indo-Nepal border
transaction include primarily basic food consumption while from the Indian side, it is Chinese toys and edibles, such as noodles.

This reveals that while informal trade from India to Nepal primarily involves locally produced goods, from Nepal to India, informal trade might be taking place in third country goods, which is indicative of an organized network of informal traders. In addition, this also underscores the case for reviewing the clause of the rule of origin, as far as its role with regard to trade promotion.

Indian officials at the Galgalia land station, when questioned on the issue, denied movement of goods for commercial purposes. At the same time, they mentioned that the movements of goods between India and Nepal through the Galgalia transit point is subject to a random manual check, which effectively results in the inspection of nearly 20 per cent of transaction passing through here. Ostensibly, it may not be difficult for traders from both sides to fetch goods using human carriers. The question is whether to treat such transactions as natural strength, systemic weakness or a potential for expansion of trade? Another issue is how to accommodate such activities in a formal framework of mutual cooperation? This dimension is critical, especially since it has been noted that more often than not, the informal channels of interaction provide greater benefits as compared to formal channels to local people engaged in trade and exchange across the border. Therefore, informal channels in a limited way should not be discouraged.5 At several transit points along the Bihar-Nepal border, formal trade traffic is low. It is likely that the customs stations are less alert, resulting in an environment conducive for the undertaking of unregulated and unaccounted activities.

Indo-Nepal tourism and the centrality of Bihar

Tourism is an important economic activity as it has a multiplier effect on a country’s overall national income, especially in those countries that are significantly dependent upon the sector. It brings in large amounts of income in payment for goods and services available, contributing an estimated 5 per cent to the worldwide GDP, and creates opportunities for employment in the service industries associated with the sector (ISI, 2012). As being highly labour intensive, tourism and tourism support activities create a high proportion of employment and career opportunities for low-skilled and semi-skilled workers, particularly for poor, female and young workers. The share of women working in the tourism sector is 70 per cent and half of all tourism

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workers are aged 25 years or less (UNCTAD, 2010). In South Asia, however, the percentage contribution of travel and tourism to regional GDP is only 2.3 per cent, which is the lowest in the world, but in terms of employment, it is 4.2 per cent, which is relatively high (WTTC, 2013). This is an indication of lower labour productivity associated with tourism services in South Asia. As in 2012, the contribution of travel and tourism to the national GDP and total employment of Nepal was 9.4 per cent and 8.2 per cent, respectively, while for India, those figures were at 6.6 per cent and 7.7 per cent, respectively (WTTC, 2013). India has great potential to develop its tourism industry. With regard to inbound tourism, the country has made steady progress in recent years, but its share of total foreign tourist arrivals has remained modest. In 2008, the tourism sector’s contribution to the country’s total employment was estimated to be about 9.24 per cent (ISI, 2012). Much of the country’s potential in this regard, particularly in the context of Bihar-Nepal tourism opportunities, remains untapped. This is especially evident in the case of Bihar and Nepal where tourism — religious as well as cultural — is another sector of close interaction with great potential. Based on very preliminary reflections, it stands out that Bihar and Nepal ties are particularly unique since those two regions share not only similar ecosystems and agroclimatic characteristics, but they also share common historical traditions and religious practices. The role of religious centres of pilgrimage for both Hindus and Buddhists can be tied to the strengthening of social and cultural bonds between the two countries. Nepal as the abode of Pashupatinath and the birthplace of Sita and Buddha has been the holiest place for both Hindus and Buddhists (Kansakar, 2012). As such, Bihar and Nepal share immense potential for cultural and religious tourism. 

**Bihar and Nepal on the Buddhist circuit**

Government statistics on tourism shows that 1.91 per cent of the foreign tourists in India come from Nepal and 15-20 per cent are from Asian countries with significant Buddhist populations, such as Bhutan, Japan, Myanmar, the Philippines, Sri Lanka and Thailand (see table 3 and figure 7). With regard to Nepal, 21 per cent of its tourist inflow originate from India. Figure 7 also indicates that a greater proportion of the tourist inflow to Nepal comes from countries with considerable followers of Buddhism as compared to India.

Bihar is ranked seven among Indian states with regard to tourist inflows. As shown in table 4, it has a 5.29-per cent share of total tourist inflows in India, Also, based on the most recent government statistics, of the total foreign tourists that visited Bihar in 2005, close to 70 per cent of them followed the Buddhist circuit and among them, 75 per cent were from countries with Buddhist-dominated populations. In 2005, foreign tourists in Bihar spent about $3 million, which equates to a daily expense of about $15 per foreign tourist.
Table 3. Percentage share of Buddhist circuit countries in total foreign tourist inflow in India and Nepal

| Country       | Sri Lanka | Nepal | China | Japan | Bhutan | Thailand | Myanmar | Viet Nam | Malaysia | Singapore |
|---------------|-----------|-------|-------|-------|--------|----------|---------|----------|----------|-----------|-----------|
| India*        | 4.51      | 1.91  | 2.57  | 3.07  | 3.30   | 1.60     | 0.47    | 0.17     | 2.98     | 2.0       |
| Nepal**       | 8.65      | 20.64 | 8.94  | 3.56  | 0.52   | 4.55     | 1.17    | 0.27     | 1.46     | 0.70      |

Sources: * India, Ministry of Tourism (2012); ** Nepal (2012).

Figure 7. Percentage of tourists from Buddhist circuit countries to total tourist inflow in Nepal and India

Sources: * India, Ministry of Tourism (2012); ** Nepal, Ministry of Culture, Tourism and Civil Aviation (2012).
In 2005, Japan was the largest contributor of foreign tourists to Bihar with a 20 per cent share followed by Nepal with a share of 16 per cent. Clearly, Bihar, which has a significant place in the Buddhist circuit, has become well-known among religious tourists of Buddhist beliefs from around the world. Nepal has a visible role in this regard. Interestingly, 0.31 per cent of foreign tourists to India use Raxaul – the Bihar-Nepal transit town as the port of entry in India. It is likely that a majority of those entering from Raxaul were tourists from Nepal. While current statistics indicate the importance of Nepal and other Asian countries as a source of foreign tourists, they actually reflect significant underutilization of the potential of religious tourism across South Asian countries with sites on Buddhist Circuit, including India and Nepal.

Figure 8, which depicts nine countries with relative predominance of Buddhism and their contribution to tourist inflows to Nepal and India, clearly indicates that there is some correspondence in tourist inflows to these two countries. This is likely as religious tourists to the Buddhist circuit would choose to cover relevant places in neighbouring countries – Nepal and India in this case. However, as a proportion to their respective tourist inflows, Nepal has a considerably greater inflow from China, Thailand and Sri Lanka than in India, whereas India has a relatively greater inflow from Bhutan, Singapore and Malaysia (figure 7). This lack of consistency indicates that India and Nepal need to coordinate their efforts in promoting tourism, especially with regard to the Buddhist circuit.

Nepal has made progress in attracting more tourists through its “Visit Lumbini Year” campaign in 2012. During that year, 509,073 tourists from 92 countries visited Lord Buddha’s birthplace, including 113,195 Indians, 52,672 Sri Lankans and 28,480 Thais. There is great potential to draw pilgrims from other Buddhist countries to India and Nepal through coordinated efforts by the countries. Furthermore, visa facilitation

<table>
<thead>
<tr>
<th>Percentage of foreign tourists in Bihar</th>
<th>Staying at Bihar Buddhist circuit</th>
<th>From countries with Buddhist population</th>
<th>From Nepal</th>
<th>From Japan</th>
<th>From South-East Asia</th>
<th>From Sri Lanka</th>
<th>Travelling for religious reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of total foreign tourists in India*</td>
<td>5.29</td>
<td>70.42</td>
<td>75</td>
<td>15.7</td>
<td>20</td>
<td>13.8</td>
<td>13</td>
</tr>
</tbody>
</table>

Sources: India, Department of Tourism (2005); *India, Ministry of Tourism (2012).
for Buddhist circuit tourists, coming from countries other than India and Nepal needs to be improved. It has been found that improvement in visa procedures leads to a significant increase in tourist inflows. Some member countries of the Association for Southeast Asian Nations (ASEAN) have undertaken coordinated measures to promote tourism trade within the region (WTTC, 2014). A report from the World Travel and Trade Council (WTTC) states that ASEAN countries stand to gain 8 million to 10 million international tourists by 2016 as a result of visa facilitation initiatives, which, in turn, could potentially generate international tourism receipts between $7 billion and $10 billion and create approximately 367,000 jobs. Such findings clearly indicate the importance of visa processes in tourism promotion. India and Nepal need to work concertedly on this front and focus on Bihar due to the strategic role of the state in the Indo-Nepal regional tourism circuit. India and Nepal can forge a smoother visa regime and may consider developing visa facilitation centres at Bihar-Nepal transit points. Such an initiative is expected to encourage circular movement of tourists who visit certain prominent places on the Buddhist circuit to other places falling on it. The economic gain expected from such an arrangement needs to be stressed. Given the structure of the economy of Bihar, this is a lucrative option, which needs to be worked upon aggressively in close coordination with Governments of India and of Nepal.

Figure 8. Cross country status as origins of tourists to India and Nepal

Sources: * India, Ministry of Tourism (2012); **Nepal, Ministry of Culture, Tourism and Civil Aviation (2012).
The roots of the ancient culture of “Mithila” span between and only across Nepal and Bihar, which renders shared beliefs and culture to the two regions. The much revered epic of the Ramayana and the Mahabharata and their central characters have roots in this “Mithila Region”, especially in Janakpur in Nepal and Sitamarhi in Bihar. In addition, there are other related religious sites in the districts of Gaya, Jehanabad, Munger, Darbhanga, West Champaran, Jamui in Bihar. In fact, Valmiki Nagar in West Champaran – where the author of Ramayana — sage Valmiki — is said to have lived is only 40 kilometres from the Indo-Nepal border. According to the epic poem Ramayana, the city of Janakpur in Nepal, which is 135 kilometres from Kathmandu, was named after King Janak of the Mithila kingdom. In addition, there are other places of significance for the Hinduism faith in Nepal, including the Pashupatinath temple in Kathmandu, which is a UNESCO World Heritage Site and another important religious site for Hindi Dhanushadham, near Janakpur. Due to this overlap of religious legacy and the belief system between Nepal and Bihar, (which is not as intrinsic to other states of India), there is significant scope to promote connected religious tourism in the Hindu circuit across the two regions. In addition, there is also considerable scope to link this Indo [Bihar]-Nepal tourist circuit to Sri Lanka, which also shares a special place in the epic poem Ramayana.

The “Ramayana circuit” is not a well-known tourist destination. Religious tourism in this area has been isolated to prominent famous places, with the circular
trail passing through places that connect the ideas of the epic poem not commonly visited. Initiatives to promote these sites would require a minimum level of facilitation from countries with sites on trails. The Government of India has begun to give consideration to this dimension of tourism, however, no concrete initiative to support it has not yet been initiated. Similarly, Nepal can be connected to several states of India, apart from Bihar, in promoting religious tourism related to other subfaiths within Hinduism.

Figure 10. Bihar Buddhist and Ramayana tourism circuit

Bihar in Indo-Nepal water resource management: the untapped opportunities

Transboundary rivers and water management are governed by treaties and Indo-Nepal cooperation, which dates back to 1954 with the signing of the Kosi Agreement. Management of the Kosi river flow has been central to Indo-Nepal water cooperation agreements. However, it has been observed that the implementation of

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the Kosi Agreement has not been smooth, owing to floods in the Kosi region (Malhotra, 2010). Nepal is said to have been concerned about several issues, such as negligence in maintenance of embankments by India and inadequate compensation for the damage to the environmental and displacement associated with the construction of dams and other works in the region (Malhotra, 2010). Consequently, disagreements between the two countries have disrupted water cooperation. At the same time, it has also been noted that water cooperation can be an effective antidote to the irritants in India-Nepal relations (Bisht, 2008). The construction of a dam and barrage has multiple implications for the economy of Bihar and India (Mishra, 2008).

Nepal has a power potential of 84,000 megawatts (MWs), of which 43,000 MWs of hydropower potential is assumed to be economically viable and technically feasible (Dhungel, 2008). This potential can be harnessed for the benefit of both countries. While Nepal needs the Indian market for exporting hydropower, India, due to its growing energy demands, requires the resources of Nepal to meet its power deficit. The potential of water cooperation between India and Nepal has been untapped. From a subregional perspective, such cooperation could result in improved irrigation conditions and boost the generation of hydropower, two areas that need to be enhanced in Bihar. Nepal could also benefit largely through hydropower generation as it carries strong sectoral linkages – both forward and backward (Taneja and Chowdhury, 2011). This strongly supports the call for subregional cooperation in generating hydropower as demand for energy has increased in line with the rapid growth in industrialization and urbanization (Malhotra, 2010). Within the federal structure of India, a provincial state enjoys greater space and power vested by the constitution of India in adopting policy. In fact, historical records in independent India suggest that such an initiative had been taken by the government of Bihar and the Government of Nepal (Mishra, 2014).

Recognizing the need for cooperation, several institutional arrangements were created between India and Nepal, such as the Power Exchange Committee and the Nepal-India Joint Committee on Water Resources. There are also intergovernmental dealings to develop multipurpose river projects in Nepal, such as the multipurpose dam and diversion scheme on Kosi and the multipurpose development project on Mahakali. Nevertheless, the quantum of energy exchanged between the two countries is hardly significant (Dhungel 2008).

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7 This does not imply that in every issue, subregional initiatives will yield the same degree of success. Bilateral dialogue is definitely required in some issues for example in the defense sector.
V. SUBREGIONAL PERSPECTIVE FROM BIHAR-NEPAL BORDER: THREATS AND WEAKNESS

Some of the specific issues that have consistently deterred Indo-Nepal economic cooperation are briefly discussed in the following paragraphs.

Procedural issues and high transaction cost

High costs associated with trade transactions and procedural issues remain inherent barriers to greater Indo-Nepal economic cooperation. Despite switching to a freer trade regime, trade between India and Nepal have not increased appreciably, which may be due non-tariff barriers (Sengupta, 2013). Among the non-tariff barriers preventing Nepalese goods from getting easy access to Indian markets are phytosanitary checks at the border and the refusal of Indian officials to accept certification of products by Nepalese authorities. Also packaging requirements and quality-testing of products, especially for food items including fish, serves as obstacles to trade expansion (Sengupta, 2013). The reduction of trade tariffs that has taken place is not sufficient alone to boost trade; steps must also be taken to address non-tariff barriers.

Formal trade between the two countries currently involves significant transaction costs due to procedural intricacies or infrastructural constraints. The time required for the completion of import and export procedures in South Asian countries is, on average, about three times higher than in developed economies (ADB and ESCAP, 2013). An average day taken to export was 16 days in India in 2013, whereas in Nepal, it was 41 days (ADB and ESCAP, 2013). With regard to imports, the process time is 20 days in India and 38 days in Nepal. Since 2006, India has made it easier to process imported goods while progress in this area in Nepal has been negligible. The cost to export and import from the two countries has also substantially increased (ADB and ESCAP, 2013). Rajkarnikar (2011) noted that to complete the process to export vegetable ghee from Nepal to India consisted of 15 steps and several complex procedures, whereas a similar transaction from India is much easier and less costly.

Road infrastructure remains outdated at the border. During field visits to East Champaran and Sitamarhi, it was found that road connectivity to Nepal from Bihar is in an abysmal condition. For example, travelling 40 kilometres from Raxaul to Bairgania, took nearly four hours, which reflected the pathetic condition of local transport at the Bihar-Nepal border. While road conditions on the north-eastern Bihar border with Nepal seemed better, lack of maintenance was evident.
The threat of Kosi

Kosi is one of the eight river basins, spreading in north Bihar towards the south of the Indo-Nepal border. As discussed earlier, the people of Nepal and North Bihar in India have been suffering immensely as the result of water overflowing during the monsoon season almost every year. In fact, the Government of India has declared this region as a flood-prone area. Initiatives taken to solve the problem dates back to the British period in India (Mishra, 2014), however, not enough progress has been recorded as far as the Kosi embankments or related issues are concerned. Kosi flood takes a heavy toll on life and resources in Bihar and in Nepal. About three million people in Bihar and nearly 50,000 people in Nepal were displaced by Kosi flood in 2008 (Bisht, 2008). Clearly the river has remained a perennial threat amid failure to agree to a framework to address this issue despite ongoing discussions for six decades. Any initiative to cooperate in this regard has been struck down due to different perceptions of gains on the part of the two countries. In the course of negotiation, there has hardly been any consensus between India and Nepal on the ratio of cost sharing of projects between them. At the same time, the Nepalese believe that many of their demands have not been considered and that most of the accruing benefits would go to India (Mishra, 2014). This criticism is not without substance and should be addressed promptly before implementing any projects. The Kosi problem has been a “stumbling block” to building a healthy relationship between the two countries. The average person in both countries has had reservations about taking cooperative initiatives. Therefore, initiating dialogue at all the levels of stakeholders could minimize the tension (Mishra, 2014).

Dealing with unregulated and informal trade

It has been argued that illegality prevails due to indirect disincentives to legality, such as high transaction cost stemming from, among other things, excessive transport costs, documentation requirements, rent-seeking attitudes of bureaucrats, and time and cost involved in custom clearances at border transit points (Taneja and Chowdhury, 2011). Streamlining approval and clearance processes would help reduce the illegal movements of goods and commodities across the Indo-Nepal border. In general, unless steps are taken to eliminate non-tariff barriers to reduce transaction costs associated with formal trade, informal trade is likely to continue between India and Nepal.

The issue here is how to deal with other forms of unaccounted transactions that are undertaken with different motives. It has been noted that illegal trade may also prevail due to domestic policy distortions. For example, a trader has the incentive to siphon off subsidized items from the public distribution system to
neighbouring countries if such commodities fetch higher prices across the border (Pohit and Taneja, 2000). The nature of informal trade across the border at the Galgalia transit point appears to reflect a similar trend.

Persistent gaps and sense of alienation on the part of Nepal

It has been observed that there is conspicuous sentiment in Nepal against the India “big-brother” attitude while sharing various platforms for cooperation, whether it is regarding trade or water sharing (Malhotra, 2010; Sengupta, 2013). At the same time, many Indians believe that their country is extending excessive trade benefits to Nepal, resulting in a competitive disadvantage for Indian traders. India on the other hand, has been concerned about the increase in Maoist activities supported by cross-border factions from Nepal. These negative sentiments have been gaining traction. In fact, closer ties between Nepal and China is often attributed to negligence by India towards its small neighbour. The environment of growing resentment between Nepal and India, in particular, poses a threat to Indo-Nepal cooperation, including involving Bihar.

VI. CONCLUDING REMARKS

There is a need to shift from bilateralism to subregionalism to develop multipurpose projects (Dhungel, 2008). There is great potential to reap economic gains if the state of Bihar and Nepal were to cooperate within their respective formal frameworks. The areas have a locational advantage that bestows natural interdependence. Creating room for subregional economic cooperation, between the state of Bihar and Nepal, could be one critical way on the part of India to engage with Nepal. The federal framework of India gives ample space to the state government to engage with a neighbouring country. Furthermore, the Government of India and government of Bihar, in congruence with policy set in Nepal, can work together towards developing a permanent mechanism for facilitating interaction between the two governments. In fact, a stable intergovernmental panel to work on development of the South Asian regional tourism circuit with a special focus on the Buddhism and Ramayana circuit may be envisaged.

In terms of trade relations, as observed in case of milk trade cooperation, there are several subsectors within a small-scale industrial and micro-entrepreneurial framework that Bihar and Nepal can promote in partnership. At the macrolevel, the two countries need to review the policy framework to strengthen the bilateral
Table 5. SWOT framework on the potential of Indo-Nepal trade with reference to Bihar

<table>
<thead>
<tr>
<th>Strength</th>
<th>Weakness</th>
<th>Opportunity</th>
<th>Threat</th>
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<tr>
<td>• Strong historical and cultural ties</td>
<td>• Inadequate government facilitation to leverage cultural ties</td>
<td>• Trade promotion through better facilitation</td>
<td>• Similar trade comparative advantages of India and Nepal</td>
</tr>
<tr>
<td>• Religious and ethnic proximity</td>
<td>• Inadequate transit and transport infrastructure</td>
<td>• Accommodation of informal transaction into mutually helpful formal framework</td>
<td>• Political instability in Nepal</td>
</tr>
<tr>
<td>• Free cross-border mobility of citizens from both sides</td>
<td>• High cost and time involved in custom procedures</td>
<td>• Joint research and development on water resource management</td>
<td>• Conflict of interest on water management</td>
</tr>
<tr>
<td>• Preferential treatment for trade extended by India to Nepal trade</td>
<td>• Lack of intergovernmental coordination</td>
<td>• Bilateral tourism promotion on shared circuit</td>
<td>• Growing hostility in India against exploitation by Nepal of the preferential trade concessions extended by India</td>
</tr>
<tr>
<td>• Trade surplus of India with Nepal</td>
<td>• Policy negligence/ apathy towards mutual promotion of tourism</td>
<td>• Joint promotion of a South Asian tourism network on major tourism circuits</td>
<td>• A few checkposts across long borders</td>
</tr>
<tr>
<td>• Access to water resources</td>
<td>• Poor water resource management</td>
<td></td>
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</tr>
</tbody>
</table>

relationship. They need to rationalize the sensitive agricultural product list. As both countries enjoy the same degree of comparative advantage in the same kinds of products, they need to enhance market access. Unless the complex procedure of trading is simplified, exploiting the trade potential between the two countries will be difficult. A dispute settlement body under the South Asian Free Trade Area needs to be set up. As Nepal is similar to Bihar from a cultural, land and socioeconomic perspective, successful collaboration between the areas will augment the size of the market and benefit both consumers and producers.

To be specific, to package tourist places in South and South-East Asia into a cohesive network, human capital development for tourism services and visa facilitation is highly required. Labour productivity in the South Asian tourism sector is lower than the global average. Hence, there is considerable scope to raise it to international standards. Identification of skill needs of the tourism sector and tailoring the workforce accordingly can benefit both Bihar and Nepal. In addition, investment must be made to improve human capital, to directly provide services in the tourism
sector and to educate the public sector, government and public in general about tourism.

Furthermore, the transit and transport infrastructure between India and Nepal are highly inadequate and the customs clearance process is inefficient. There is an urgent need for a full-fledged integrated customs post with close coordination between custom authorities on both sides of the border. Also connectivity between the two areas needs to be enhanced through better transport and communication and upgrading roads, which are the main mode of transportation between Nepal and Bihar.

Given that water sharing and management is a critical issue pertaining to the relationship between India and Nepal, it may be feasible to work together for sustainable solutions. In this regard, India may take an initiative to develop an information-sharing mechanism with Nepal for disaster preparation and maintenance (Malhotra, 2010). This, in turn, may ensure greater transparency in overall processes and invoke greater cooperation from Nepal. In addition, there is need to engage and work with communities affected by flood and/or displacement on both sides of the border in Bihar and Nepal. This may be another way to take people into confidence and mobilize support on developing a water management strategy. Finally, environment governance is another aspect that the two regions need to address jointly as they share natural and topographical features.
REFERENCES


CONTRIBUTION OF THE URBAN POOR: EVIDENCE FROM CHENNAI, INDIA

Kala Seetharam Sridhar and A.Venugopala Reddy*

In the present paper, evidence is gathered on the contribution of the poor to the city economy, using the case of Chennai in India based on large primary surveys. We find that gender, education level and the salary status of the urban poor have a significant impact on their income. The paper takes into account the contribution made by informal enterprises located in the slums of the city. By aggregating across households and enterprises based on the primary surveys and extending this contribution to all slums in the city, we find that slums, which contain 19 per cent of the population of Chennai, contribute to 14 per cent of the city’s economy. The paper summarizes the policy implications of the research.

JEL Classification: I32, J31, O15, O18.

Key words: Urban poor, cities — India, contribution of urban poor, urban poverty — Chennai.

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I. INTRODUCTION

Given that India is rapidly growing and urbanizing, and that it has more than 7,000 towns, which are going to soon become politically influential and contribute to nearly 65 per cent of gross domestic product (GDP), it is crucial to understand urban poverty in the country. \(^1\) While cities offer opportunities, such as jobs, and the possibility of networking and interactions to the poor, they also induce the conditions within which poverty spreads. On the positive side, it is well known that urban development leading to economic growth (and greater economic growth leading to increased urbanization) increases the income of the poor. Cities have the capability to improve living and working conditions, and to create an environment within which poor people are treated equitably by political and bureaucratic systems. Unfortunately, however, many poor do not benefit from the opportunities offered by cities (www.dfid.gov.uk/Documents/publications/wssd-neg-cochin.pdf).

Throughout the world, urban poverty is rising; in certain countries, the urban poor are growing at a more rapid rate than the rural poor. India is no exception. Urban poverty in India remains high, at roughly 25 per cent, with an estimated 80 million poor people in the cities and towns of India (source: National Sample Survey Organization’s survey report). An example of the magnitude of this problem: 80 million is roughly equal to the population of Egypt. The rising number of poor living in urban areas has resulted in a phenomenon called the “urbanization of poverty”. The scale of the problem in India means that any work done to understand urban poverty and its contribution has implications for an international audience.

Research questions and core research objectives

In the present paper, evidence on the contribution of the urban poor to their urban economies is reported. This information could potentially add strength to their voices in the policymaking process. The paper also attempts to quantify different dimensions of the contribution of the urban poor to the urban economy. Specifically, this paper endeavours to answer the following questions:

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\(^1\) Poverty is defined differently in different countries of the world. The Planning Commission in India defines the number and proportion of population living below the poverty line based on the recommendations of a Taskforce on the Projection of Minimum Needs and Effective Consumption Demands (1979). This Taskforce defines the poverty line as the cost of obtaining an all India consumption basket that meets the following caloric norms: 2,100 calories per person per day in the urban areas and 2,400 calories in the rural areas. These norms translate into 49.09 Indian rupees (Rs) (US$0.77, based on the exchange rate of US$1 = INR63.85, as per the Reserve Bank of India’s website (www.rbi.org.in/) on 19 June 2015) for rural areas and Rs56.64 per capita per month (US$0.89) for urban areas (all in 1973/74 prices). This converts to Rs351.86 per month for rural areas (US$5.5) and Rs547.42 per month for urban areas (US$8.6) as of 2004/05. Available from www.scribd.com/doc/2336001/Measuring-Urban-Poverty-in-India.
1. How do the urban poor contribute to the city’s economy? What is their role in the urban economy’s structure consisting of labour and manufacturing (enterprises in the economy)? Can a value be placed on their service support to the urban middle and upper classes, which enables that group to engage in economic activities that increase the wealth of the city they live in? Are the urban poor primarily entrepreneurial (self-employed) or employed by others. This will help shed light on the contributions low income areas make to the city’s entrepreneurship. This paper also makes an attempt to understand the demographic and income earning characteristics of the urban poor. It examines if the sociodemographic and other characteristics of the urban poor determine their contribution to the city’s economy, society and governance.

2. What is the contribution of the urban poor to savings? Here their investment in their housing and other assets, and impacts on their remittances will be studied.

This paper is organized as follows. First, a literature review to document that this is really unchartered territory is presented. Then, the methodology adopted to perform the research is summarized. Following the description of the methodology, the primary findings from the surveys are summarized. This is done by first presenting the findings from the household surveys, responding to the various hypotheses raised, and then disclosing the regressions, which summarize the determinants of the contribution of the urban poor to the economy. The next section discusses the inequalities between the slum and non-slum economy of Chennai, based on secondary data. Then, the findings from the survey of enterprises are summarized. Following this, a section pulls together the contribution of the urban poor based on the households and the enterprises, after which the final section contains a summary of the policy implications of the research and the conclusion.

II. LITERATURE REVIEW

Two broad approaches have been used in the literature to understand the contribution of the urban poor. In one approach, the poor are viewed at the aggregate, place-based level for their contributions to the urban economy. In this approach, attempts are made to understand the contribution of low income areas (rather than the residents themselves) to the city economy. In the search of the literature, it was found that Frankenhoff (1967) and Ulack (1978) focus on this approach. In another more micro approach, the urban poor (rather than the area where they live) are viewed as contributors to the national economy. More recent literature (for example, Hayami, Dikshit and Mishra, 2006) focuses on this micro approach. Some equate the urban
poor with those in the informal sector. The informal sector is economic activity that is neither taxed nor monitored by a government, and is not included in the country’s gross national product (GNP), as opposed to a formal economy. Although the informal economy is often associated with developing countries — where up to 60 per cent of the labour force (with as much 40 per cent of GDP) work (Miller, 2013), all economic systems contain an informal economy in some proportion. The informal economy in developing countries is diverse; it usually includes small-scale, as well as larger, regular enterprises and occasional members (often street vendors and garbage recyclers).

In addition, during the course of the research, studies that attempt to estimate the contribution of the informal sector to the economy (see Sinha, Sangeeta and Siddiqui, 1999) are reviewed. Against the backdrop and inability of the formal sector to provide adequate employment to job seekers, Olajoke and others (2013) seek to examine the role of urban informal enterprises as an alternative to job provision in the Ibadan cosmopolitan region, and find that a large proportion of respondents agree that it provides jobs, is perceived to increase the income of operators, especially those that engage in it to sustain their livelihood, and prevents youth from indulging in criminal activities. The authors recommend that the government formalize urban informal enterprises by institutionalizing them through proper registration, easy access to loans and other available financial assistance.

Furthermore, generally in India, most of the urban poor are involved in the informal sector activities in which there is constant threat of eviction, removal, confiscation of goods and almost non-existent social security cover. While most informal sector workers are poor, not all urban poor work in the informal sector. Hence, the research is not confined to the informal sector, but it also takes into account all urban poor.

While reviewing the literature, it was noted that empirical evidence regarding the above was quite limited in the context of urban poor in cities of developing countries, such as India. This was what is attempted in this research as the role of the urban poor and low-income areas in urban growth differs substantially between the developed and the developing economies. The India Urban Poverty Report (India, Ministry of Housing and Urban Poverty Alleviation, 2009) is noted, but there are no specific data which point to this. It was also found during the review that in this literature, no data that relate to the contribution made by the urban poor in the cities of India exists. Sridhar and Reddy (2014) estimate the contribution of the urban poor to the city economy of Bengaluru, this paper assesses the same for Chennai.
III. METHODOLOGY

Defining the category of the “urban poor” is not a straightforward task. However, given the limitations of the information available, for this paper, it is assumed that slum dwellers represent the poor of the city. As per Gupta, Arnold and Lhungdim (2009), 63 per cent of the population of Chennai were living outside of the census-designated slums. The challenge is to geographically map such information.

It may be noted that income-based poverty line estimates and targeting of families below the poverty line (BPL), have proved especially controversial (see Vakulabharanam and Motiram, 2012). However, it must be noted that the “poor” are best seen as a highly heterogeneous group, occupying different niches within the urban economy.

It should also be mentioned that this paper does not assess the value addition created by the poor through the provision of certain essential services or by cost savings on activities that the government may have to undertake otherwise, which Hayami, Dikshit and Mishra (2006) estimate. Nor does it follow the methodology of Hayami, Dikshit and Mishra (2006), which assess the reduction in the expenditure of the government of Municipal Corporation of New Delhi, because of the work of ragpickers. Alternatively, this paper assesses the contribution made by the urban poor to the economy of Chennai, using primary surveys of the slum dwellers in the city, utilizing certain unique data sets, which throw light on the city economy’s size and the use of standard national income accounting methods.

Given the limitations of time and budget, Chennai was selected for studying the research questions discussed in this paper. Secondary data on the geographic location of the slums from the Tamil Nadu Slum Clearance Board were gathered. Thus, it should be noted that this paper takes a spatial approach to defining the urban poor. As finding reliable demographic data for each low income area is difficult, data regarding various aspects of the contribution of the urban poor through primary surveys of the urban poor were gathered. The poor families of Chennai constitute 14 per cent of the city’s households (Sridhar and Kashyap, 2014), consistent with the India Urban Poverty Report (India, Ministry of Housing and Urban Poverty Alleviation, 2009), which estimates the percentage of poor in large cities to be 14 per cent, as of 1999/2000. Given the data constraints, a representative group of such

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2 The source of these data is the Chennai Municipal Corporation. This is also the average of three years of data on the BPL families in the city, as a proportion of the number of households estimated for the three years, 2007/08 to 2009/10.
areas in Chennai was sampled to understand their contribution to the urban economies where they are located.

The sample size, based on the assumption of 14 per cent urban poor population in Chennai, with a 10 per cent error or a 90 per cent confidence interval, turns out to be 615. This is based on the following equation (1):

\[
N = \frac{Q}{P} \times \frac{1}{e^2}
\]

where \( P = 14; \ Q = 86; \ e = 0.10; \ N = 614. \)

As 14 per cent urban poor are used in some of the computations to assess their contribution, it turns out that the sample size of 1,200 (of 1,000 households and 200 enterprises) for this study allows for a 0.01 error (or a 99 per cent confidence level).³

Some 1,000 households and 200 enterprises in the slums of Chennai were sampled. If the data using descriptive statistics, namely mean or frequencies, were analysed, then nearly any sample size will suffice. However, given that more in-depth analysis, such as multiple regression, probit analysis, and use city-wide aggregation is being used, a large size sample is needed and hence is envisaged.

**Sampling design**

In Chennai, several areas where the slums are concentrated in the city were selected. A geographically representative sampling, using a map of the slums of Chennai obtained from the Tamil Nadu Slum Clearance Board (TNSCB) was used to sample a subset of the slums and then to select households within those slums. Some 1,000 households and 200 informal enterprises were covered to get a large enough number for doing econometric work as well as to perform city-wide aggregation.

Based on the list obtained from TNSCB, Chennai has 1,677 slums, taking into account notified and non-notified areas. Some 50 slums and 20 households were selected to account for a sample size of 1,000 households, based on a map of the city’s slums we received from TNSCB. To select the 20 households within the selected slums, every fifth house in smaller slums and every tenth house in larger slums using the right hand rule was selected. Also a list of tenements (from TNSCB) made it possible to complete city-wide aggregations.

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³ This was obtained by using equation (1) substituting for \( P = 14, \ Q = 86 \) (which is 1-\( P \)), and 1,200 for \( N \), solving for \( e \).
To cover 200 informal enterprises, four enterprises from each of the 50 selected slums were selected, implicitly taking into account the criterion that different categories of enterprises need to be represented for detailed analysis used to estimate their contribution. In the surveys, a full headcount of all enterprises in the selected slums was carried out to enable extrapolation of the sampled data to all the enterprises in the slums.

**How was the contribution of the slums to the city economy assessed?**

To assess the contribution of the slums to the city’s economy, the factor income approach was applied. This approach is typically used in national income accounting. Based on this method, data on incomes in the slums generated from the household surveys were obtained.\(^4\) The average household monthly gross income was converted into per capita income and annual figures for the slums, based on the number of poor families given in the information from TNSCB. This was then converted to total income for the poor population, based on the average family size from our primary surveys.

Next, information obtained on the average gross profits of enterprises, which they stated after making their income net of salaries, rents and raw material costs was used to compute a total gross profit based on the number of enterprises in each slum, which was obtained simultaneously through a headcount of enterprises in the selected 50 slums. Total enterprise profits for all the slums in the city were computed based on the assumption that the number of enterprises in each slum would be the average of what we found, based on a sample of slums. For the slums that were surveyed for the headcount of enterprises, the actual total number of enterprises that was found there was used. The monthly average gross profits of the enterprises were converted to annual numbers and then were cumulated to represent the contribution of the enterprises.

Furthermore, to estimate the contribution of the slums in relation to the city economy, an estimate of the city economy was needed. For this, the district’s\(^5\) GDP, which is a unique data set published by most of the states (and is available at the Planning Commission’s website: www.planningcommission.nic.in/plans/stateplan/index.php?state=ssphdbody.htm), was used.

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\(^4\) In this, the chief wage earner respondents were asked about their seasonal income, if any, and added that to the permanent income reported. However, only 1 per cent of the respondents reported having seasonal income.

\(^5\) In the case of Chennai, it has already been noted that the district and the metropolitan area is concomitant.
An explanation of how the income of Chennai was computed, is in order. The ratio of the gross district domestic product (GDDP) of Chennai in current prices to the GDDP in constant 1999/2000 prices, both for 2005 and 2006 was used. This provided the price index over 1999/2000 to 2005/06. This ratio was applied to GDDP of Chennai for 2005/06 (in current prices) to arrive at the GDDP of Chennai for 2011/12 in current prices (as the contribution estimates are in current prices for 2011/12). Computed in this way, the GDDP of Chennai in current prices for 2011/12 was obtained. Then, the ratio of the contribution of the slums to the GDDP (in current prices) was used to arrive at the poor’s contribution to the city economy.

Specifically, this paper intends to understand the contribution of the urban poor to the economy. In this attempt, the impact of various sociodemographic and economic characteristics of the urban poor on their ability to contribute to the economy (measured by income) also must be understood. The equations used to understand the impact of various characteristics of the urban poor on their economic contribution, are to be derived from the micro, household-level data gathered through the primary surveys.6

For this study, it had been hypothesized that the economic contributions made by the urban poor may be specified and explained by the following equation:

\[
\text{Income of urban poor resident}_i = a_{0i} + a_{1i} \text{age} + a_{2i} \text{education} + a_{3i} \text{occupation} + a_{4i} \text{migrant status} + a_{5i} \text{dummy for salaried} + a_{6i} \text{social group} + a_{7i} \text{gender} + e_i
\]  

Equation (2) is estimated by ordinary least squares. It should be noted that the data that form the basis for estimating equation (2) are micro, individual level (as denoted by the subscript i in the equations) and are invaluable in enabling our assessment of their contributions.

6 The survey instruments used for households and enterprises are available upon request.

7 SC stands for scheduled caste; ST stands for scheduled tribe.
Hypotheses

All data cannot be captured quantitatively. Qualitatively, certain hypotheses are tested with respect to the role and contribution of the urban poor to the urban and national economy, based on the micro, household-level data. They are as follows:

1. Given the role of the urban poor as domestic and construction workers, it is hypothesized that low income areas contribute to the service sectors rather than manufacturing sectors of the urban economies where they are located. Examination of the occupational distribution of the urban poor reflects the supply of the labour force to the urban centre. In India, the urban poor contribute workers to the civil construction sector, drivers, domestic servants and many of the unskilled labour force of the urban centre. Thus, the low income areas export a product, unskilled and semi-skilled labor services for which there is relatively inelastic demand, whose price tends to be low and are also readily substitutable.

2. Low income areas contribute to the rural economy through their remittances. This hypothesis follows from earlier work on migration from rural to urban areas. Related literature shows that rural-urban or circular migration leads to the sending of remittances to marginalized sending localities, which can be used to invest in human capital or in productive assets in sending localities and can play an important role in reducing vulnerability, improving food security, stimulating land markets in sending areas, increasing local wages and the demand for local goods and services and generally improving the economy (Deshingkar, 2006).

3. The next hypothesis is that the informal enterprises in the low income areas source their funds from internal savings rather than through banks or other financial institutions. It is possible that microcredit is also active in the low income areas. Nobel laureate Mohammad Yunus, the founder of Grameen Bank in Bangladesh and the father of microfinance, reckons that 5 per cent of the bank’s clients exit poverty each year. Yet economists point out that there are surprisingly few credible estimates of the extent to which microcredit actually reduces poverty. Thus, it is assumed that the urban poor contribute to the urban centre through their own savings.

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8 Microcredit involves providing unsecured small loans to poor people in developing countries whom most banks would turn away. Yet, those small borrowers almost always repay their loans (and the fairly steep interest charges) on time, which suggests that they find productive uses for the money. Available from www.economist.com/PrinterFriendly.cfm?story_id=14031284.
4. The urban poor contribute to *public revenues* through payment of property and other taxes, given that there is some value to their dwelling and also because their economic activity might add value that is taxable;

5. The slum dwellers contribute to a *more skilled future labour force* of the urban and national economy as their children are likely to be more educated than them.

Summarizing, the methodology for this study consists of quantitative techniques, such as multiple regression and probit analysis for the city of study, Chennai, based on the rich microlevel data, the extrapolation of the slum-level and enterprise-level data to all slums and the city economy, using standard national income accounting methods combined with qualitative testing of other hypotheses that have been made regarding the contribution of the urban poor to the city's economy.

**Occupational distribution**

The sample consisted of 1,000 households and 200 enterprises in the slums of Chennai. Nearly 85 per cent of the sample of respondents had a secondary education or less. Most (84 per cent) were married. Nearly 40 per cent lived in reinforced cement concrete (RCC) houses, while more than two-thirds (38 per cent) of the respondents were in houses constructed with asbestos or zinc sheets. About one fifth resided in thatched houses.9

Table 1 describes the occupational distribution of the urban poor in the labour force along with their average monthly income. Consistent with the hypothesis, the table confirms that the occupational distribution of the slum dwellers in Chennai is skewed towards services, such as driving, construction work, manual labour and services in private organizations. More than half of the respondents worked in services, such as those mentioned above. Other significant occupations were cooks, domestic work and mechanics. In addition, the average monthly income for those employed in government was the highest (at 13,070 Indian rupees (Rs) ($204)), followed by hospital workers at Rs9,600. About 10 per cent of the respondents reported that their income had increased over the last two years. Almost all (99 per cent) slum dwellers had television sets and one fifth had a two-wheeler. The largest component of the urban poor’s expenditure was on food, followed by rent. Less than one fifth of the respondents borrowed to finance their additional expenditure and those that did, borrowed an average of Rs2,687 a month.

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9 Characteristics on which relevant data were available for non-slum households in Chennai were compared, using secondary data, in a separate section later.
Overall, 39 per cent of the respondents were working within the same slum. The average distance of the work place for the chief wage earner was 7.8 kilometres. While a small proportion (16 per cent) had a two-wheeler, which they used to get to their place of work, more than one third of the respondents reached their place of work by foot. This shows the need for pedestrian-friendly cities, especially for the urban poor, marginalized and the vulnerable. An additional one fourth of respondents took a bus to get to work. Nearly 94 per cent had a mobile phone, which testifies to the ease with which feedback can be solicited on various programmers targeted at them.

Based on the sample, the supply of drivers, cooks, maids and labourers from the slum to the city economy can be estimated consistent with the hypothesis that the slums supply unskilled labour to the city economy. The sample consisted of 1,000 households with an average family size of 3.83, and an average worker size of 1.19 for every family of 3.83 members. Hence, a total population in the labour force of 1,190 (1,000x1.19) is covered. The total number of construction workers, drivers, labourers, domestic workers and cooks in the sample is, respectively, 165, 159, 112, 68 and 28. If it is assumed that there were 165 construction workers for every 1,190 in the city’s labour force, then for the 380,800 poor labour force living in the slums, the total supply of construction workers, drivers, labourers, domestic workers and cooks, respectively, would be 52,800, 50,880, 35,840, 21,760, and 8,960 to the city from the slums.

The hypothesis as to whether or not low income areas contribute to remittances is rejected. This is because a small proportion (10 per cent) of the slums

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number of respondents</th>
<th>Percentage</th>
<th>Standard deviation</th>
<th>Average monthly income (in Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory worker</td>
<td>37</td>
<td>3.7</td>
<td>2 401.2</td>
<td>7 608.1</td>
</tr>
<tr>
<td>Self-employed</td>
<td>140</td>
<td>14.0</td>
<td>4 498.2</td>
<td>8 280.0</td>
</tr>
<tr>
<td>Driver</td>
<td>159</td>
<td>15.9</td>
<td>3 071.3</td>
<td>8 437.1</td>
</tr>
<tr>
<td>Mechanic</td>
<td>43</td>
<td>4.3</td>
<td>3 558.3</td>
<td>8 569.8</td>
</tr>
<tr>
<td>Pensioner</td>
<td>5</td>
<td>0.5</td>
<td>4 324.3</td>
<td>8 800.0</td>
</tr>
<tr>
<td>Private organization</td>
<td>102</td>
<td>10.2</td>
<td>6 540.8</td>
<td>9 553.9</td>
</tr>
<tr>
<td>Hospital worker</td>
<td>5</td>
<td>0.5</td>
<td>4 615.2</td>
<td>9 600.0</td>
</tr>
<tr>
<td>Government service</td>
<td>35</td>
<td>3.5</td>
<td>7 069.1</td>
<td>1 3071.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1 001</strong></td>
<td><strong>100.0</strong></td>
<td><strong>4 087.6</strong></td>
<td><strong>7 874.3</strong></td>
</tr>
</tbody>
</table>
of Chennai is migrant based on the sample. Of them, only 1.2 per cent (12 in actual numbers) were sending remittances to their place of origin, the average amount of the monthly remittance being Rs1,792.

The next hypothesis that the informal enterprises in the low income areas source their funds from \textit{internal savings} rather than through \textit{banks or other financial institutions} is well-founded. Based on the survey of informal enterprises, it appears that while 80 per cent of the enterprises used their own savings to start the enterprise, an additional 18 per cent of enterprises took loans from family, relatives and friends. Only 2 per cent of the surveyed enterprises approached a bank, pawnbroker or a microfinance institution while starting their business.

Taking the next hypothesis that the urban poor contribute to \textit{public revenues} through payment of property taxes, given that there is some value to their dwelling, the results show that 45 per cent of the households that were surveyed in the slums lived in their own dwelling built by themselves. Nearly one third (32 per cent) of property owners paid property tax, the average amount of the property tax being Rs693, with a maximum of Rs6,400 in one case. Sometimes, the property tax they paid for the current year included arrears from previous years. For the 266 payers, the total amount of tax paid was Rs184,327. It was found that the respondents paid on average Rs1,378 to the Tamil Nadu State Marketing Corporation to purchase alcoholic beverages, for a total revenue of Rs705,650, for 1,000 respondents. This is consistent with evidence from a study by Gupta, Arnold and Lhungdim (2009), which indicated that Chennai had the highest rates of alcohol consumption and domestic violence, among the eight large Indian cities that were studied.

While the urban poor may be contributing to the state and local economy through the payment of indirect taxes as well, the respondents were not questioned about indirect taxes as these are included in commodity and service taxes, and are largely sourced out of their income. Including their income as well as these indirect taxes in their contribution to the urban economy would represent double counting.

The other hypothesis is that slum dwellers contribute to a \textit{more skilled future labour force} of the urban and national economy as their children are likely to be more educated than them. The profile of the children of the slum dwellers in the school going age group was examined. On average, one third of the children in the families,
were out of school.\textsuperscript{12} It was found that 48 per cent of children of slum dwellers were going to government schools, whereas 38 per cent were going to private schools. Of those who were going to government schools, most of them (96 per cent) were getting free books, more than two third free uniforms and another one fifth were getting scholarships and midday meals. A majority (95 per cent) of the poor surveyed financed their children’s education through their own savings.\textsuperscript{13} Hence, there is every reason to believe that the slums contribute to a more skilled future labour force of the urban and national economy as their children are likely to be more educated than them.

\textbf{IV. RESULTS FROM ESTIMATION}

Equation (2) was estimated to understand the determinants of the contribution of the urban poor to the economy, as discussed earlier.

Table 2 summarizes the regression from the income regression, which is estimated by ordinary least squares. Gender, education level and the salary status of the respondent were found to have a significant impact on income. Males contribute on average nearly Rs1,900 more per month than their women counterparts. The poor with a higher level of schooling completed, such as primary, secondary, high school, college and so forth, earn about Rs400 more. The salaried poor contribute nearly Rs2,350 more per month than their self-employed or other non-salaried counterparts. The model as a whole explains 11 per cent of income of the urban poor.\textsuperscript{14}

While the regression summarized in table 2 is based on the individual respondent’s earning, table 3 summarizes the household income and expenditure, based on the sample. An attempt was made to reconcile these estimates with other available sources that publish the data.

There are no readily available estimates of income, but other comparable estimates of expenditure based on data from the National Sample Survey Organization exist. Chaudhuri and Gupta (2009), based on the National Sample

\textsuperscript{12} This was the result of computing the proportion of children out of school based on the total number of children who were reported to be going to either a government or private school and the total in the school going age group (6-18 years of age).

\textsuperscript{13} As far as the financing of health needs (may or may not be related to children’s health) is concerned, it was found that nearly (90 per cent) had no health insurance, and a majority depended on their own savings (85 per cent) and loans from relatives and friends for health needs (17 per cent).

\textsuperscript{14} A conceptual framework for the regressions has not been presented as there is a lengthy stream of literature which has estimated such wage equations.
Survey (NSS) sixty-first round survey (2004/05), present a summary mapping, of best and worst districts within each state in terms of average monthly per capita expenditure (MPCE) or poverty (head count ratio (HCR)), to indicate the spatial disparity among the districts within and across the states. They (in table 7 of their report) find that in Chennai (their “best” MPCE district, whose area is actually concomitant with the municipal corporation) the poor’s average MPCE was Rs1,596. We note that while their data were from 2004/05, the primary surveys for this paper were completed in 2012, hence the average MPCE of Rs2,105 we obtain here (total

Table 2. Determinants of income of the urban poor

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>t</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>4 359.20***</td>
<td>707.12</td>
<td>6.16</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>1 902.36***</td>
<td>387.68</td>
<td>4.91</td>
<td>88% (male)</td>
</tr>
<tr>
<td>Age</td>
<td>7.72</td>
<td>11.77</td>
<td>0.66</td>
<td>41 years</td>
</tr>
<tr>
<td>Education</td>
<td>398.81***</td>
<td>56.88</td>
<td>7.01</td>
<td>4 (middle school completed)</td>
</tr>
<tr>
<td>Dummy for salaried versus non-salaried</td>
<td>2 347.34***</td>
<td>474.53</td>
<td>4.95</td>
<td>7% (salaried)</td>
</tr>
<tr>
<td>Caste</td>
<td>-398.61</td>
<td>246.81</td>
<td>-1.62</td>
<td>53% (SC/ST)</td>
</tr>
<tr>
<td>Dummy for migrant</td>
<td>241.60</td>
<td>419.09</td>
<td>0.58</td>
<td>9% (migrant)</td>
</tr>
</tbody>
</table>

Dependent variable: Income of the chief wage earner in the previous month (gross).
Mean: Rs7,904.8.
Number of observations: 999.
Adjusted R-squared: 0.11.

Note: ***Statistically significant at the 1 per cent level.

Table 3. Distribution of household income and expenditure in the slums of Chennai

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Standard deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief wage earner's previous month earning (gross)</td>
<td>7 904.80</td>
<td>1 500</td>
<td>50 000</td>
<td>4 085.66</td>
<td>1 001</td>
</tr>
<tr>
<td>Household’s previous month earning (gross)</td>
<td>9 329.00</td>
<td>1 500</td>
<td>71 000</td>
<td>5 580</td>
<td>1 001</td>
</tr>
<tr>
<td>Household’s previous month expenditure</td>
<td>8 063.83</td>
<td>1 500</td>
<td>35 000</td>
<td>3 554.57</td>
<td>999</td>
</tr>
</tbody>
</table>
monthly household expenditure of Rs8,063.83 reported in table 3, divided by the mean household size of 3.83 members, based on the surveys, is Rs2,105.44), is consistent with the NSS data from 2004/05 reported by Chaudhuri and Gupta (2009).

Based on the estimates of income and expenditure in table 3, the magnitude of savings is determined. This has implications for capital formation in the economy at large. Based on table 3, on average, the household’s savings are roughly Rs1,265.17. This is expected to translate to capital formation in the economy as they become capital in the form of deposits in banks (35 per cent of our respondents said that they had a bank account), chit funds or revolve in self-help groups, and eventually become loans to some other activity. While 25 per cent of our respondents reported that they were saving, based on the stated household income and expenditure, only 7 per cent of the respondents were actually saving! We also computed to find that 75 per cent of the sample had a per capita income of less than or equal to $2 a day, hence they are the genuinely poor.

In the following brief subsection, characteristics on which data were available for the slum and non–slum residents of the city are compared.

**V. INEQUALITIES BETWEEN THE SLUM ECONOMY AND THE NON-SLUM ECONOMY**

The information in this section is necessarily anecdotal and is qualitative. Quantitative data have been presented and compared only for those characteristics for which similar information was available from secondary sources.

With respect to the quality of housing, 22 per cent of the surveyed slum households had thatched houses (deemed to be of poor quality). As per Agarwal (2011), this was 18 per cent (based on data from 2009) for the slum households in Chennai. As per the study by Agarwal (2011), the analogous percentage of households in houses built with poor quality materials in non-slum areas of the city was less than 10 per cent, but was well above 45 per cent in the case of the poorest households.

Gaur, Keshri and Joe (2013) cited some interesting health outcomes with respect to inequalities between the slum economy and the non-slum economy in Chennai. They found that Chennai (along with Hyderabad) showed a high prevalence of overweight women across both slum and non-slum areas. The intensity of income-related inequalities in underweight outcome was much greater for non-slum areas, whereas inequalities in overweight outcomes were higher among slums.
The findings on disparities between the slums, non-slums, the poor living outside of the slums, and in comparison with other studies point towards a need for better counting of the proportion of disadvantaged city dwellers, and more focused efforts to reach the large segment of the urban poor who suffer sharp disparities in terms of various indicators.

Profile of enterprises

On average, there were 25 enterprises in each slum, as described earlier based on a headcount of enterprises. Less than one fifth of the enterprises were headed by women and half of them were owned by the young (up to the age group of 40). Also 88 per cent of them were owned by Hindus, with the remaining equally owned by Muslims and Christians.

A review of the education of the owners of the enterprises indicated that 29 per cent of them had completed middle school and one fifth had completed secondary school; only about 3 per cent were graduates and 2 per cent had an ITI or technical diploma. Surprisingly, about 17 per cent were illiterate. All in all, the findings show that education is not a decisive factor for running microenterprises in the slums.

The profile of the enterprises in the slums as shown in table 6 reveals that about 67 per cent of the enterprises belong to the food (eat-in and take away types), beverages or grocery store related sectors, and slightly less than one third belong to the service sector, such as saloon, tailoring and mobile recharge. The highest average profit per enterprise is in the steel and engineering sector.

<table>
<thead>
<tr>
<th>Industry sector</th>
<th>Number of enterprises</th>
<th>Percentage</th>
<th>Average monthly income from sale (in Rs)</th>
<th>Average surplus earned in a month (in Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>56</td>
<td>28.0</td>
<td>30 526.8</td>
<td>8 098.2</td>
</tr>
<tr>
<td>Groceries</td>
<td>78</td>
<td>39.0</td>
<td>25 464.1</td>
<td>6 331.8</td>
</tr>
<tr>
<td>Service</td>
<td>47</td>
<td>23.5</td>
<td>28 010.6</td>
<td>7 095.7</td>
</tr>
<tr>
<td>Repair work</td>
<td>13</td>
<td>6.5</td>
<td>22 692.3</td>
<td>8 769.2</td>
</tr>
<tr>
<td>Steel and engineering</td>
<td>2</td>
<td>1.0</td>
<td>50 000.0</td>
<td>16 625.0</td>
</tr>
<tr>
<td>Furniture &amp; wood work</td>
<td>2</td>
<td>1.0</td>
<td>57 500.0</td>
<td>10 000.0</td>
</tr>
<tr>
<td>Leather work</td>
<td>2</td>
<td>1.0</td>
<td>45 000.0</td>
<td>14 000.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200</strong></td>
<td><strong>100.0</strong></td>
<td><strong>28 061.0</strong></td>
<td><strong>7 380.7</strong></td>
</tr>
</tbody>
</table>
Three fourths of enterprises in the sample started after 2000, with most of them being individually owned and 3 per cent of them being partnerships. On average, their investment in fixed assets was Rs53,700. About 87 per cent of the enterprises served residents of the same slum, while only 7 per cent served different locations within the city. On average, the daily customers of those enterprises increased from 38 to 78 since the time they started, although 51 per cent said that there were other competitors selling the same products.

Table 7 summarizes income and surplus earned from the sale of the enterprises and their costs in the form of rent, raw material, transport, utilities and the salaries paid. As shown in table 7, the average overall surplus earned by the enterprises after deducting their costs is Rs7,381 per month.

Table 7. Enterprise profits and costs

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Standard deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise income from sales</td>
<td>28 061.0</td>
<td>3 000</td>
<td>150 000</td>
<td>25 525.5</td>
<td>200</td>
</tr>
<tr>
<td>Enterprise overall surplus</td>
<td>7 380.7</td>
<td>-5 000</td>
<td>70 000</td>
<td>6 112.3</td>
<td>200</td>
</tr>
<tr>
<td>Amount spent on rent</td>
<td>2 880.3</td>
<td>200</td>
<td>20 000</td>
<td>2 341.0</td>
<td>94</td>
</tr>
<tr>
<td>Amount spent on raw materials</td>
<td>14 024.1</td>
<td>50</td>
<td>100 000</td>
<td>16 291.6</td>
<td>193</td>
</tr>
<tr>
<td>Amount spent on transport</td>
<td>1 758.9</td>
<td>100</td>
<td>60 000</td>
<td>5 180.7</td>
<td>146</td>
</tr>
<tr>
<td>Amount spent on electricity</td>
<td>1 016.3</td>
<td>100</td>
<td>15 000</td>
<td>1 381.5</td>
<td>142</td>
</tr>
<tr>
<td>Lowest salary paid</td>
<td>4 220.7</td>
<td>1 500</td>
<td>8 000</td>
<td>1 685.4</td>
<td>58</td>
</tr>
<tr>
<td>Highest salary paid</td>
<td>4 737.9</td>
<td>1 500</td>
<td>10 000</td>
<td>1 927.0</td>
<td>58</td>
</tr>
<tr>
<td>Total amount paid as salaries</td>
<td>6 763.8</td>
<td>1 500</td>
<td>35 000</td>
<td>5 620.2</td>
<td>58</td>
</tr>
</tbody>
</table>

One grocery enterprise sampled was running at a loss and three others were breaking even (which indicates hope that the enterprise may turn a profit in the near future). The majority (70 per cent) of the enterprises were self-maintained and operated (by employing themselves and/or immediate members of their family), more than 27 per cent of them employed only one worker (apart from themselves or their immediate family) and 3 per cent of them employed three workers. More than three fourths of the workers in those enterprises were from the same slum. This shows that the enterprises established in the slums are providing job opportunities for the local economy.

On average, the total amount of salary paid was Rs6,764. About 41 per cent of the owners were running the enterprise on their own land, 14 per cent were operating on public land and the remaining were paying rent. The average amount of rent paid
was Rs2,880. On average, the enterprises spent Rs14,024 to purchase raw materials during the previous month.

To start the enterprise, 80 per cent of the enterprises used their own savings. A surprising finding was that few (4 per cent) of the enterprises approached a bank for a loan. Among those who approached a bank (8 out of 200), only one enterprise was granted a loan. The reasons given by the banks for not granting loans were lack of adequate security and lack of evidence of address required as part of their Know Your Customer (KYC) norms. About one third of the operators of the enterprises received some training before they started their business.

More than one fourth of the operators used sources other than banks for taking a loan to run their enterprise. Three fourths of them approached either a moneylender or pawnbroker. A little more than one fifth of them approached friends and relatives. Less than 2 per cent of them approached microfinance institutions for the loans.

About 48 per cent of the enterprises have expanded since they opened, while 11 per cent of have downsized due to lack of demand for their services/products. Of those that expanded, an additional investment was made in 87 per cent of them and in less than one fifth of them, additional jobs were created. Interestingly nearly three fourths of the 200 enterprise owners surveyed were optimistic about the prospects for their enterprise, consistent with the fact that several of them were continuing even though they were just breaking even.

VI. CONTRIBUTION OF THE SLUMS OF CHENNAI TO THE CITY ECONOMY

Using the method described in the section on methodology, the contribution of the households and enterprises to the city’s economy was derived. Using the estimates of TNSCB, the number of slums in the city, estimates of their contribution, taking into account incomes earned by the households, and gross profits (before tax) earned by enterprises (net of salaries paid, raw material costs and rents paid) were made. Assuming that there are 1,677 slums in Chennai, then taking into account the above components, the slums which constitute 19 per cent of the city’s population, contribute 14 per cent to the city economy (the non-agricultural GDDP of Chennai in 15 The population of the Chennai Municipal Corporation, according to the 2011 census is 4,681,087. When taking into account the extended city corporation area (after the merging of surrounding corporations), the city corporation’s area is 6,612,937. The number of poor families in the city as provided by the Tamil Nadu Slum Clearance Board is 320,000. The city’s poor population, based on an assumption of 3.83 members per family (based on the survey), is 1,225,600, and accounts for 18.53 per cent of the city’s population.
current prices for 2011/12 was computed to be Rs302 billion), or Rs41.97 billion (of which Rs38.28 billion is contributed by household income and Rs3.68 billion by enterprises). This indicates that 19 per cent of the city’s population contributes to nearly 14 per cent of the city’s economy, which is not a negligible amount. Table 8 summarizes the contribution made by households and enterprises to the economy of Chennai.

Table 8. Contribution of slums to Chennai’s economy***

<table>
<thead>
<tr>
<th>Number of slums=1 677 (19% of city’s population)</th>
<th>Contribution (in INR)</th>
<th>% to city economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross income</td>
<td>38 283 135 744</td>
<td>12.68</td>
</tr>
<tr>
<td>Value added by enterprises (includes rent)</td>
<td>3 683 736 893</td>
<td>1.22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>41 966 872 637</strong></td>
<td><strong>13.90</strong></td>
</tr>
</tbody>
</table>

Note: ***19 per cent of the city’s population contributes 14 per cent of the city’s economy.

These estimates were compared with estimates for Bengaluru (Sridhar and Reddy, 2014), where it was found that 15 per cent of the city’s poor population contributed to 3-3.5 per cent of the city’s economy. Thus, in Bengaluru, the slum dwellers constituted not only a smaller proportion of the city’s population as compared with Chennai, but they also contributed a significantly smaller proportion to the city economy. There are several reasons for the different findings across these two Indian cities, including:

1. Chennai is smaller than Bengaluru, with a population of 6.6 million (which is the extended area of the Chennai corporation of 429 sq.km after the merger of the surrounding areas into the Chennai corporation limits in September 2011, following the census count), compared with the Bengaluru population of 8.43 million. However, the number of poor people living in Chennai compared with Bengaluru is greater; they constitute 18.53 per cent of the city economy, as compared with 15 per cent in Bengaluru.

2. The non-agricultural GDDP (in current prices) of Chennai, Kanchi and Tiruvallur districts (all of which are part of the extended Chennai corporation)\(^{16}\) for 2005/06 was Rs303 million, as compared with Rs473 million.

\(^{16}\) The total GDDP for Chennai and half of each of the other two districts (Kanchi and Thiruvallur), all in current prices, for 2005/06, were considered.
million for Bengaluru. The smaller number in Chennai could be the result of underreporting, a variable over which the researcher has no direct control. Based on discussions with the Tamil Nadu Directorate of Economics and Statistics a possible explanation for this is that in Chennai, most of the manufacturing that contributes to the city’s GDP is beyond the city corporation boundaries, while in Bengaluru, the high contributors to the city’s GDP, the IT industries, are located very within the city boundaries.

3. In addition, a review of the per capita incomes of Chennai (along with that of Kanchi and Thiruvallur districts, as they are also part of the extended Chennai corporation), and that of Bengaluru showed that the average annual per capita income of the Chennai slums (where surveys were conducted) was Rs31,236 as compared with Rs16,844 for the Bengaluru slums.17 The review of the incomes of the urban poor indicated that there was significant under-reporting of income of the urban poor in Bengaluru in comparison with those in Chennai, for the same occupations (for example, a driver in Bengaluru reportedly earns on average only Rs5,550, whereas a driver in Chennai earns Rs8,437 on average, both based on the surveys). This could be partly due to the fact that the government of Tamil Nadu is quite generous as far as worker salaries are concerned. For instance, a driver in Tamil Nadu who has about 13 years of work experience in government, earns about Rs24,000 a month, based on the surveys, whereas the maximum income of a driver with eight years of experience Bengaluru was only Rs10,000. This is also consistent with the data in the India Labour Report (TeamLease and IIJT, 2009, table B: State wise minimum wages), which shows that minimum wages in Tamil Nadu are Rs91 a day, compared to only Rs88 in Karnataka.

4. The findings indicated that the enterprises contribute to 1.2 per cent of the total contribution of the slums to the city economy in Chennai, as compared with only 0.21 per cent in Bengaluru. Thus, while the majority of the contribution to the city economy is made by households in both the cities, the relative contribution of the enterprises is higher in Chennai.

The findings regarding the contribution made by the poor in the Indian cities to their respective city economies are especially relevant because this group of people tends to undergo a lot of hardships in order to earn their livelihood. Mitra (1992) found at the aggregate macrolevel that, with a rise in the residual absorption of labour in the

17 The average per capita income of Chennai, Kanchi and Thiruvallur districts is Rs40,750, whereas it is Rs69,418 for Bengaluru Urban District.
informal sector activities that generated meagre earnings, the average consumption expenditure per capita pertaining to the urban areas of the states declined and the poverty ratio increased. Mitra (2010) reported that several of the long-duration migrants and the natives of slums still had a low level of well-being measured by low household income and consumption expenditure per capita, high child–woman ratio and low education and health expenditure per capita, taking the cases of several Indian cities — Jaipur, Ludhiana, Mathura and Ujjain.

VII. POLICY IMPLICATIONS

Several policy implications emerge from this research. The first and foremost issue of contention is the identification of the urban poor. This is also consistent with the findings in Paul and others (2012). While information on the type of housing structure was available, the authors still think a reliable indicator of poverty might be expenditure, which is being used by the National Sample Survey Organization (NSSO) of India in their household surveys. The consistency of expenditure with that reported by the NSSO for 2004/05, has been confirmed.

The research indicated that a majority of the slum dwellers were receiving various public services, such as water supply (100 per cent, although it was a public tap for half of them), electricity (83 per cent), street lights (93 per cent), roads (92 per cent), drainage (72 per cent), primary health care centres (24 per cent) and government schools (46 per cent). Public toilets and garbage collection were public services less available in slums where these slums were found wanting, as only 22 per cent had access to public toilets and 13 per cent of slum dwellers had access to garbage collection. In fact, Gupta, Arnold and Lhungdim (2009) found that in Chennai (along with other cities such as Delhi, Mumbai, and Kolkata), not even one out of every four slum households used toilet facilities. This implies that there is great potential for policy to influence and incentivize the entry of private service providers into slums.

Having noted the above regarding various public services, 30 per cent of the slum dwellers were found to have a problem with public services, with half of them being drainage related. In addition, two thirds of them approached someone to resolve the problem, nearly 89 per cent did so collectively, but for most (82 per cent), the problems were not resolved. This indicates that the problem with service delivery is primarily not access, but effectiveness and reliability. Service providers also have to be made more accountable and responsive, as very few agreed that the corporators/councilors have not done anything substantial for the betterment of their locality.
For purposes of this paper, the population was related to enterprises in the slums (200 firms in 50 enterprises were sampled and a headcount was conducted, which indicated that there was an average 25 enterprises per slum) to examine how well the enterprises catered to the needs of the slum population. This showed that there was an enterprise for every 30 persons on average, taking into account the 50 slums in which a full headcount was done.

Another expected finding is that very few poor households had health insurance, with nearly 85 per cent of them financing their health needs out of their own savings. Given the nature of health and emergency needs, it might be too expensive to finance such costs through private means. One possible approach would be to explore health insurance options and if there is any scope for group welfare schemes for the slum dwellers as a whole. Surprisingly, none of the respondents showed any awareness of the Rashtriya Swasthya Bima Yojana (RSBY), a health insurance scheme for below poverty line families, which was launched in 2007. The objective of RSBY, a programme not specifically targeted at urban areas, is to provide insurance coverage for major health shocks that involve hospitalization.

Another surprising finding is that in the survey of enterprises, a very small proportion (less than 1 per cent) had approached a bank for loan. Most (80 per cent) of the enterprises used their own savings or borrowed money (18 per cent) from family, relatives and friends. However, given the usurious nature of such transactions with pawnbrokers, money lenders and microfinance institutions, the complete bankability of urban areas including slums should be seriously considered.

One of the things as it relates to human capital is that roughly 48 per cent of the children in the surveyed households went to government schools, whereas nearly 38 per cent of children went to private schools. While the urban poor households continue to finance their children’s education through their own savings, given the prohibitive costs of private schooling, appropriate investments should be made in government schools, so that the poor can continue to get quality education in government schools.

Finally, given the startling findings in this paper, there may be a case for the Ministry of Housing and Urban Poverty Alleviation, Government of India to replicate this effort in other cities of India in order to not only formulate sustainable policies to support urban poverty reduction, but also to appreciate their contribution to the city and national economies as a whole.
REFERENCES


REGIONAL DISPARITIES IN SRI LANKA:
AN EMPIRICAL ANALYSIS

Deeptha Wijerathna, Jayatilleke S. Bandara, Christine Smith and
Athula Naranpanawa*

To effectively implement the proposed United Nations development agenda beyond 2015, Governments will need to focus on reducing inequality in their national planning strategies. In order to provide an evidence base for such planning in the Sri Lankan context, a systematic and comprehensive analysis on regional inequality is required. The present study begins to undertake this type of analysis using summary sigma convergence statistics, such as the coefficient of variation, the Gini coefficient and mean deviation scores. Regional gross domestic product (GDP) per capita data for the period 1996 to 2011 reveal that inequality with respect to this welfare indicator is considerable. Analysis of trends, over this 16-year period, indicates that while some beta convergence has occurred since 2000, this convergence (both conditional and unconditional) is not statistically significant. Indeed, the results suggest that based on current trends, it will take 15 years to halve the current inequality and about 30 years to achieve a regionally balanced economy. In this context, well-planned regionally inclusive development strategies are needed in order for Sri Lanka to move forward, especially since the current levels of regional disparity are argued by some to have contributed to the civil unrest and conflict that led to a reduction in national economic development over the three decades to 2009.

JEL Classification: O2, O53, R11, R12, R58.

Key words: Economic disparity, regions, inequality, convergence, divergence, Sri Lanka.

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I. INTRODUCTION

Sri Lanka needs to focus on post-war development strategies to get its economy back on track after it was severely affected by a civil war that ended in 2009 following nearly three decades of conflict (Collier, Hoeffler and Rohner, 2009; Wright, 2009). Furthermore, the country also faces the challenge of framing these strategies so that an equitable share of the benefits of economic growth is accessible to all regions and communities. Regionally imbalanced economic growth and regional disparities in the level of well-being is a widely discussed topic. Notably, it is evident in both developing and developed countries (Smith, 2004).

As many authors have highlighted, economic disparities can lead to social unrest and civil conflicts, which, in turn, contribute to the further widening of those disparities (Sen, 1997; World Bank, 2011; Wright, 2009; Vu and others, 2012; Buhaug and Gates, 2002; Buhaug and others, 2011). In its recent turbulent political history, particularly since 1970, Sri Lanka experienced two youth insurrections in the southern part of the country, one in 1971 and the other in the late 1980s, and nearly three decades of civil armed conflict in the northern and eastern provinces. In fact, in the late 1980s the country was involved in two wars, one in the South and another one in the North and the East (Abeyratne, 2004). The catchy slogan Kolambata Kiri Gamata Kekeri (Villagers have only low value cucumber, while people in Colombo enjoy the cream!), which was used by the southern revolutionary youth movement uprising in the late 1980s under the banner of Janatha Vimukthi Peramuna (JVP), provides a good example of civil unrest aroused by regional inequality and lack of economic and employment opportunities in regional economies (Sri Lanka, Presidential Commision of Youth, 1990; Hasbullah and Morrison, 2004; Karnik, 2002; Yeung and Lin, 2003).

Even though the armed struggle of the Liberation Tigers of Tamil Eelam (LTTE), commonly known as the Tamil Tigers, for a separate state in the northern and eastern parts of Sri Lanka is widely viewed as a terrorism problem, regional economic disparities that prevented equitable access to opportunities generated by national economic development following the opening up of the economy in 1977 is often acknowledged to be a major cause of it (Abeyratne, 2004; Grobar and Gnanaselvam, 1993; Arunathilake, Jayasooriya and Kelegama, 2001; Dhananjayan, 2005).

To ensure that post-war economic and political stability continues, the Government of Sri Lanka is implementing a ten year development strategy targeting lagging regions under the banner Mahinda Chintana (Sri Lanka, National Planning Division, 2010). Mahinda Chintana gives priority to investments in infrastructure on the rationale that this type of investment will contribute to the rebalancing of regional economic growth. It also identifies a number of other policy measures to rebalance economic development, emphasizing their contribution to both spatial equity and economic efficiency (World Bank, 2010).
Clear understanding about the current level of economic disparities and the dynamics of those disparities during the past is of key importance in evaluating the impact of Mahinda Chintana and in formulating further development strategies aimed at reducing regional disparities. The number of Sri Lankan-specific studies on this issue is relatively sparse. The main objective of the present paper, therefore, is to conduct a comprehensive and updated empirical analysis on regional disparities even though the regional statistical database to support such analysis is weak in comparison with a number of other countries. The paper also provides a brief review of related theories and global experiences in analysing and mitigating regional disparities.

The present paper is structured as follows. The next section provides a brief overview of stylized facts on regional disparities and possible reasons for such disparities in Sri Lanka. Section three presents a summary of related economic theories and global experience. It also documents previous attempts to analyse regional development disparities in Sri Lanka. The fourth section provides an overview of the methodology employed in this paper to analyse such disparities over the period 1996-2011. The fifth section presents the authors’ empirical findings, and the final section contains concluding remarks and a discussion on some relevant policy implications.

II. SRI LANKAN REGIONS: STYLIZED FACTS

Sri Lanka is a small island in the Indian Ocean, located at the south-eastern part of the southern tip of the Indian subcontinent. It was a British colony from 1815 to 1948 (De Silva, 1981). During that period, the country was geographically divided into nine provinces (see figure 1).

Except for the period 1948 to 1956 during which the colonial open economic policies were continued following independence and a brief episode of partial trade liberalization (from 1965-1970), Sri Lanka had a centralized unitary Government with closed economic policies up to 1977. The right-of-centre Government, led by the United National Party (UNP), which came to power in 1977, opened the economy by introducing a trade liberalization package and undertaking other structural reforms, including privatization. In 1978, the newly elected Government also introduced a new Constitution, making considerable changes to the administrative system. In response to growing regional unrest, especially in the Northern and Eastern provinces and the Indian intervention in 1987, the 13th Amendment to the 1978 Constitution was made to establish provincial councils as a second layer of Government (Leitan, 1990; Sri Lanka, 1987; Marasinghe, 2007).
With the introduction of the provincial council system in 1988, the planning and administrative activities of Sri Lanka were decentralized to a certain extent. Due to variations in natural conditions, resource endowments and sociocultural settings, the production systems and economic conditions also vary across the provinces. According to statistics for 2011, 44 per cent of national GDP is produced in the Western province. This province, which is home to Colombo, the capital city, and serves as the country’s commercial centre, comprises 5.7 per cent of the land area and 28 per cent of the population (see for details, Bandara and Jayasuriya, 2010; World Bank, 2010; Wijerathna, Bandara and Karunagoda, 2013).

The distribution of the land area, population and economic activity across the provinces is given in table 1.

GDP per capita, shown in last two columns of table 1 (in absolute terms and as a share of that of the country), demonstrates the economic dominance of the Western province (with a per capita GDP of 157 per cent of the national average) and the relative weakness of Northern, Uva, North Central and Eastern provinces (which have a GDP per capita of 64, 69, 76 and 76 per cent, respectively). This is consistent with the finding of Bandara and Jayasuriya (2010, p. 12) who argue that “...it is clear that
WP (Western province) differs significantly from other regions: it has much higher per capita income and (a) lower rate of poverty, industry and services dominate the structure of the economy (with agriculture’s share being almost negligible), accounts for most of manufacturing industry in the country (number of establishments, employment and value added), and has better infrastructure facilities (road density, communication facilities and access to financial facilities)."

These regional inequalities can also be observed in other regional economic data published by the Department of Statistics and the Central Bank of Sri Lanka. To date, only a handful of studies have attempted to explain the reasons for the regional disparities in Sri Lanka. For example, Castro and Devarajan (2006, p. 2), argue that market-oriented reforms, such as liberalization of trade, deregulating industry and promoting private investment, have benefited the Western province due to its superior location and infrastructure. Critically reviewing the above simplistic explanation, Bandara and Jayasuriya (2010, p. 213) argue that the historical evolution of policies and political factors created “initial conditions” favourable to the Western province and the nearly three decades of war have created conditions that exacerbate regional disparities. They further argue that the factors that produced the existing distribution

<table>
<thead>
<tr>
<th>Province</th>
<th>Land area (sq.km)</th>
<th>Land share (%)</th>
<th>Population ('000)</th>
<th>Population share (%)</th>
<th>GDP (Rs\textsuperscript{a} billion – nominal prices)</th>
<th>GDP share (%)</th>
<th>GDP per capita (Rs)</th>
<th>GDP per capita relative to the nation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western</td>
<td>3 593</td>
<td>5.7</td>
<td>5 919</td>
<td>28.4</td>
<td>2 905</td>
<td>44.4</td>
<td>490 792</td>
<td>157</td>
</tr>
<tr>
<td>Southern</td>
<td>5 383</td>
<td>8.6</td>
<td>2 519</td>
<td>12.1</td>
<td>727</td>
<td>11.1</td>
<td>288 607</td>
<td>92</td>
</tr>
<tr>
<td>North-Western</td>
<td>7 506</td>
<td>12.0</td>
<td>2 366</td>
<td>11.3</td>
<td>652</td>
<td>10.0</td>
<td>275 571</td>
<td>88</td>
</tr>
<tr>
<td>Central</td>
<td>5 575</td>
<td>8.9</td>
<td>2 719</td>
<td>13.0</td>
<td>644</td>
<td>9.8</td>
<td>236 852</td>
<td>76</td>
</tr>
<tr>
<td>Sabaragamuwa</td>
<td>4 921</td>
<td>7.8</td>
<td>1 962</td>
<td>9.4</td>
<td>406</td>
<td>6.2</td>
<td>206 932</td>
<td>66</td>
</tr>
<tr>
<td>Eastern</td>
<td>9 361</td>
<td>14.9</td>
<td>1 584</td>
<td>7.6</td>
<td>375</td>
<td>5.7</td>
<td>236 742</td>
<td>76</td>
</tr>
<tr>
<td>North Central</td>
<td>9 741</td>
<td>15.5</td>
<td>1 255</td>
<td>6.0</td>
<td>300</td>
<td>4.6</td>
<td>239 044</td>
<td>76</td>
</tr>
<tr>
<td>Uva</td>
<td>8 335</td>
<td>13.3</td>
<td>1 342</td>
<td>6.4</td>
<td>292</td>
<td>4.5</td>
<td>217 586</td>
<td>69</td>
</tr>
<tr>
<td>Northern</td>
<td>8 290</td>
<td>13.2</td>
<td>1 203</td>
<td>5.8</td>
<td>241</td>
<td>3.7</td>
<td>200 333</td>
<td>64</td>
</tr>
<tr>
<td><strong>Total / National</strong></td>
<td><strong>62 705</strong></td>
<td><strong>100.0</strong></td>
<td><strong>20 869</strong></td>
<td><strong>100.0</strong></td>
<td><strong>6 542</strong></td>
<td><strong>100.0</strong></td>
<td><strong>313 479</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Sources: Central Bank of Sri Lanka (2013) and authors’ calculations.

Note: \textsuperscript{a}Sri Lanka rupee, US$1 = Rs 131.25.
of economic activities and the associated infrastructure and institutions have been the main reasons behind the existing regional disparities.

However, as discussed below, the dominance of a national economy by the region that includes the national capital is not unique to Sri Lanka and in fact is not particularly unusual in the context of developing countries. What is more important is the pattern of change in these regional disparities over time and policies adopted to rectify this situation while maintaining a high level of overall national growth.

III. THEORETICAL AND EMPIRICAL EVIDENCE FROM PREVIOUS STUDIES

A number of theories on regional development are used to analyse regional development disparities (UNDP, 2012; Smith, 2004; World Bank, 2009). A review of these theories is important for understanding possible causes for existing problems, as well as for ascertaining the most appropriate ways to overcome these problems.

Development theories of the 1950s and 1960s primarily focused on the material growth associated with the process of modernization (Barca, McCann and Rodriguez-Pose, 2012). According to neoclassical regional growth theories, disparity across regions should not persist as convergence occurs naturally over time through the operation of free market forces. The movement of factors of production across regions in search of greater economic returns and absorption of new technologies from leading regions (by peripheral lagging regions) have been identified as the key factors leading to convergence (Ray, 2007). According to the associated catching-up hypothesis, the rate of growth of per capita income of lagging regions should be inversely related to their initial level of per capita income. In addition to government interventions, which create price distortions, barriers to the free movement of factors of production, such as family ties, links to the land, ethnic loyalties or religious affinities to particular localities, can adversely affect the process of convergence (Fotopoulos, 2012).

As per the endogenous growth theory, the smart use of resources owned by a region can provide the key to its economic success. However, many authors have observed that disparities may persistent due to differences in resource endowment among regions and lagging regions inadequate capacity to benefit from agglomeration in the leading regions (Marques and Soukiazis, 1998; Matsuki and Usami, 2011; Barro and Sala-i-Martin, 1997). Myrdal (1957) argues that while the leading region will have a favourable effect on the other regions due to “spread effects” of trade and modernization of institutions (as discussed above), this will normally be outweighed by adverse backwash effects with movements of factors of
production and other resources favouring the leading region at the expense of the lagging regions.

“New economic geography”, which has evolved as a sub-discipline of both economics and geography, attempts to understand more clearly the causes and dynamics of agglomeration, urbanization, interregional and international trade and factor flows, regional economic growth and other location-specific socioeconomic issues (Sheppard and others, 2004; Krugman, 1990). Krugman (1998) and Fujita, Krugman and Venables (2001) highlight the role of history in shaping the economic geography of a region and discuss factors contributing to changes in the spatial structure of the economy. Recent regional growth and development theories also attempt to analyse the macroeconomic issue of the role of location in development.

As noted previously, few attempts have been made to analyse regional-level disparities within Sri Lanka (Bandara and Jayasuriya, 2010; Gunewardena, 2008; Kakwani, 1988; Karunaratne, 2007; Uduporuwa, 2007). Two of the studies undertaken are based on theories of convergence. Shankar and Shah (2003) have considered the level of regional disparity among Sri Lankan provinces during the period 1990-1995. They have also compared the level of regional disparity in Sri Lanka with both developed and developing countries that have either unitary or federal governing systems. Karunaratne (2007) analyses the provincial disparity of per capita income in Sri Lanka with a sigma convergence analysis that was carried out using the coefficient of variation measure for the period 1998-2003.

The present paper is unique due to three factors. First, it is based on regional GDP data for 16 consecutive years. Most other regional studies that focus on Sri Lanka are based on data for either a short period or a few selected reference years. As the analysis includes the pre and post Sri Lankan civil war eras, the use of data from a relatively long time span is also helpful in understanding the regional development impact of this phenomenon. Second, the present paper uses five established indicators to analyse regional disparity, which is significantly more than the number used for other studies. Third, it also employs an extension of mean deviation analysis to explain the contribution of individual provinces to regional disparity measures and the variation of those contributions over time.

IV. METHODOLOGY

The analysis is mainly based on the well-established regional inequality analysis methods of sigma and beta convergence. However, due to the poor performance of the standard beta convergence regressions given the limitations of the dataset, an alternative approach based on decomposition of mean deviations is employed to assist in understanding the pattern of convergence over time.
Following authors, such as Barro and others (1991), provincial-level per capita GDP, which is denoted as per capita GPDP (gross provincial domestic product) in the rest of the paper, is used for this analysis. Data required for the study were obtained from published and unpublished reports of the Central Bank of Sri Lanka (Central Bank of Sri Lanka, 2002-2013). As published provincial-level GDP data for Sri Lanka are available annually only from 1996, the quantitative analysis is restricted to a period of 16 years starting from 1996.

Sigma convergence analysis is commonly used in cross sectional studies to understand the level of overall economic disparities within countries. Repeated sigma convergence analysis is useful in understanding the variation in such disparities over time. Different authors have come up with alternative inequality measures for analysing the level of sigma convergence (Williamson, 1965; Shankar and Shah, 2003). Since these alternative indicators, with varying complexities, are best used for highlighting different aspects of disparity and convergence, four widely applied indicators are used in the analysis:

**Maximum to minimum ratio (MMR)**

The ratio of maximum and minimum per capita GPDP is the most simple and direct measure or indicator that can be used. In interpreting this measure, the ratio gets closer to one with an equal distribution and further from one with increasing disparity. Though this indicator is easily calculated, it is highly sensitive to the presence of outliers. Furthermore, it does not permit analysis of regions with per capita GPDP values that fall in between the minimum and the maximum.

\[
MMR = \frac{GPDP_{richest\ province}}{GPDP_{poorest\ province}}
\]

**Coefficient of variation (CV)**

Following the work of Williamson (1965), the coefficient of variation is widely used in convergence literature (Smith, 2004). CV is defined as the ratio between the real value of mean per capita GPDP and its standard deviation across the regions. It is essentially a measure of the dispersion of per capita GPDP of each region from their average. Since this is a standardized value, it can be used in comparisons over time or across other countries. It is possible to calculate CV either as a simple or weighted measure in a few different ways. Below are the methods used to calculate weighted and unweighted CV.
Unweighted Coefficient of Variation (CVu)

\[ CV_u = \sqrt{\frac{\sum_{i=1}^{n} (Y_i - \bar{Y}_u)^2}{\bar{Y}_u}} \]

where \( Y_i \) is the per capita GDP of \( i^{th} \) province, \( N \) is the number of provinces and \( \bar{Y}_u \) is the simple average of per capita GDP and it is calculated as:

\[ \bar{Y}_u = \frac{1}{N} \sum_{i=1}^{n} Y_i \]

Some authors, including Williamson (1965), have used national per capita GDP as the denominator in the above equation. Following the convention of Shankar and Shah (2003), an unweighted simple average of per capita GDP is generally considered appropriate. The value of \( CV_u \) varies from 0, for perfectly equal distribution, to \( \sqrt{N - 1} \) for perfectly unequal distribution. One problem with this measure is its sensitivity to outliers. A highly deviated single per capita GDP value can increase the value of \( CV_u \) and provide an incorrect picture in comparisons (either across time or countries). The simple \( CV_u \) is also insensitive to the varying population of the different regions since they are each weighted equally.

Weighted coefficient of variation (CVw)

To overcome possible bias due to varying populations in provinces, an alternative measure of weighted \( CV \) can be calculated. The population weighted coefficient of variation is calculated as:

\[ CV_w = \sqrt{\frac{\sum_{i=1}^{n} (Y_i - \bar{Y})^2 \frac{P_i}{P}}{\bar{Y}}} \]

where \( Y_i \) is the per capita GDP of \( i^{th} \) province, \( \bar{Y} \) is per capita GDP of the nation, \( P_i \) is population of the \( i^{th} \) province and \( P \) is population of the nation. The value of \( CV \) varies from 0, for a perfectly equal distribution, to \( \sqrt{(P - P_i)/P} \) for a perfectly unequal distribution where a single province generates the entire national GDP.
Weighted Gini index ($G_w$)

The Gini index is one of the most widely used indices in analysing inequality among people, households or regions. Following Kakwani and World Bank (1980); Kakwani (1988); Shankar and Shah (2003) the weighted Gini index is calculated as:

$$G_w = \left( \frac{1}{2\bar{Y}} \right) \sum_{i=1}^{n} \sum_{j=1}^{n} |Y_i - Y_j| \frac{P_i P_j}{P^2}$$

where $\bar{Y}$ is the national per capita GDP, $Y_i$ and $Y_j$ are per capita GDP of $i^{th}$ and $j^{th}$ provinces, $P_i$ and $P_j$ are population of $i^{th}$ and $j^{th}$ provinces, $P$ is national population and both $i$ and $j$ represent different provinces. $G_w$ varies from 0 (for a perfectly equal provincial distribution) to $1-(P_i/P)$ (for a perfectly unequal distribution where a single province generates all of the national GDP).

Weighted mean deviation ($MD_w$)

Weighted mean deviation is another measure used by researchers, including Smith (2004), Williamson (1965), Kakwani (1988), and Shankar and Shah (2003). In some studies, this measure is named as the relative mean deviation, such as in Shankar and Shah (2003). Given, however, that it is a summation of the absolute difference between national per capita GDP and per capita GDP of each province, $MD_w$ is applied for the following reasons. First, as it does not require the squaring of mean differences, it is less sensitive to outliers. Second, it is an additively decomposable measure. The following method is used in calculating $MD_w$.

$$MD_w = \left( \sum_{i=1}^{n} \left( |Y_i - \bar{Y}| \frac{P_i}{P} \right) \right) / \bar{Y}$$

where $Y_i$ is the per capita GDP of $i^{th}$ province, $\bar{Y}$ is per capita GDP of the country, $P_i$ is population of $i^{th}$ province, $n$ is the number of provinces and $P$ is population of the country. $MD_w$ has the value of 0 for a perfectly equal distribution and varies up to $2P(n-1)/ P$ for a perfectly unequal distribution.

Many authors have used beta convergence analysis, with cross sectional regressions employed to analyse the rate of convergence during a given time period. As Barro and others (1991) explain, if beta convergence exists among a group of regions or countries, a statistically significant negative relationship should be expected between the initial level of per capita GDP and the corresponding rate of
growth over time. In this study, the use of (conditional and unconditional) beta convergence analysis is explored. However, due in part to the limited number of years of data and the limited number of provinces, it is supplemented with alternative measures aimed at understanding the rate of convergence and the time required for full convergence with the rate of current convergence.

Adopting the method of Smith (2004), the annual regional share \( (R_i) \) of province \( i \) in overall national disparity can be derived by decomposing the weighted mean deviation \((MD_w)\) that was derived earlier:

\[
MD_w = \left( \sum_{i=1}^{n} (|Y_i - \bar{Y}| \frac{P_i}{P}) / \bar{Y} \right)
\]

where definitions for all terms are as above. By decomposing the right hand side of the above equation \((R_i)\) can be calculated as:

\[
R_i = (Y_i - \bar{Y}) \frac{P_i}{P} / \bar{Y}
\]

By substituting the \(R_i\) into the equation for \(MD_w\), absolute mean deviation of the country can be rewritten as an aggregation of weighted mean deviations of individual provinces as follows:

\[
MD_w = \sum_{i=1}^{n} R_i
\]

Furthermore, the percentage contribution of an individual region to the overall weighted mean deviation, which is defined as the regional share of weighted mean deviation \((RSMD_w)\) can be given as:

\[
RSMD_w = \left( \frac{|R_i|}{MD_w} \right) \times 100
\]

While \(RSMD_w\) provides the magnitude of deviation, the sign of \(R_i\) is important in understanding whether the region is contributing to inequality with an income higher or lower than the national mean. While a positive \(R_i\) indicates an upward contribution to inequality with a per capita GPD larger than national per capita GDP, a negative \(R_i\) indicates a downward contribution to the inequality with a per capita GPD less than national per capita GDP.
In addition, the following approach derived from decomposition of mean deviation and its change over time is used, with a particular focus on:

$$\Delta R_i = |R_{it}| - |R_{i(t-1)}|$$

where $R_{it}$ and $R_{i(t-1)}$ are shares of mean deviation of the $i^{th}$ province in time periods $t$ and $t-1$, respectively, and $\Delta R_i$ is the annual absolute change in $i^{th}$ region’s share (contribution) to overall inequality.

If $\Delta R_i$ is negative (positive), that region is contributing to the convergence (divergence) over time. When a region is neither converging nor diverging, the value of $\Delta R_i$ is zero. The magnitude of $\Delta R_i$ is useful in understanding the relative contribution of individual provinces for total convergence (divergence). The rate of convergence of an individual province ($RC_i$) can be given as follows:

$$RC_i = \frac{\Delta R_i}{R_{it}} \cdot 100$$

While the sign $\Delta R_i$ is useful in understanding whether the region is contributing to an overall convergence or divergence, the comparison of $R_{it}$ with $R_{i(t-1)}$ is useful in understanding the direction or nature of convergence or divergence as follows:

- If $R_{it} > R_{i(t-1)}$ and $\Delta R_i$ is negative, it is an upward convergence (UC);
- If $R_{it} > R_{i(t-1)}$ and $\Delta R_i$ is positive, it is an upward divergence (UD);
- If $R_{it} > R_{i(t-1)}$ and $\Delta R_i$ is zero, it is an upward neutral (UN);
- If $R_{it} < R_{i(t-1)}$ and $\Delta R_i$ is negative, it is a downward convergence (DC);
- If $R_{it} < R_{i(t-1)}$ and $\Delta R_i$ is positive, it is a downward divergence (DD);
- If $R_{it} < R_{i(t-1)}$ and $\Delta R_i$ is zero, it is a downward neutral (DN); and
- If $R_{it} = R_{i(t-1)}$ and $\Delta R_i$ is zero, it is an absolute neutral (AN).

Overall convergence (divergence) can happen either with upward convergence (downward divergence) of lagging regions, or with downward convergence (upward divergence) of leading regions or with both of these phenomena. Before concluding the methodology section, it is important to note the limitations of this empirical analysis. As noted in previous studies, the Sri Lankan regional statistical database is weak. As a result, the analysis may be skewed due to data limitations. The quality of empirical analysis is directly related to the quality of the data that are accessible. Provincial-level GDP data for Sri Lanka were available in published form only from 1996. The more comprehensive available provincial-level GDP data include some
values systematically derived from national-level GDP calculations. As a result, the level of accuracy of data in terms of coverage or reporting is unknown. Provincial-level GDP deflators were also not available, and thus the real price calculations are based on available national GDP deflators. This may have led to some incorrect estimation given varying price level changes in different provinces. The population census in Sri Lanka is usually carried out once in every ten years, but none were conducted during the period 1981 to 2001. Hence, most of the annual regional population data used in calculating per capita GDP during this period are estimated values published by the Department of Census and Statistics. Some over- or under-estimation of per capita GDP and GPDP values may have resulted associated with the estimation errors related to population.

It should also be noted that GDP is an imperfect measure of economic welfare, and its use as the focus of our convergence/divergence analysis may need some qualification in subsequent research. Per capita GDP represents income generated in a particular region or province rather than the per capita income actually received by residents of that region. For example, some of the GDP data recorded as being associated with the Northern and Eastern provinces represents expenditure on Sri Lankan armed forces located in those regions for “peacekeeping” purposes. Furthermore, a large proportion of GDP generated in the Western provinces accrues as gross operating surplus (or profits) to multinational corporations based in Colombo and the migrant work force rather than representing income that finds its way into the hands of local residents. Consumption, or household disposable income, is arguably a better measure of economic well-being and subsequent research by the current authors will focus on this measure.

V. RESULTS

The sigma convergence analysis results are presented in table 2 and figure 2. As depicted by the indicators in table 2, Sri Lankan provinces diverged during the period 1996 to 2000 (that is, indicators become larger in absolute size), before starting to converge again with some fluctuations (especially during the period 2000 to 2007). In 2000, the per capita GDP of the wealthiest province is 6.75 times higher than that of the poorest (see column 1 entries). By 2011 the condition has drastically improved such that the wealthiest province had a per capita GDP that is only 2.45 times higher than the poorest one. According to the other indicators, however, the overall disparity among regions only experienced a slight improvement compared to the 1996 situation. As shown in columns 4-6 of table 2 and in figure 2, the three population-weighted indicators \((CV_w, G_w, MD_w)\) behaved in the same pattern over time though the absolute magnitudes of these indicators obviously differ. This pattern comprises
divergence between 1996 and 2000, a brief period of convergence between 2000 and 2001, a period of divergence from 2002 to 2004, followed by a period of convergence (with two minor fluctuations) from 2004 onwards. This convergence has accelerated post 2009, following the end of civil war.

As it is possible to observe a linear trend in convergence from 2000 (see the regression line related to $CV_w$ in figure 2), the rate of convergence is estimated as the mean annual percentage decrease of each of the weighted coefficients.

**Table 2. Sigma convergence observed in Sri Lankan provinces**

<table>
<thead>
<tr>
<th>Year</th>
<th>Max/Min ratio (MMR)</th>
<th>Simple coefficient of variation ($CV_u$)</th>
<th>Weighted coefficient of variation ($CV_w$)</th>
<th>Weighted Gini index ($G_w$)</th>
<th>Weighted mean deviation ($MD_w$)</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

**Source:** Authors' calculations based on data from the Central Bank of Sri Lanka.
As table 3 shows, sigma convergence among Sri Lankan regions is taking place at an average rate of 3.01 to 3.59 per cent from year 2000. If the country can maintain this rate for another 14 to 17 years, it may be able to halve its regional disparity and have a regionally balanced situation in about another 30 years.

**Table 3. Rate of convergence**

<table>
<thead>
<tr>
<th></th>
<th>Weighted coefficient of variation</th>
<th>Weighted Gini index</th>
<th>Weighted mean deviation</th>
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<td>Average annual % convergence (2000-2011)</td>
<td>3.22%</td>
<td>3.59%</td>
<td>3.01%</td>
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<td>Time for full convergence</td>
<td>31.00</td>
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Source: Authors’ calculations.
All of the above indicators provide some understanding about the overall level of provincial disparity in per capita GDP distribution, but they fail to offer insights into the situation of individual provinces. Provinces can contribute to the disparity in per capita GDP values by being either higher or lower than the national average. Figure 3, based on normalized regional per capita GDP, is important in depicting the behaviour of the regional economies relative to the country over time.

**Figure 3. Temporal variation in regional per capita GDP (with respective to national average)**

![Graphs by province](image)

<table>
<thead>
<tr>
<th>Year</th>
<th>Western</th>
<th>Southern</th>
<th>Sabaragamuwa</th>
<th>Central</th>
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<th>Eastern</th>
<th>North-Western</th>
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</table>

**Source:** Authors’ calculations.

In the case of Sri Lanka, a single province (Western province) is leading the economy and standing well above the national average. The Southern and North-Western provinces have maintained a level that is below but close to the national average, while the level for the Northern province has consistently stayed well below the national average. As for the other five provinces, although the level has remained below the national average, Sabaragamuwa and Uva provinces have exhibited slight divergence relative to the national average over time.
Figure 3 provides some idea about the nature of disparity by individual provinces, while table 4 shows the percentage of contributions of each region to national disparity based on the $MD_w$ measure.

### Table 4. Regional contribution to the inequality

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<tr>
<th>Year</th>
<th>Western</th>
<th>Southern</th>
<th>Sabaragamuwa</th>
<th>Central</th>
<th>Uva</th>
<th>Eastern</th>
<th>North-Western</th>
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*Source:* Authors’ calculations.

The level of inequality among regions varies over the specified time. While the leading Western region is contributing to 50 per cent inequality with an upward deviation, other regions are contributing to 50 per cent of the downward deviation, with different rates that change over the time. This variation is due to the different rates of growth of the regions. For example, the Southern province contributed to 11 per cent of the downward deviation in 1997 and only 3 per cent in 2011. The Northern and North Central provinces also experienced significant declines in their contribution towards downward deviation between 1997 and 2011, falling from 13 to 6 per cent and from 6 to 4 per cent, respectively. In contrast, Sabaragamuwa province experienced an increase in its contribution to the downward deviation from 5 to 10 per cent over this same time period. The contribution also increased in the Central, Uva and North Western provinces. As Barro and others (1991) explain, if beta convergence exists among a group of regions or countries, a negative relationship is likely to exist between the initial level of per capita GPD and the corresponding rate of growth over time. In figure 4, average growth rate of per capita GDP of individual
provinces is plotted against their corresponding initial values. As expected, the trend line has a negative slope, which provides evidence of beta convergence in the Sri Lankan case during the analytical period 1996 to 2011.

The study employed the standard regression equations used in the literature to test for both unconditional and conditional convergence (see Rodrik, 2011 for a detailed description of this methodology). Unfortunately, no statistically significant convergence was found. Perhaps this was a result of not being able to find a version of the two types of regression equations that explained more than 10 per cent of the overall variance in our data. The study only had 16 time periods to include in our panel and a limited number of explanatory variables available for each of the nine provinces on an annual basis.

Under these circumstances, the study employed an approach derived from decomposing the mean deviation and its change over time to explore further the nature of convergence and divergence behaviour at the provincial level. In particular, it focused on the following indicator:

$$\Delta R_i = |R_i| - |R_{i(t-1)}|$$
where $R_t$ and $R_{{t-1}}$ are shares of mean deviation of the $i^{th}$ province in time periods $t$ and $t-1$ respectively, and $\Delta R_i$ is the annual absolute change in $i^{th}$ region’s share (contribution) to overall inequality.

If $\Delta R_i$ is negative (positive), that region is contributing to the convergence (divergence) over time. When a region is neither converging nor diverging, the value of $\Delta R_i$ is zero. The magnitude of $\Delta R_i$ is useful in understanding the relative contribution of individual provinces for total convergence (divergence). The rate of convergence of an individual province ($RC_i$) can be given as follows:

$$RC_i = \frac{\Delta R_i}{R_{i(t)}}$$

The sign of $\Delta R_i$ is useful in understanding whether the region is contributing to an overall convergence or divergence while the comparison of $R_t$ with $R_{{t-1}}$ is useful in understanding the direction or nature of convergence or divergence. Table 4 provides a summary of the diverging and converging pattern of different provinces over the time period. The nature of the divergence given in this table is derived as follows:

- If $R_{it} > R_{i(t-1)}$ and $\Delta R_i$ is negative, it is an upward conver gence (UC);
- If $R_{it} > R_{i(t-1)}$ and $\Delta R_i$ is positive, it is an upward diver gence (UD);
- If $R_{it} > R_{i(t-1)}$ and $\Delta R_i$ is zero, it is an upward neutral (UN);
- If $R_{it} < R_{i(t-1)}$ and $\Delta R_i$ is negative, it is a downward conver gence (DC);
- If $R_{it} < R_{i(t-1)}$ and $\Delta R_i$ is positive, it is a downward diver gence (DD);
- If $R_{it} < R_{i(t-1)}$ and $\Delta R_i$ is zero, it is a downward neutral (DN);
- If $R_{it} = R_{i(t-1)}$ and $\Delta R_i$ is zero, it is an absolute neutral (AN).

Overall, convergence (divergence) can happen either with upward convergence (downward divergence) of lagging regions, or with downward convergence (upward divergence) of leading regions or with both of these phenomena. Table 5 is important in providing an overall understanding of the converging behaviour of each of the Sri Lankan provinces. Figure 5 depicts graphically the variation of normalized provincial-level per capita GDP over time.

As the analytical results depicted in table 5 and figure 5 indicate that the Sri Lankan convergence pattern is consistently driven by the behaviour of the leading Western region. During the period 1996-2000, the Western province contributed towards the overall national divergence with an upward divergence in the region. During that period, the North-Western and Southern regions each depict a converging behaviour and the other provinces display some diverging behaviour. Since 2004, the
Table 5. Regional contribution to the convergence

(Percentage)

<table>
<thead>
<tr>
<th>Period</th>
<th>Western</th>
<th>Southern</th>
<th>Sabaragamuwa</th>
<th>Central</th>
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</table>

Source: Authors’ calculations.

Rate refer to the corresponding provincial rate of convergence.
Southern province has contributed to overall convergence with its high rate of upward convergence. Only in 2008 and 2009, a slight diverging behaviour can be observed.

Even though the North-Western region also started to converge during the same period, it contributed to divergence during 2008 and 2010. The Eastern province contributed to convergence for five consecutive years starting from 2005.

Figure 5. Normalized GPDP (of lagging provinces)

Source: Authors’ calculations.

Note: PGDP – per capita GDP.
The Northern province also contributed to convergence in each of the last five years. The above results are consistent with the targeted infrastructure development programmes initiated by the Government under Mahinda Chintana. The two lagging regions of Uva and Sabaragamuwa mostly contributed to divergence during the entire analytical period.

V. CONCLUDING REMARKS AND POLICY IMPLICATIONS

Based on the analysis and insights from previous studies, we can derive the following set of conclusions. Economic conditions in Sri Lankan provinces are not equally distributed geographically and a considerable level of inequality has persevered over time. The disparity between provinces is visible both in the contribution that they are making to the national GDP and also in terms of value addition per head (in the province) or per capita GPDP. Variation in per capita GPDP is not as high as that of the provincial GDP due to comparatively high population density in the leading region.

All three weighted indicators \( (CV_w, G_w, MD_w) \) calculated to understand sigma convergence (in terms of per capita GPDP) show similar patterns of temporal variation. Though the magnitudes of indicators are not comparable, any of them can be used in analysing temporal variation of convergence behaviour. Sri Lankan provinces diverged during the period 1996-2000. Since 2000, there has been a declining trend in inequality, albeit with some temporary fluctuations for particular regions. Some fluctuations in the pattern of convergence are coincident with changes in political conditions and the prevailing armed conflict at the time. For example in 2009, at the peak of civil war, there is divergence. A clear convergence is visible after the conclusion of the war. This is a positive sign. Moreover, the average rate of convergence observed with our three weighted indices \( (CV_w, G_w, MD_w) \) during the period 2000-2012 varies from 3.3 to 4.1 per cent, and is almost twice as the average rate of 2 per cent of beta convergence observed by Barro and Sala-i-Martin (1997) with data of the United States of America. Furthermore, the current pattern of convergence observed in per capita GPDP is associated with recent rural road development projects and other post-war reconstruction projects initiated by the national government. Variations in industrial structure, natural resources endowment, the quality of human resources, available technology, and level of infrastructure conditions are the other main reasons for varying economic conditions in the provinces.

If the average rate of convergence prevailing in the period 2000-2012 continues linearly, Sri Lanka may be able to halve its current level of inter-provincial disparity in 16 years and eliminate the asymmetry in about 30 years. In saying this, however, it
must be recognized that there is no guarantee about continuity of convergence even with the maintenance of current policy settings. Policies suggested in literature on enhancing regional development fall into two main categories. Development policies designed without explicit consideration to space are designated “place-neutral” or spatially blind policies. Those policies are targeted at maximizing national economic growth and efficiency while improving the lives of individuals wherever they live or work, although not necessarily in an equitable manner. While some development practitioners and reports, including the World Development Report 2009, support this approach, some authors, such as Barca (2009); Barca, McCann and Rodríguez-Pose (2012), highlight the importance of spatially targeted or “place-based” development policies. The place-based approach suggests the need to focus on area-specific development policies that consider the social, cultural and institutional characteristics, as well as the natural and capital resource endowment of the geographical context (Pike, Pose and Tomaney, 2006; OECD, 2009a; 2009b). Development policy within this context seeks to target lagging regions for enhanced levels of economic growth even if it is at the expense of some loss in overall national growth.

In this context, recent Sri Lankan policy interventions involving targeted public investments in lagging regions are important towards achieving a higher level of convergence in regional per capita GDP over time. However, given the current emphasis on public-private partnerships to spread the public investment dollar further, the provision of incentives for private sector firms to establish operations in lagging regions is also required. Even if the focus is concentrated on public investments as a vehicle for achieving regionally balanced growth moving forward, there is an urgent need to develop a policy analysis tool, such as a bottom-up multiregional computable general equilibrium model, to guide the selection of the most appropriate set of interventions (both place-based and place-neutral). The authors are currently involved in development of such a policy analysis tool for Sri Lanka.
REFERENCES


THE CHALLENGE OF BETEL NUT CONSUMPTION TO ECONOMIC DEVELOPMENT: A CASE OF HONIARA, SOLOMON ISLANDS

Stephen Pratt*

The chewing of betel nut is prevalent throughout the Asia-Pacific region, especially in the Pacific subregion. Consumed for its stimulant properties, there is concern over this habit’s association with negative health consequences. The present study examines the case of Honiara in Solomon Islands where the prevalence of betel nut consumption has increased in recent years, especially among schoolchildren. The potential negative health costs and increasing proportion of household income used to sustain this habit has a negative impact on economic development. Possible solutions are suggested to curb betel nut consumption, but they are fraught with difficulties and barriers to change. A major culture change is needed to stem this rising trend.

JEL Classification: I15, E26, O17.

Key words: Areca, betel nut, economic development, Pacific islands, Solomon Islands, oral health.

I. INTRODUCTION

In 1999, as many as 200 million people chewed betel nut (Areca catechu) regularly in the Asia-Pacific region (Chen, Johnson and Taufu, 1999). People chew betel nut because it is a stimulant that produces a mild psychoactive effect. This feeling of “drunkenness” or euphoria is addictive. Betel nut use is widespread, affecting approximately 20 per cent of the world’s population (Warnakulasuriya, 2002). The chewing of betel nut is especially prevalent in the Pacific islands. In fact, betel nut

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consumption in Papua New Guinea is more widespread than drinking alcohol, smoking tobacco or consuming caffeine (Chen, Johnson and Taufu, 1999). In Solomon Islands, data from 2005-2006, indicated that the prevalence of betel nut chewing was 62.5 per cent of the population (World Health Organization, 2010). There is anecdotal evidence that this figure has increased.

The “betel nut quid” is actually comprised of three parts: the areca nut (Areca catechu) from the betel palm; the leaf, bean or the bark from the betel vine (Piper betle); and the slaked lime (calcium hydroxide) from coral or shells (Norton, 1998). When chewed together, the quid produces a blood-red colour. This red juice stains the teeth and gums and after many years of use, the teeth of the chewer can become black (Norton, 1998). The quid is placed in the mouth. It is then held against the inside of the mouth and the molars and chewed episodically to extract the juice (Winstock, 2002).

Betel nuts are ovoid with a pointed apex usually three to five centimetres long and two to four centimetres wide (World Health Organization, 2004). The preparation of the betel quid differs by location. In Solomon Islands, the fibrous husk of the young nut is ripped off with the teeth and the nut is chewed, while the betel leaf is dipped in the lime, bitten off and chewed in unison with the nut (Norton, 1998). Lime powder is used to enhance the stimulant effect of the betel nut. The saliva and lime powder breaks down the arecoline, the acid-based alkaloid found in the areca nut, to produce the central nervous stimulant (Norton, 1998).

Much research exists on the harmful health effects of betel nut consumption (Zhang and Reichart, 2007), of which most of it has been epidemiological, with less attention directed at the socioeconomic impacts of it (Croucher and Islam, 2002; Williams and others, 2002). The present paper provides an updated examination into betel nut consumption in Honiara, the capital of Solomon Islands, as previous studies are somewhat dated (Wilson and South Pacific Commission, 1983; World Health Organization, 2010). It also discusses the possible negative effects of betel nut consumption in terms of health costs and diversion of income towards betel nut and away from basic necessities and provides a comparison of these with the possible positive impacts in terms of household income from growing, transporting and selling betel nut. Using intercept surveys conducted among 259 adults and 102 schoolchildren based in Honiara, this research seeks to determine the prevalence of betel nut chewing among those two cohorts. It reveals the main motivations for chewing betel nut and the perceived effects that chewers experience. Other data on chewing behaviour, such as frequency and length of chewing and intention to quit are also captured. Among non-consumers, the research captures the main reasons for not partaking in betel nut consumption. Additionally, in-depth interviews were held with medical practitioners in Honiara to understand the frequency and types of
medical problems specifically associated with betel nut consumption in the capital city. The paper then concludes by critically evaluating a range of recommendations to minimize the negative impacts of betel nut consumption that may hinder economic development in the island State.

II. HEALTH IMPACTS OF BETEL NUT

Betel nut consumption affects the body by stimulating the nervous system and dilating blood vessels. The physical effects from chewing betel nut include increased heart rate and sweating. Betel nut consumption also aids digestion and the absorption of food by increasing the muscular activity in the intestines. In developing countries, there is evidence that some people chew betel nut to suppress their appetite. Low-income betel nut chewers may satiate their appetites through betel nut to avoid buying food. The “attraction” of chewing betel nut is that it produces a psycho-stimulating and euphoria-inducing effect for the consumer. The majority of chewers experience those effects within five minutes and the experience lasts for approximately two to three hours (Chu, 1993). Guha (2006) argues that betel leaf has been used to treat various ailments, such as halitosis, boils and abscesses, constipation, headaches, itches, mastitis, conjunctivitis, ringworm and rheumatism. Reported health impacts differ between cultures. Reid (1985) reports that betel nut consumption has allegedly prevented burping after meals, diarrhoea, dysentery and scurvy. In some societies, it is reported to aid menstruation. It can increase the capacity for physical exercise and mental sharpness, lessen fatigability and provide a sense of well-being (Deng and others, 2001; Guha, 2006; Hirsch, 1990; Williams and others, 2002). It is also reported to be an aphrodisiac (Williams and others, 2002).

Betel nut has long been used in Chinese medicine, primarily to rid parasites, such as roundworms and tapeworms, in the intestinal tract (Reid, 1985; Zhang and Reichart, 2007). However, because of its addictive nature, chronic daily use often occurs as users attempt to avoid withdrawal symptoms (Gupta and Warnakulasuriya, 2002).

In contrast to the reported positive health impacts, betel nut consumption has been proven to cause oral cancer and cancer of the oesophagus. Other research has shown that betel nut consumption leads to asthma (Taylor and others, 1992) and cancer of the pharynx (Lee and others, 2005). There is evidence that it provides a low level of toxicity in chewers (Deng and others, 2001) and can have adverse effects on newborns of chronic betel nut users (López-Vilchez and others, 2006; Senn and others, 2009). Tests done on betel quid chewers show that they tend to have higher blood pressure than non-users and suffer from hypertension (Heck and others, 2012). The spitting of betel nut juice indiscriminately in public places helps transmit and spread respiratory infections (Williams and others, 2002).
III. THE SOCIOECONOMIC IMPACTS OF BETEL NUT

The consumption of betel nut can have profound sociocultural and economic impacts on an economy. Users start relatively early in life in the Federated States of Micronesia, 12 years was the mean age of initiation and those school-aged children had already reported symptoms of poor oral health (Oakley, Demaine and Warnakulasuriya, 2005). Betel nut usage is also highly associated with the chewing of tobacco (World Health Organization, 2012). This can compound the negative health effects of betel nut consumption. In developing countries, costs associated with betel-nut related illnesses have the potential to drain public funds.

Income spent on betel nut among populations in developing countries can divert funds away from basic necessities. These basic necessities, such as electricity and water, may already be too expensive for some households or in limited supply due to poor infrastructure. Thus, household expenditure on betel nut can contribute to an even poorer standard of living. The World Bank (2014a) notes that Solomon Islands currently has one of the lowest rates of electricity access in the world and some of the highest electricity prices (greater than $0.80 per kWh). In Honiara, which accounts for about 90 per cent of the country’s electricity generation and consumption, only 64 per cent of the households are grid connected. In terms of access to water, in 2011, the World Bank reported that only 79.2 per cent of the Solomon Island population had access to improved sources of water (World Bank, 2014b). Maebuta and Maebuta (2009) found that households in Solomon Island squatter settlements spend an average of 8.4 per cent of their annual income on betel nut. In this same study, 96.6 per cent did not have electricity and 92.3 per cent had no water supply to their home, often because those services were too expensive. School fees were perceived to be too high, and, as a result, squatter households could not afford to send their children to school (Maebuta and Maebuta, 2009).

In Papua New Guinea, Gibson (2000b) found that the average share of total expenditure spent on betel nut was 3.66 per cent for rural households and 2.09 per cent for urban households. Gibson notes that, along with fish, banana, and sweet potato, betel nut is one of the most important locally produced items in the diets of people from Papua New Guineans.

The chewing of betel nut also has cultural implications. The mild psychic and euphoric effect can aid the reconciliation process of negotiation among disagreeing tribes. Betel nut consumption is closely linked with speechmaking, authority and politics in Papua New Guinea (Hirsch, 1990). At times, it has been used for healing, gifts and cementing relationships, and as a welcome offering (Chen, Johnson and Taufu, 1999). It has symbolic significance in many cultures and is consumed when paying homage, recognizing courtships, betrothals and marriages and at funerals and
ancestral remembrances (Guha, 2006; Malinowski, 1921; Norton, 1998; Reid, 1985; Sharp, 2013; Williams and others, 2002).

The production and sale of betel nut can provide an essential source of income for many households in countries where it is consumed. Often, betel nut sellers, who are outside the formal economy, have few other economic alternatives to generate income. Income from betel nut sales go directly towards school fees, food, medicine and other everyday household requirements. A recent study from Solomon Islands estimated that 43.6 per cent of all households grew betel nut as a cash crop in 2009 (Solomon Islands, 2009). Previous estimates were somewhat lower, with 17 per cent of households in 1986 and 30 per cent of households in 1999 reporting that they grew betel nut as a cash crop. The reasons for this growth may include the increased demand for betel nut consumption and/or the monetization of what was once a largely subsistence activity. Yet, in 2009, in the urban centre of Honiara, only 1.1 per cent of households grew betel nut.

Increasing urbanization may be contributing to the increased demand for betel nut, as betel nut cannot be grown in sufficient quantity in urban areas. Solomon Islands (2009) reports that, while the rural population grew from 1970 to 2009 by an average of 5.2 per cent per annum, the population of Honiara province grew by an annual average of 11.2 per cent. This growth in the urban population may indicate that Solomon Islanders who previously grew their own betel nut on their property in the rural areas may now need to purchase the product while residing in Honiara.

While those in Honiara do not directly benefit from the production of betel nut, many residents generate income as a “middleman” between betel nut farmers and end consumers. Betel nut is widely available, with small sellers being found in many locations, as well as in specified markets (Solomon Islands, 2009). Many roadside makeshift stalls sell betel nut, the fruit leaf and lime along with single cigarettes. A recent report (World Health Organization, 2010) estimates that in Solomon Islands, a betel nut seller could earn up to $63.49 per day.

Elsewhere in the Pacific subregion, Gibson (2000a) reported that an estimated 1.23 million people received income from betel nut in Papua New Guinea in 1996. This represented 25.4 per cent of the population at that time. The economic value of this betel nut income was $7.094 million, or 9.5 per cent of the total national income from agricultural products.

Previous research has found that betel nut consumption in Solomon Islands is common at all levels of society, with most islanders having chewed betel nut at some time in their life (Wilson and South Pacific Commission, 1983). More than 50 per cent of adults were estimated to have chewed betel nut at least once a week. Both women
and men were as likely to chew betel, but men had a lower age of initiation and were heavier users. Young children commonly chew the betel nut husk then progress to chewing betel nut. The regular chewing of betel quid was not commonly observed before puberty (Wilson and South Pacific Commission, 1983).

In Bangladesh (Heck and others, 2012) and in Taiwan Province of China (Ko and others, 1992), researchers found a negative relationship between betel nut consumption and education level and employment. With regard to Indonesia, Reid (1985) says that males have switched to tobacco smoking while females have not embraced tobacco smoking to the same extent. Rural communities consume more betel nut than urban communities.

This brief review outlines some of the literature on the health and socioeconomic impacts that betel nut consumption and production can have on an economy. The focus of the review has been on literature in the context of the Pacific subregion.

IV. METHODOLOGY

The research undertaken in the present study contains three categories of respondents: Solomon Island adults, schoolchildren and health personnel. The research among the Solomon Island adult cohort used a convenience sample in and around Honiara. The two-page survey instrument was derived from the extensive literature review cited above. The survey instrument captured prevalence of betel nut chewing, the main motivations for chewing and the perceived effects that chewers experience. Frequency of consumption and average length of chewing of each betel nut, age of the respondent when first started chewing, and intention to quit are all also asked in the questionnaire. Chewers were also asked how much they spent on the three components of the quid: the betel nut, the leaf and the lime. Among non-chewers, the research captured the main reasons for not partaking in betel nut consumption. Demographic questions included age, gender, level of education, home province and employment status. For the research, SPSS version 20 was used to analyse the data.

A total of 259 surveys among Solomon Island adults were completed in June 2014. The profile of the sample closely matched the population profile. The gender split was 53.4 per cent/46.6 per cent male/female, while the age breakdown was 18.3 per cent: 18-24 years; 43.3 per cent: 25-34 years; 19.9 per cent: 35-44 years; 10.6 per cent: 45-54 years; 4.8 per cent: 55-64 years; and 3.0 per cent: 65 years or older.
The research among Solomon Island schoolchildren was conducted in June 2014. The survey instrument was adapted from Oakley, Demaine and Warnakulasuriya (2005), which was a one-page questionnaire that captured data on prevalence and frequency of betel nut, alcohol and tobacco consumption, as well as on awareness of the harmful effects of betel nut consumption. One hundred and two schoolchildren were interviewed across seven different schools in and around the Honiara area. The selection of schoolchildren came from King George Sixth High School, Bokona Community High School, Saint John Community High School, Saint Nicolas Community High School, Honiara Senior Secondary School, Panatina Community High School and Bishop Epalle High School. There was a relatively even split by gender (53.9 per cent male). The age of the schoolchildren ranged from 13 years to 21 years, with 48 per cent of the sample aged 16 years or younger.

The health personnel survey was conducted among health professionals, including dentists, medical doctors and registered nurses. Twenty health professionals were approached in July 2014 to complete the survey. Ten health professionals agreed to respond to the in-person interview. Six respondents were male. Five respondents were doctors, with the remaining five being nurses. The level of experience of those health professions ranged from 1 year to 23 years, with an average of 13 years in practice. Six respondents practised at the National Referral Hospital, another three practised at Honiara City Council clinics and one was a single private medical centre doctor. These health professionals were asked how many patients they see with medical problems specifically associated with betel nut consumption and how many other patients they see with other medical issues that have symptoms of betel nut consumption. For those patients who specifically seek medical attention as a result of betel nut consumption, the symptoms they experienced were sought. Lastly, these health professionals were asked if they had advised patients to stop chewing betel nut.

The author also tried to obtain detailed information on the costs associated with treating betel nut induced health problems. However, those costs could not be retrieved from the National Pharmacy Division nor the Planning and Finance Division of Ministry of Health.

V. FINDINGS

Adults

This research revealed that 81.0 per cent of the respondents chewed betel nut. This number was significantly higher than the prevalence of betel nut consumption found in earlier studies. While not directly comparable, the World Health Organization
(2010) estimated the prevalence of betel nut consumption across three districts: Honiara, Western Province and Malaita, at 62.6 per cent in 2006 (67.8 per cent of men and 57.3 per cent of women). Unfortunately, the World Health Organization report did not separate prevalence by province. Unlike Wilson and South Pacific Commission (1983), both women and men were as likely to chew betel. Those from Malaita province were statistically significantly more likely to chew betel nut than Solomon Islanders whose home province is Guadacanal Province (86.4 per cent versus 66.1 per cent).

As found by Heck and others (2012) in Bangladesh and Ko and others (1992) in Taiwan Province of China, there was a negative relationship between betel nut consumption and education level (Table 1). In this study, 69.6 per cent of those with tertiary education consumed betel nut compared to 89.7 per cent without tertiary education. In terms of frequency, 73.0 per cent of those who chew partook every day while a further 12.9 per cent chewed at least once a week but not every day and 14 per cent consumed betel nut less than weekly. The large majority (93.9 per cent) of betel nut consumers obtained their supply from a market stall and a further 5.5 per cent grew betel nuts for their own consumption.

### Table 1. Prevalence of betel nut consumption (per cent)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Province</th>
<th>Education level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Male</td>
</tr>
<tr>
<td>Yes</td>
<td>81.0</td>
<td>84.5</td>
</tr>
<tr>
<td>No</td>
<td>19.0</td>
<td>15.5</td>
</tr>
</tbody>
</table>

**Source:** Author’s calculations.

**Note:** * indicates 5 per cent significance level from adjacent column.

Consumers chewed an average of 11.4 betel nut quids each day (median = 8). Again, there were statistically significant differences by education level with those with tertiary education chewing an average of 7.2 quids per day while those less educated chewed an average of 13.6 betel nut quids per day. Adult respondents were asked, on average, how long did each betel nut last. Each betel nut lasted an average of 1 hour and 15 minutes (median = 10 minutes). When asked what age the respondent first chewed betel nut, the average age was 16.2 years with a median age of 15 years. Unlike previous studies, there was no statistically significant difference in the age of initiation between males and females. However, among those interviewed, there was evidence to suggest that the age of initiation was getting younger. The 18 to 34 year olds commenced chewing betel nut at the average age of 14.5 years, those aged
between 35 and 44 years commenced at the average age of 18.5 years while those aged 45 years or older stated that they started chewing betel nut at 20.2 years of age.

Betel nut consumers surveyed in this study were spending a significant proportion of their income on betel nut. The average price of a betel nut was 2.23 Solomon Islands dollar (SI$) (US$0.29), the average price of the leaf is SI$1.02 and the price of lime was on average SI$0.83 (meaning that the average price of a betel nut quid in Solomon Islands was SI$4.09). When multiplied by the number of betel nut quids consumed per day and the amount of days per week betel nut was consumed, the average weekly amount spent on betel nut was SI$338.44 (median = SI$175.00). The median yearly expenditure per betel nut consumer was SI$9,100. This was similar to Palau, where a regular betel nut chewer spent $32.55 a week on betel nut, which equated to $1,692.60 per year (World Health Organization, 2012). The median betel nut expenditure represented 8.5 per cent of the median annual household income of a Solomon Islander residing in Honiara (Solomon Islands Statistics Office, 2006). This estimate is not insignificant given the negative health and social costs associated with its consumption. Furthermore, in terms of nutrition, only negligible amounts of protein and energy are in the ingredients contained within the betel nut supply, and betel nut and the associated betel quid ingredients may be bought in preference to nutritious food (Weegels, Heywood and Jenkins, 1984).

Table 2 shows the results of the query in the survey on the reasons for chewing betel nut. Among the reasons cited were the euphoric effect (69.3 per cent), followed by mouth freshening (63.8 per cent). Almost half of all chewers (42.9 per cent) believed it relieved boredom, while a host of other reasons, including more energy, combats hunger, aids digestion and increases mental insight, were cited by about a third of all chewers. In terms of differences by segment, females were more likely than males to state that chewing betel nut aids digestion (24.0 per cent males; 38.9 per cent females). Young adults (18-34 years) were more likely to chew because they believe it made their lips look attractive (40.3 per cent: 18-34 years; 15.3 per cent: 45+ years). Young adults were also more likely to chew for something to do than those in the older age brackets (48.9 per cent: 18-34 years; 17.0 per cent: 45+ years).

Betel nut consumers were asked the strength of their intention to quit chewing betel nut. Over a third of chewers (35.9 per cent) had no intention to quit betel nut consumption, while almost half (48.7 per cent) had a moderate intention to quit chewing and only 15.3 per cent of chewers had a strong intention to quit chewing betel nut. Interestingly, females were more likely to have no intention to quit than males (no intention to quit: 29.2 per cent males/44.8 per cent females).

Of those who did not chew betel nut (19 per cent of the total sample), the main reasons cited include being bad for health (63.3 per cent), against religious beliefs
Among the schoolchildren surveyed, the prevalence of betel nut consumption was 68.6 per cent as compared to 3.9 per cent of schoolchildren who consumed alcohol and 19.6 per cent who smoke tobacco cigarettes. Schoolchildren who consumed betel nut chewed an average of 2.11 quids per day (median 1.0) and schoolchildren who used tobacco smoked an average of 4.1 cigarettes per day (median 3.0). There was no statistically significant difference in betel nut or tobacco use by gender, at least at the 95 per cent level of confidence. Over a third (38.6 per cent) of those who chewed betel nut swallowed the betel nut juice. As found by Wilson and South Pacific Commission (1983), the use of lime was common but not universal. The large majority (78.6 per cent) of those who chewed betel nut consumed the nut, the leaf and the lime together. 14.3 per cent of school children chewed the betel nut by itself, while only 7.1 per cent consumed the betel nut and leaf together, that is, without the lime.

The large majority of schoolchildren surveyed (89.2 per cent), including almost all of the betel nut consumers (97.1 per cent), were aware that betel nut consumption causes mouth cancer. In fact, there was greater awareness of that fact among betel nut consumers. The prevalence of betel nut consumption was 68.6 per cent as compared to 3.9 per cent of schoolchildren who consumed alcohol and 19.6 per cent who smoke tobacco cigarettes. Schoolchildren who consumed betel nut chewed an average of 2.11 quids per day (median 1.0) and schoolchildren who used tobacco smoked an average of 4.1 cigarettes per day (median 3.0). There was no statistically significant difference in betel nut or tobacco use by gender, at least at the 95 per cent level of confidence. Over a third (38.6 per cent) of those who chewed betel nut swallowed the betel nut juice. As found by Wilson and South Pacific Commission (1983), the use of lime was common but not universal. The large majority (78.6 per cent) of those who chewed betel nut consumed the nut, the leaf and the lime together. 14.3 per cent of school children chewed the betel nut by itself, while only 7.1 per cent consumed the betel nut and leaf together, that is, without the lime.

Table 2. Motivations for chewing betel nut

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makes you feel good</td>
<td>69.3</td>
</tr>
<tr>
<td>Makes your breath smell nice</td>
<td>63.8</td>
</tr>
<tr>
<td>Is good to pass the time</td>
<td>42.9</td>
</tr>
<tr>
<td>Makes me less tired</td>
<td>35.3</td>
</tr>
<tr>
<td>Makes me less hungry</td>
<td>33.8</td>
</tr>
<tr>
<td>Makes your lips look attractive</td>
<td>32.8</td>
</tr>
<tr>
<td>Helps you to digest your food</td>
<td>30.7</td>
</tr>
<tr>
<td>Increases my mental sharpness</td>
<td>27.8</td>
</tr>
<tr>
<td>Increase my ability for physical exercise</td>
<td>22.5</td>
</tr>
<tr>
<td>Increases my sex drive</td>
<td>3.4</td>
</tr>
<tr>
<td>Other reasons</td>
<td>14.1</td>
</tr>
</tbody>
</table>

Source: Author’s calculations.
nut consumers than non-chewers (97.1 per cent versus 71.9 per cent, \( p < 0.05 \)). Among this cohort, that behaviour may be explained by hyperbolic discounting, that is, the tendency for people to increasingly choose a smaller-sooner reward (the buzz from chewing betel nut) over a larger-later reward (good health later in life) (Heath, 2009, p. 221). Schoolchildren may perceive the chances of a betel-nut-induced ailment as so small and the negative consequences of betel nut consumption far into the future, so that when offered the opportunity to chew betel nut, the attraction of the immediate euphoria takes precedence.

There was a moderate positive correlation between tobacco consumption and betel nut consumption among schoolchildren (\( r = 0.281, p = 0.004 \)). Of those who smoked, 95.0 per cent also chewed betel nut, while the prevalence of betel nut consumption among non-smokers was 62.2 per cent, a statistically significant difference at the 95 per cent level of confidence. Similarly, betel nut chewers were more likely to smoke — the prevalence of tobacco use among betel nut chewers was 27.1 per cent compared to 3.1 per cent among non-chewers. Smokers were also more likely to consume alcohol than non-smokers (15.0 per cent versus 1.2 per cent respectively).

Health professionals

Seven out of the ten health professionals interviewed reported that they had seen patients with medical problems specifically associated with betel nut consumption in the previous month. That included the health professionals that worked at the dental clinic. Three of those seven health professionals had also seen patients who had other medical issues, but also had symptoms associated with betel nut consumption. That potentially creates a situation of a double disease burden in which there may be complications from betel nut chewing which are combined with other diseases.

Of those patients who specifically sought medical attention as a result of betel nut consumption, the most common health issues patients experienced (in order of mentions) were oral cancer, cancer of the oesophagus, cancer of the pharynx, high blood pressure and diarrhoea. The health professionals interviewed reported advising patients at some point to stop chewing betel nut for various reasons. Health professionals had asked patients with any abnormal features to the mouth, oral mucosa, tongue, gum or teeth to stop chewing betel nut. Chairside education regarding oral hygiene and the importance of preventative measures was usually provided to patients.
VI. DISCUSSION AND CONCLUSIONS

This sample of Honiara residents indicated that betel nut consumption is on the increase with the prevalence among adults being 81.0 per cent and the prevalence among school-aged children being 68.6 per cent. The long-term health problems associated with continued betel nut consumption include oral cancer, tooth discoloration and dental caries and periodontal disease. Increased usage will continue to put pressure on the health system of Solomon Islands, creating an additional burden for medical practitioners and the Government. Health professionals in Solomon Islands reported that Honiara residents were seeking medical help for betel nut-induced health issues. Furthermore, those seeking health care for non-betel nut-induced problems also exhibited symptoms of excessive betel nut consumption, potentially leading to a double disease burden. Betel nut consumption and tobacco use were positively correlated and health issues will be exacerbated with this co-consumption. In the markets and at roadside stalls in and around Honiara, the supply of betel nut and tobacco cigarettes makes consumption relatively easy for those who choose to consume.

These increasing health costs could divert government funds away from other productive uses, such as infrastructure development and educational resources. The health effects could diminish the ability of the working population to offer their labour. Against these negatives, the informal economy of betel nuts generates significant economic benefits in developing countries. Economic benefits associated with betel nut production are mainly enjoyed in the rural areas. However, the on-selling of betel nut in the urban centre of Honiara, provides an important source of income for the population. Hence, this informal economy could help alleviate poverty in developing countries, as seen in the Honiara case.

The sociocultural environments of Pacific island countries, including Solomon Islands, have a long-established habit of betel nut use, which is integral to community life. It is a socially approved habit that is incorporated into both ceremonial situations and routine aspects of daily life. As described by Marshall (1987, p. 21) “betel is used in informal interpersonal exchanges, in formal presentations, in ceremonials and rituals, in decorations and ornamentation, in trade and commerce, in magic and sorcery, and in medicinal preparations”. Given its social importance, curbing consumption will be difficult.

Nevertheless, there have been several policies and recommendations proposed in different countries to diminish or eliminate betel nut’s negative influence on economic development. The World Health Organization (2012) has suggested measures that need to be taken to discourage the use of betel nut. WHO suggests that a well-designed communication programme would inform a variety of different
audiences about the hazards of betel nut and tobacco use and interventions. However, this research has shown that school-aged betel nut consumers are very aware of the negative health effects of betel nut consumption. For schoolchildren, the short-term euphoria of consuming betel nut or the social activity of chewing with friends outweighs the distant, long-term issues of health problems. Being lectured by politicians and teachers may not necessarily be effective. Nevertheless, there may be more that health officials and policymakers could do to influence betel nut consumption. This may be accomplished through the use of sporting or music role models to support education and information campaigns that target youth and children.

Regulation and legislation has been used as a mechanism to stem betel nut consumption (World Health Organization, 2004). There are policies that ban spitting in public places, most notably in health-care facilities and schools, although the enforcement of the ban is rarely, if ever, enforced. As with tobacco consumption, in many developed countries, policymakers could consider a ban on the sale and consumption of betel nut to people under the age of 16 years. The key to any legislation of that kind would be effective enforcement — it is one thing to have a law in place and quite another thing to enforce it. Citizens could be encouraged to monitor and report violations of bans on sales to minors. Diligence would be needed to stop the consumption of betel nut among minors by seeking to ban the sale of betel nut by those selling the quids at market stalls. In Solomon Islands, this would be very problematic given the ubiquity of betel nut for sale and the very informal nature of the production and consumption of betel nut, not to mention the resources needed to adequately monitor this law given the already-stretched law enforcement organizations. Moreover, the policy of banning sales to children may also fail due to the strong “gift” economy in the Pacific subregion (Carrier, 1992) so that adults may purchase the quids and give them to children.

Sharp (2013) highlights the recent case in Papua New Guinea, whereby the newly elected governor of Port Moresby enacted a betel nut ban. The National Capital District Betelnut Control Law 2013 prohibits the sale, consumption and spitting of betel nut in public places within the capital. The Law goes further by banning transportation of more than two kilograms of betel nut into the capital without a permit. This amount is economically viable for smaller sellers, but would exclude commercial transactions by larger traders and market vendors. Selling then, is restricted to designated markets within the city limits, enabling government officials can monitor betel nut sales (Sharp, 2013). This type of legislation may also be an option for Solomon Islands.
Yet, enforcement of the betel nut ban in Port Moresby has not been without problems. Sharp (2013) reports that in police checks, patrol officers responsible for enforcing the ban have often physically intimidated and attacked vendors and stolen produce. The penalties of a 300 Papua New Guinea kina ($11) on-the-spot fine, or two-hour community service for first-time offenders and prosecution for repeat offenders may be open to corruption.

In the Marshall Islands, the legislature passed a law in 2010 banning the importation of betel nut and making it a crime to import, distribute or sell betel nut, backed by a fine of up to $100 and 30 days in jail (World Health Organization, 2012). This is unlikely to be an option for Solomon Islands, given that betel nut is grown locally and not imported.

Another major obstacle to restricting demand is the availability of supply, not only owing to its prevalence and the informal nature of the betel nut economy, but also due to the fact that betel nut provides an essential source of income for many households. Often, betel nut sellers, who are outside the formal economy, have few other economic alternatives to generate income. Income from betel nut sales go towards school fees and food, medicine and other household expenses. By banning betel nut consumption, household incomes may decline, contributing to increased poverty, as the ability to afford household necessities also decreases.

Policy initiatives to curb demand, such as through regulation and legislation, including the banning of its sale, also present its own sets of problems. A more appropriate platform for action might be public awareness, education, communication and advocacy (World Health Organization, 2012). This may include strengthening communication and advocacy activities by using role models to convey the important messages of the dangers of betel nut, particularly the link to cancer. Policymakers could also fund education and information campaigns that educate the public about the early signs of betel-nut related health conditions and the importance of oral health exams for early detection. Lastly, policymakers could encourage residents to monitor and report violations of bans on sales to schoolchildren. The implementation of those policies will not be an easy task.

This research has several limitations. First, the sampling method used was a convenience sample among Honiara residents and Honiara-based schoolchildren. As such, the findings are not generalizable to the Solomon Island population. Future research could implement simple random sampling or systematic sampling, perhaps by including a series of questions about betel nut consumption and production in an appendix to a census so that the results could be extrapolated to both rural and urban populations. Additionally, health costs of different treatments were not available for Solomon Islands. Even if data on health care costs were available, it may be
difficult to separate out the costs attributed to betel nut use compared to other sources. Having such data would enable analyses such as cost-benefit analysis to be undertaken, which might shed light on the contribution of betel nut to economic development in Solomon Islands.
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