SIZE OF INFORMAL ECONOMY IN NEPAL

SHIVA RAJ ADHIKARI
NIRMAL KUMAR RAUT

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Centre Department of Economics
Tribhuvan University, Kathmandu

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Shiva Raj Adhikari

Nirmal Kumar Raut

Dr. Adhikari is a Professor at the Central Department of Economics, Tribhuvan University. He can be reached at shiva.adhikari@cdec.tu.edu.np **Dr. Raut** is an Associate Professor at the Central Department of Economics, Tribhuvan University. He can be reached at nirmal.raut@gcdec.tu.edu.np

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Acknowledgment

Foreword

The study of the informal economy is important for developing economies where the informal sector is a pervasive and undeniable reality. Measuring the size and evolution of the informal economy is a prominent and pressing issue from the policy perspective as it has far-reaching macroeconomic policy implications. The informal economy operates beyond the formal channels of economic reporting. As a result, the contributions of the informal sector may not be fully reflected in official national accounts. Additionally, incomplete economic indicators constrain the formulation of public policies in the right way.

In the context of Nepal, the "Study on Size of Informal Economy of Nepal" is very important, given that 62.2 percent of the labor force is engaged in the informal sector. This issue gathers prominence with a finding of the Economic Census 2018, highlighting that about 50 percent of total establishments are yet to be registered. While these figures may not directly correspond to the informal economy, they do indicate a perceptible share of the informal economy in Nepal. Considering the importance, NRB has collaborated with the Central Department of Economics, Tribhuvan University to carry out this study. I hope that this study will provide some foundation for understanding the size and evolution of the informal economy in Nepal and lay the background for further study in this area.

I would like to express gratitude to Professor Dr. Shiva Raj Adhikari and Associate Professor Dr. Nirmal Kumar Raut of the Central Department of Economics, Tribhuvan University for conducting this study. I would like to thank Directors Dr. Dilli Ram Pokhrel, Mr. Laxmi Prasad Prasai, Dr. Rajan Krishna Pant, and Mr. Madhav Dangal, and Acting Director Dr. Birendra Bahadur Budha for their invaluable suggestions on the study. Further, I would like to thank Assistant Directors Mr. Prabhakar Jha and Mr. Rohan Byanjankar for facilitating administrative tasks.

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Prakash Kumar Shrestha, PhD

Executive Director

Economic Research Department

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Table of Contents

Executive Summary

The informal economy is a growing concern for all economies irrespective of their size and development status. It has a significant bearing on economic and social development, national accounts, and public finance. There, however, is no common consensus on the definition of the informal economy. The quality of information on the national economy is vital for economic policymaking. Various studies in the past have reported the prevalence of a sizeable informal economy in Nepal and this is therefore a matter of important concern. The informal economy is a broad concept with various names in the economic literature such as shadow, underground, black, hidden, unofficial, parallel, cash, unreported, or unrecorded economy. There is no common understanding of whether they all have the same meanings or the same things or not. What relationships they have with one another is rarely explained in the literature. In this study, the informal economy is defined in terms of unreported or untraced income resulting from illegal as well as legal activities; mostly from monetary, or non-monetary transactions that would generally be taxed if reported at the taxing authorities. In this respect, it includes all market-and non-market-based production of goods and services, whether legal or illegal, that escapes detection in or is intentionally excluded from the official estimates of GDP. In addition to this, misreporting of data related to production activities, and unrecorded, and unreported activities are also part of the informal economy.

The primary objective of this study is to estimate the size of the informal economy by utilizing indirect approaches of the Currency Demand Method (CDM) and the National Accounts Method (NAM). Informal economy or unrecorded activities differ from country to country, activity to activity, and over time. The exhaustive estimates of Gross Domestic Product (GDP) may capture the informal economy and can be categorized into two groups: formal and informal out of total gross value addition (GVA). Informal or non-observed activities are indirectly measured during the compilation of national accounts. However, the Central Bureau of Statistics offices don't explain their method sufficiently while compiling national accounts. Therefore, another econometric model is needed to make complementary estimations and to improve the reliability of estimation.

Due to methodological differences and underlying assumptions, it may not be appropriate to compare the estimated size of the informal economy. However, it gives us the range of estimated size. Economic activities are so dynamic and changed over the period. Therefore, the ranges of the size of the informal economy provide sufficient information for policy making. The National Accounts approach also reports a sector-wise estimate of an informal economy based on the International Standard Industrial Classification. The CDM approach uses time series data of relevant macroeconomic variables for the fiscal years 1991/92 to 2020/21 while the National Accounts approach uses various micro-surveys data available for the periods 2010/11 to 2020/21. For triangulation purposes, this study hence compares average estimates of the informal economy for the periods that overlap between the two approaches i.e., 2010/11 to 2020/21. The study provides some ranges of the size of the informal economy in Nepal. The National accounts and currency demand approaches yield estimates of the average size of the

informal economy for the periods 2010/11-2020/21 as 42.66 percent and 40.06 percent of GDP respectively.

The latest estimate is available for the year 2020/21 which is 38.66 percent and 41.31 percent of GDP, as reported by the National Accounts and CDM approaches respectively. This study also compares CDM estimates with the most recent IMF and the WB estimates available for the periods 1993-2015. Using predictive mean matching and MIMIC approaches, the IMF estimates yield an average size of 29.22 and 37.11 percent respectively over the years 1991-2015 (Medina and Schneider, 2018). Using dynamic general equilibrium and MIMIC methods, the WB estimates yield an average size of 37.70 and 36.84 percent of GDP respectively (Elgin et al., 2021). The current study reports an average size of 32.41 percent over a similar period which is close to the IMF and the WB estimates.

The estimated size of the informal economy of Nepal largely depends on undeclared, unrecorded, or under-recorded, and unmeasured economic activities carried by the households for their final use. The estimates reported in this study should be taken as an indicative picture of the size of the informal economy in Nepal. The National Accounts approach also reports sector-wise disaggregates of the informal economy. The sector-wise disaggregation shows that real estate activities, agriculture, forestry and fishing sectors, and accommodation and food services constitute a very high share of informal economic activities. Likewise, arts, entertainment, recreation activities, etc. have a high share of informal economic activities. The share of informal components in the case of other sectors is either medium or low.

On the other hand, CMD is based on the computation of discrepancies between declared income and income implied by the observed currency demand. The excess of currency multiplied by the income velocity of circulation gives a measure of the size of the informal economy; however, the income velocity of circulation for both informal and formal may not be the same in practice. For understanding purposes, the estimates from the current study may also be interpreted as a lower-bound estimate of the size of the informal economy. This is not unusual since the CMD approach may underestimate the size of the informal economy as several transactions take place in non-cash form (Medina and Schneider, 2018). Hence, differences among the estimates if any may be therefore attributed to methodological differences adopted by these studies.

With an understanding of the limitations and assumptions of the method of estimation, careful interpretation of the estimated size of the informal economy is required. Estimating the informal economy is a complex task given the numerous uncertainties inherent in the estimation methods, data, and nature of informality itself. Existing data don't properly reflect the magnitude of activities related to capital flight, cross-border shopping, tax evasion, and drug trafficking among others. Nevertheless, capital flight and tax evasion are not productive activities and are not measured in the GDP. We need a specific survey to understand the magnitude and procedures of activities related to the underground economy. The underground economy is a part of the informal economy. The estimated size of the informal economy of Nepal, therefore, does not reflect the underground, black, hidden, or parallel economy. It largely indicates the unreported, underreported, or unrecorded economic activities that are produced by the household for their final use.

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1. Introduction

Informal economy[1] is an emerging issue partly because the economic activities carried out in such an economy cannot be accounted for in the national accounts, and therefore accurate estimates of standard measures of economic progress such as Gross Domestic Product remain understated. Some argue that the informal economy generates jobs and production and helps the poor, while many argue its ill effects are higher than its beneficial effects (Kumar, 2011). One of the critical consequences of informality is that it stifles economic growth (thus reducing tax receipt of the governments, which may then be compensated by raising the tax rates imposed on formal business) and productivity by keeping companies subscale and unproductive (operating at just half the average productivity level of formal companies in the same sectors), and aid companies to take market share from bigger, more productive formal competitors (as the cost-benefit avoiding taxes and regulations often amounts to more than 10 percent of the final price). Any short-term employment benefits of informality are thus greatly outweighed by its long-term negative impact on economic growth and job creation (Farrell, 2004). Knowledge of the extent of prevalence of the informal economy would therefore be helpful to design appropriate economic policies so that strategies towards the formalization process can be carried out effectively. The transition from an informal to a formal economy was recommended at the 104th International Labour Conference in 2015.

The size of the informal economy is increasing rapidly in today's world. It relates to the economic activities that are not included in the formal measurement of GDP. It has existed and continues to exist in one form or another in all societies. Many developed and developing countries have shown serious concern over the informal economy and its consequences. This is because it has a significant effect on economic and social development, national accounts, and public finance. It also distorts the market due to which there is unequal production among the producers in the formal economy and underground economy. As a result, there is a distortion in economic indicators. Furthermore, the presence of an underground economy may influence the decisions of policymakers because they will make their decisions based on inaccurate information which reduces the efficiency and effectiveness of public policy. For example, effective monetary and fiscal policy requires a level of precision in the estimates of key statistics (such as income, consumption, unemployment, etc.), and the existence of the shadow economy can distort these measures (Albu, 1995). Therefore, efforts should be made to estimate the size of the underground economy.

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[1] The informal economy is a broad concept with various names in the economic literature; shadow, underground, black, hidden, unofficial, informal, unreported, or unrecorded economy. In this study, informal economy can be defined as consisting of activities engaged in the production of goods and services with objective of generating employment and income to the related person and production of household for their own final use. The production unit is relatively small and operating at a low level and no division between labour and capital as a factor of production. In addition to this, underground activities, illegal activities, misreporting data related to production activities, unrecorded and unreported activities are also the part of informal economy.

Nepal is not an exception to the prevalence of informal economic activities, both legal and illegal. NLFS (2017) estimates that 62.2 percent of total employment in the country is in the informal sector. The estimates of informal employment[2], which accounts for both employment in the informal sector and informal employment in the formal sector, are much higher at 84.6 percent. This indicates that many of the population working in formal establishments do not have access to basic benefits and therefore work in precarious situations. These numbers are only indicative of the prevalence of the informal economy since their definitions exclude the economic activities that are carried out as legal but form a part of hidden/underground activity and the other one is illegal activities themselves. With regards to the estimates of the underground economy in Nepal, early estimates were made by Schneider (2004) who estimated its size as a percentage of GDP for the years 1999/00, 2001/02, and 2002/03 to be 38.4, 39.7, and 38.7 percent respectively. Much later, another study by Raut et. al. (2014) shows that the informal economy accounted for 34 percent for the years 1985/86-2011/12. Since then, almost a decade has elapsed during which significant changes in the political, demographic, economic, and legal spheres have taken place in the country. This may also have altered the size of the informal economy in the country. Since there have been no credible attempts to re-estimate the size of the informal economy using robust methods and reliable data, this study tries to fill this gap. The study will have both academic and policy significance.

2. Objectives

The objective of the study is to estimate the size of the informal economy in Nepal by utilizing two different approaches: The currency Demand Method (CDM) and the National Accounts. It means that the research study provides some ranges of the size of the informal economy in Nepal.

3. A brief review of the literature

3.1. Concept

Shadow economy is a broad concept with various names in the economic literature; underground, black, hidden, unofficial, informal, unreported, or unrecorded economy. According to Schneider & Medina (2019), the shadow economy includes all market-based legal production of goods and services that are deliberately concealed from public authorities, chiefly to avoid paying income, value-added or other taxes, to avoid making social security contributions, to avoid having to meet legal labour market standards such as minimum wages, maximum working hours and safety standards, and to avoid complying with administrative procedures such as statistical questionnaires or other administrative forms.

There is no unique definition of a shadow economy. According to Feige (1989), it "consists of those economic activities and the income derived from them that circumvent or otherwise

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[2] Informal employment includes employers, own-account workers, and contributing family workers who are employed in informal sector establishments, as well as employees and paid apprentices/interns who do not have paid annual leave or sick leave benefits and whose employers do not contribute to their social security (NLFS, 2017).

elude government regulation, taxation, or observation". Smith (1994, p.15) presents four alternative definitions of the shadow economy ranging from a narrow definition; "market-based production of legal goods and services that escapes detection in the official estimates of GDP', to a broad definition; "market-and non-market-based production of goods and services, whether legal or illegal, that escapes detection in or is intentionally excluded from the official estimates of GDP". According to the United Nations System of National Accounts (SNA 1993, Para 6.34), the shadow economy (called the underground economy) "consists of activities which may be both productive in an economic sense and also quite legal (provided certain standards or regulations are complied with) but which are deliberately concealed from public authorities (e.g. to avoid the payment of taxes and/or social security contributions or to avoid meeting certain 3 standards or administrative requirements)". While Schneider (1986, p. 646) defines it as 'all economic activities that contribute to value added and should be included in national income in terms of national accounting conventions but are presently not registered by national measurement agencies". Schneider and Enste (2002), concentrate in their definition on the "legal value-added creating activities which are not taxed or registered and where the largest part can be classified as "black" or clandestine labor". Table 1 shows the various classifications of shadow economic activities according to the monetary and legal status of the activity.

Table 1: Types of Shadow Economic Activities

Type of Activity	Monetary Transactions		Non–monetary Transactions	
Illegal Activities	Trade in stolen goods; drug dealing and manufacturing; prostitution; gambling; smuggling; fraud		Barter of drugs, stolen, or smuggled goods, producing or growing drugs for own use, Theft for own use.	
	Tax Evasion	Tax Avoidance	Tax Evasion	Tax Avoidance
Legal Activities	Unreported income from self-employment. Wages, salaries, and assets from unreported work related to legal services and goods	Employee discounts fringe benefits.	Barter of legal services and goods.	All do-it-yourself work and neighbor help.

Source: Lippert and Walker (1997) and Schneider (2002)

Table 1 clearly shows that unreported or untraced income resulted from illegal as well as legal activities; either from monetary, or non-monetary transactions that would generally be taxed where the reported taxing authorities are included in the underground economy. Illegal monetary transactions like the trade of stolen goods, manufacturing and dealing of drugs, prostitution, gambling, smuggling, fraud, etc. constitute underground. To add up, illegal monetary transactions like barter of drugs, stolen goods, smuggling, etc, production of drugs for own use, and theft for own use too fall under the underground economy. Legal activities, yet tax-envisioned cases like unreported income from self-employment, wages, salaries, and assets from unreported work related to legal services and goods, and the cases of tax avoidance like employee discounts, and fringe benefits are also part of the underground economy. Legal yet non-monetary transactions like barter of legal goods and services, and all works done by self and with neighbor's help where tax evasion and avoidance take place respectively also constitute an underground economy.

3.2. Methods and uses.

Many international studies have attempted to measure the size of the underground economy for different economies both developed and underdeveloped using various direct and indirect approaches.

Direct methods of measuring the underground economy are the micro approaches that employ either sample survey data based on sociological investigations, or tax audits. Although the sample survey method helps derive detailed information about the structure of the underground economy, the accuracy and precision of its measurement heavily depend on the way the questionnaire is prepared, and the respondent's willingness to cooperate in the survey. The tax audit method attempts to measure the shadow economy by looking into the discrepancy between income declared for tax purposes and that measured by selective checks. This method, to some extent, unveils the extent of tax evasion based on the errors the tax authorities find in tax returns. The major disadvantage of tax audit is that this method estimates only that portion of the underground economy that the tax authorities succeed in discovering which may not represent the total of the underground economy. Mostly, the tax authorities become successful in exposing only a fraction of hidden income, because the subjects of fiscal audits often know the date and the object of the audit in advance. Besides this, the poor result of the fiscal audit is also subjected to criticisms that it is not representative of the entire population as they are not sampled, and many of the illicit activity categories are usually not even found by the fiscal audit agents.

As such, although a micro survey clarifies the nature of the problem, it has a weakness in that it may provide an extremely lower bound to shadow activity. On the other hand, the success of the audit method depends upon the existence of efficient tax administration and corruption (Eilat and Zinnes, 2000). Indirect methods are best at providing good measures of change in total economic activity and, therefore, can also help detect trends in the size of the shadow economy over time but their usefulness in transition countries is much less clear (*ibid*).

Indirect methods, also known as indicator methods, use macroeconomic indicators to explore the grievances of the underground economy. Indirect methods include the following:

a) Differences between income and expenditure at the household level; b) Discrepancies in National Accounts; c) The difference between official labor and actual labor; d) The Transaction Approach; e) Currency demand approach; f) Electricity consumption approach; and g) Model approach.

The income-expenditure difference method compares the income and consumption of the household and if the expenditure exceeds the income, it may be because the household has an additional income source over the declared one which is not reported to tax authorities. However, the problem with using this method is that the respondents would be reluctant to report income from the shadow economy. In the National Income Accounting approach, whatever may be the approach used, income approach or expenditure, both should equalize each other. If the discrepancy between the income approach and expenditure approach is observed, it can be treated as an indicator of the extent of the underground economy. While measuring national income, if we can include all the components of the expenditure side without omission and error, this method could act well enough to reflect the scale of the underground economy. However, this is not possible always. Thus, the reliability of this method can be often questioned. Another indirect method is estimating the shadow economy by recording the difference between official and actual labor statistics. In other words, the decline in labor force participation in the official economy while total labor force participation is assumed to be constant can be seen as an indication of increased underground activities. The premise of this method is that illegal work stays at the base of the underground economy. Employers from the informal economy sector are tempted to use illegal labor to hide their illicit activities (Schneider, 2002). Mostly, the discrepancies between the official and real labor force are observed at the rural level where people work illegally in agriculture, or they have a second unofficial job in the industry. While in the urban zone, the illegal jobs are usually far away, and at times it exists, it is found to be done by immigrants and the unemployed. This indicator does not give information about the dimension of the underground economy, but still, it may show its existence.

Another indirect approach to the estimation of the informal economy is the transaction approach that was developed by Feige (1997) on the proposition that there is a constant relation over time between the volume of transactions and official GNP. This approach is developed as the base of Fisher's Quantity Equation of Money.[3] Relating total nominal GNP to total transactions, the GNP of the shadow economy can be calculated by subtracting the official GNP from the total nominal GNP. The major weakness of this method is the need to assume a base year without shadow economy, difficulty in obtaining precise figures of the total volume of transactions, and the assumption that all variations in the ratio between the

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[3] MV=PT where, M= Money Supply, V= Velocity of Money, P= Average Price Level of Transactions, and T= Transactions Volume. To estimate the level of the underground economy, Feige assumed that the total value of the transaction (P*T) can be replaced in Fisher's equation with k* nominal GNP (official GNP + unofficial GNP); and the velocity of money is the same for the legal and underground economy.

total value of the transaction and the officially measured GNP are due to the shadow economy.

Another indirect method is the currency demand approach which is the most popular and evolving method of measuring the informal economy (Schneider and Enste, 2000). The foundation of this method is based on the assumption that informal economic transactions are made in cash (Cagan, 1958). Estimates on the size of the underground economy are made by looking at the correlation between demand for currency and tax pressure. The major drawback of this method is the presumption that all underground transactions are made in cash while researchers have found that about 80% of transactions are made in cash (Isachsen and Strom, 1980). Another critical assumption that all tax burden is the primary cause of the informal economy is also unrealistic.

Another method is the electricity consumption method which assumes that the best physical indicator of economic activity is electricity consumption (Kaufmann and Kaliberda, 1996). Similar to the currency demand method, the electricity consumption method looks at the relationship between electricity consumption and GDP, and the difference between the gross rate of registered GDP and the corresponding rate of total electricity consumption is attributed to the growth of the informal economy. Critics argue that not all informal activity requires electricity, and that the elasticity of electricity consumption is volatile depending upon the respective market, the efficiency of electricity distribution, and the machines in use (Schneider, 2002).

Finally, the model approach is another indirect method that considers the multiple indicators and multiple causes that result in the existence and growth of the shadow economy. For the estimation, a factor-analytic approach is used to measure the hidden economy as an unobserved variable over time. The unknown coefficients are estimated in a set of structural equations within which the "unobserved" variable cannot be measured directly. This model is so far considered the best model since it has an intuitive quality in that it utilizes multiple data sources to capture as many components as possible of informal economic activity; the model can determine both the size and development of informal economic activity over time; and its potential to be deployed at local levels.

Essentially, most of the previous studies used the indirect method because this is less costly and convenient in terms of the availability of time-series data required to estimate the models.[4] These studies, therefore, measure the size of the shadow economy focusing on the aggregate shadow economy, usually expressed in terms of the size of the official economy.

3.3. Empirical review of past studies
In early studies, mainly in the 90s, most researchers concluded high taxes, unfairness in the distribution of tax burden, and regulation as the main causes of the shadow economy. Those

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[4] Schneider and Enste (2000) used the physical input method, currency demand approach and in some cases also MIMIC approach to estimate the size of underground economies of various developing and transition economies.

studies used the currency demand approach (CDM) and concluded that increasing the strictness of tax enforcement or increasing the effective tax to higher rates induces economic agents to evade paying tax which leads to an increase in the size of the shadow economy (Lippert & Walker, 1997; Cebula, 1997). In recent studies, in addition to CDM, researchers have extensively used the MIMIC (Multiple Indicators Multiple Causes) estimation methods. For example, Schneider et al (2010) used a MIMIC method where they revealed the main causes, indicators, size, and development of the shadow economy for 162 countries between 1999 and 2007. They concluded that the driving forces of the shadow economy are an increased tax burden, combined with labor market regulations and the quality of public goods and services, as well as the state of the official economy. Porqueras, et.al (2011) used the Lagos-Wright theoretic model of money and further concluded that the size of the shadow economy is endogenously determined and depends on the rate of inflation, the marginal tax rate, and how the tax savings from using cash are split between buyers and sellers. Contrary to expectation, Yendi (2011) finds that the size of the shadow economy increases as the GDP growth rate per capita increases, however, the size of the shadow economy decreases as unemployment increases in the observed country's economy. Her results show the impact of inflation, economic freedom, and government spending on the shadow economy is ambiguous. She also found as the marginal corporate tax rate increases; the size of the shadow economy increases. Many other studies in recent decades have used the MIMIC and CDM methods to estimate the size of the shadow economy (see, for example, Schneider et al. 2015; Del' Anno 2007; Dobre and Alexandru 2015; Abu et. al. 2022; Paraskevi Koufopouloua et. al. 2021).

CDM and MIMIC approaches are therefore the dominant approaches so far to estimate the size of the underground economy. Dybka et al. (2019) also acknowledge this fact and in their paper, they proposed a hybrid model of these two approaches that address their previous criticisms, particularly the misspecification issues in CDM and the vague transformation of the latent variable obtained in the MIMIC model into interpretable levels and paths of the shadow economy. However, they also conclude in their paper that the contribution of (a correctly specified model) MIMIC model to the measurement of trends in the shadow economy is marginal vis-à-vis the contribution of the CDM approach. Similarly, Abela et al. (2020) applied both methods to measure the size of the Maltese shadow economy but concluded that CDM is relatively easier to follow than the MIMIC model due to the simplicity of assumption. As such, given the availability of data and convenience in application, this study uses National Accounts and CDM approaches to estimate the size of the informal economy.

In the Nepalese context, there are limited studies that use the CDM approach to estimate the size of the informal economy while studies using the National Accounts approach are rather nonexistent. As mentioned earlier, in the case of Nepal, early estimates were made by Schneider (2004) who estimated its size as a percentage of GDP for the years 1999/00, 2001/02, and 2002/03 to be 38.4, 39.7, and 38.7 percent respectively. Much later, another study by Raut et. al. (2014) applies the CDM approach to show that the informal economy accounted for 34 percent of GNP using time-series data from 1985/86 to 2011/12. Since then,

there have been no credible attempts to re-estimate the size of the informal economy using robust methods and reliable data. This study, therefore, tries to fill this gap by applying two different methods to estimate the size of the informal economy and conduct a triangulation exercise to establish the validity and robustness of the estimates obtained from these approaches.

4. Data and methods

4.1. Overall approach

Various direct and indirect methods are available that may be used for estimating the size of the informal economy. Direct methods are the micro approaches that employ either sample survey data based on sociological investigations, or tax audits. These two approaches are practically difficult to use because of limited sample size (hence lack of representativeness), lack of cooperation from the respondents, problems in survey design, poor fiscal audit and tax administration, etc. Hence, indirect methods are best at providing good measures of change in total economic activity and, therefore, can also help detect trends in the size of the shadow economy over time. The indirect methods, also known as indicator methods, use macroeconomic indicators to explore the extent of the underground economy. Since these methods primarily use the macro approach (data), the estimates of the informal economy are roughly assumed to be representative of the entire economy. However, data required for most of these 'macro' methods are not readily available and this is more problematic in developing than developed countries.[5] Considering these issues/concerns relating to the availability of data and reviewing the related literature, this study will adopt two 'indirect' methods to estimate the size of the informal economy: The currency Demand Method (CDM); and the National Accounts approach (See figure 1).

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[5] Details of the direct and indirect methods can be found in Schneider and Enste (2000).

Figure 1: Framework of the approaches used to estimate the size of the informal economy
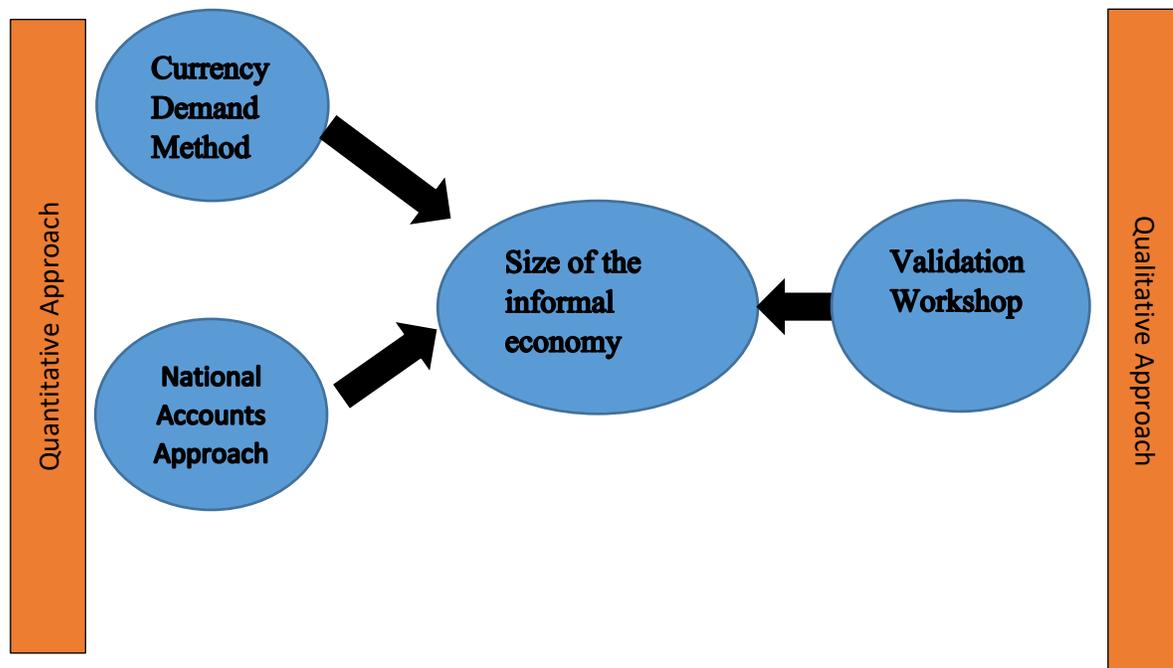
Source: Study team

One advantage of using two different approaches is to check the robustness of the estimates of the informal economy. In addition, the study also checks the external validity of the findings by comparing them with the recent estimates reported by the World Bank and the International Monetary Fund. In the succeeding sub-sections, a detailed outline of the selected methods is discussed.

4.2 National Accounts Method

4.2.1. Theory

From the perspective of the economic unit, the informal economy can be defined as constituting all informal productive activities. Informal activities include all productive activities carried out by persons and economic units that are –in law or practice –not covered by formal arrangements. The concept of the national account method is heavily based on the System of national account (SNA) 2008.

National Accounts need to cover both observed and non-observed economies. Primarily, non-observed activities of the economy are included in the informal sector. The non-observed economy refers to all productive activities that may not be captured in the basic data sources used for compiling national accounts. The non-observed economy does not mean a non-measured part of the economy. In 2002, the OECD released its Handbook for Measurement

of the Non-observed economy, which is considered as a basis for this work. The concepts defined in the Handbook on measuring the non-observed economy are mentioned as:

i. underground production.

ii. informal sector.

iii. production by households for their own final use.

iv. misreporting of data.

v. production not recorded for statistical reasons.

The analytical framework as shown in figure 2 is used for classifying the non-observed economy is given as follows:

a) Illegal activities: Unregistered (illegal); b) Informal activities: Unregistered (not required to register); Data not reported; c) Activities concealed for economic reasons: Unregistered (intentionally); Misreporting; d) Activities not observed for statistical reasons: non-response; incomplete coverage of respondents; Out of date registers.

Underground activities, illegal activities, and the production of households for their own final use among others are included as part of the non-observed economy. Production activities that are legal but deliberately concealed from public authorities in order to avoid paying taxes such as VAT or income tax or social security contributions or complying with official procedures and regulations. These activities include underground activities. Illegal activities are always part of the informal economy. As defined by the system of national account (SNA) 2008, informal activities include all productive activities carried out by persons and economic units that are –in law or in practice –not covered by formal arrangements.

There are two kinds of illegal production: a) productive activities which are forbidden by law; b) the production activities that are usually legal, but they become illegal when carried out by unauthorized producers. Drugs and human trafficking, prostitution, and smuggling are illegal activities. Illegal cross-border flows are also domestic illegal activities. Informal cross-border transactions such as informal tourism services for non-residents by household, and remittances transmitted through informal channels. Legal production activities are characterized by a low level of organization, with little or no division between labour and capital as a factor of production. Typically functions on a system of unofficial relationships and does not rely on official agreements. Small-scale production of goods and services with the primary objective of generating employment and income for the people concerned.

Informal productive activities in the formal sector include all productive activities of informal workers engaged by formal economic units and the production of informal establishments of formal sector enterprises.

Figure 2: Delimiting the observed from the non-observed economy as suggested by the 2008 SNA
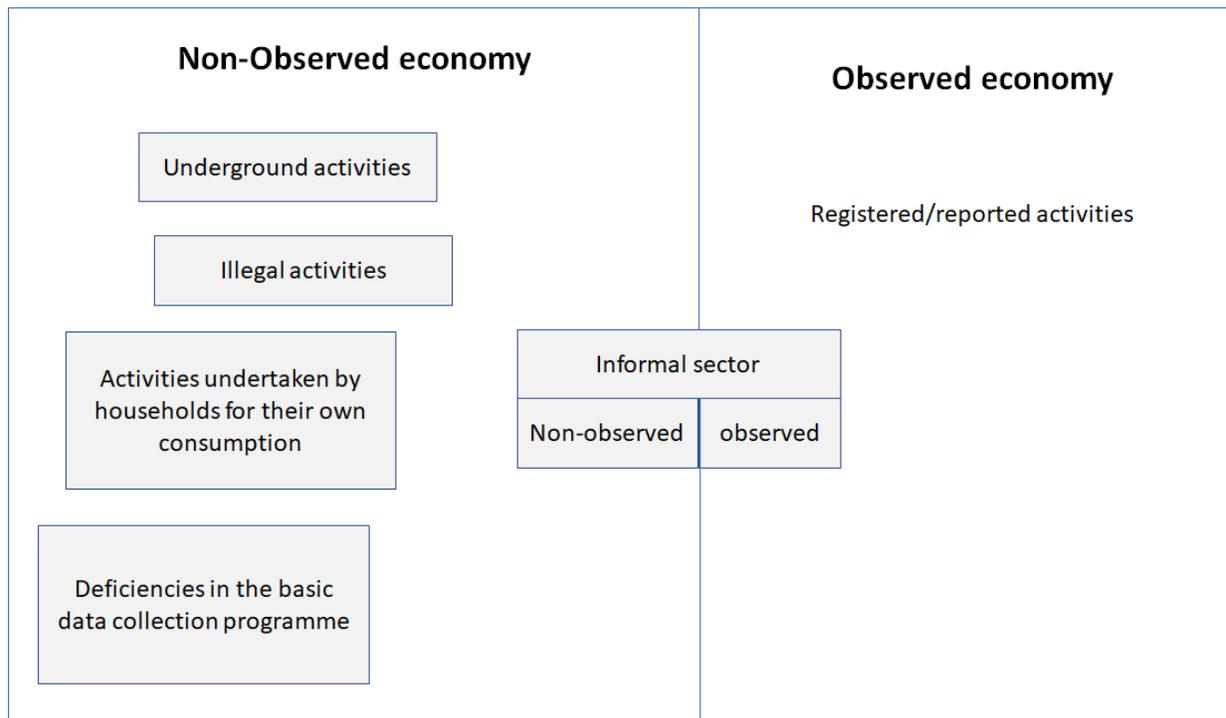
Source: SNA (2008)

4.2.2. Estimation methods and data sources

Comprehensive coverage of national accounts estimates is important and pragmatic statistical approaches should be set up to capture the unrecorded economy (Bloem and Shrestha, 2000). In a working paper developed by Bloem and Shrestha (2000), a detailed examination of the data gaps and review of the possible sources and methods to cover them is discussed advocates an approach based on improvements in source statistics and direct measurement where possible. The non-observed (hidden and informal) economy or unrecorded activities differ from country to country, activity to activity, and over time. For each situation, an appropriate approach should be selected by investigating various possible alternatives.

When estimating the output of goods and services by sectors, estimates of informal economic activities are made using the following methods: a) the commodity-flow method (based on input-output tables and balances for the selected goods and services; b) combined methods of estimating indicators (alternative calculations of value added); c) indirect methods requiring comparison of data from various sources (comprehensive surveys, sample surveys of households and administrative data sources); d) methods of comparative analysis based on the estimates of the ratio between inputs and outputs in various groups of enterprises. Output, intermediate consumption, and value-added are calculated by means of certain ratios that imply assumptions regarding the relationship between the estimated variable and the indicator.

There are two categories: formal and informal out of total gross value addition (GVA). SNA 2008 recommended three types of surveys: Household Surveys, Establishment Surveys, and Mixed household-enterprise surveys to collect data from informal sectors. Nepal has conducted different types of surveys and censuses in previous periods with information on the informal sector. By analyzing these surveys and census data, the contribution of the informal economy to the GDP of Nepal is estimated. The following table explains the data source by industries to estimate the GVA from the informal economy with a brief methodology. A detailed note on the methodology adopted in National Accounts Approach is provided in Appendix 2.

Table 2: Industrial classification, data sources, and methodology

	Industrial Classification	Data Source	Methodology
A	Agriculture, forestry, and fishing	1.Nepal Commercial Poultry Survey 2.Commercial Tea Survey 3.Commercial Coffee Survey 4.Nepal Fishery Survey 5.Nepal Commercial Floriculture Survey	Estimating the GVA from the formal sector and subtracting it from the total GVA the informal sector GVA can be obtained.
B	Mining and quarrying	1.Economic Census, 2017/18	All activities are formal in the Mining sector and a small study can be done to identify the informal share in quarrying with the help of an economic census.
C	Manufacturing	1. Nepal Living Standards Survey, 2010/11 2. Survey of Small Manufacturing Establishment, 2008/09	By analysis, these two sets of data informal sector GVA will be estimated.
D	Electricity, gas, steam, and air conditioning supply	1. Survey of Gobar Gas	Electricity has no informal activities.
E	Water supply; sewerage, waste management, and remediation activities	1. Economic Census, 2017/18	For not registered water user groups and west management.
F	Construction	1. Population and housing census for informal construction of the house 2. Nepal Living Standards Survey, 2010/11	Own account construction of the house and the estimate of the out can be estimated from NLSS.

G	Wholesale and retail trade; repair of motor vehicles and motorcycles	1. Nepal Living Standards Survey, 2010/11 2. Economic census. 2017/18 3. Distributive Trade Survey, 2008	The number of informal establishments can be identified by analyzing the economic census data and GVA from NLSS.
H	Transportation and storage	1. Non-mechanized land transport survey.	From the small study of informal types of transportation like Rikhsa, Tanga, etc.
I	Accommodation and food service activities	1. Nepal Living Standards Survey, 2010/11 2. Economic census. 2017/18	The number of informal establishments can be identified by analyzing the economic census data and GVA from NLSS.
J	Information and communication	1. Nepal Living Standards Survey, 2010/11 2. Economic census. 2017/18	A very small share and Number of informal establishments can be identified from analyzing the economic census data and GVA from NLSS.
K	Financial and insurance activities		No informal
L	Real estate activities	1. Nepal Living Standards Survey, 2010/11 2. Economic census. 2017/18	By analyzing data
M	Professional, scientific and technical activities	1. Nepal Living Standards Survey, 2010/11 2. Economic census. 2017/18	By analyzing data
N	Administrative and support service activities	1. Nepal Living Standards Survey, 2010/11 2. Economic census. 2017/18	By analyzing data
O	Public administration and defense; compulsory social security		No informal activities
P	Education	1. Economic census. 2017/18 2. Nepal Living Standards Survey, 2010/11	By analyzing data
Q	Human health and social work activities	1. Economic census. 2017/18 2. Nepal Living Standards Survey, 2010/11	By analyzing data

Sources: Study team's compilation

4.3. Currency demand approach

4.3.1. Theory

The currency demand method is based on a strong belief that the higher the tax burden, the more frequent will be the unreported activities in the economy. The primary reason to include the tax rate in the money demand function is that as the tax rate increases, the demand for money for transactions and precautionary purposes (liquid components) increases since agents need more money to finance underground activities. Since the nominal GDP will capture the demand for money in the recorded economy, we can easily attribute any linkage between money demand and tax to the existence of an underground economy. It means that the estimate of tax elasticity of money demand can be used to estimate the amount of money held in the illegal economy. This approach was first used by Cagan (1958) for the US over the period 1919 to 1955 and this method was further developed by Tanzi (1980 &1983) who econometrically estimated a currency demand function for the US for the period 1929 to 1980. This approach assumes that shadow (or hidden) transactions are undertaken in the form of cash payments, so as to leave no observable traces for the authorities. An increase in the size of the shadow economy will therefore increase the demand for currency. Many studies conducted to estimate the size of the underground economy use the currency demand approach so far (See, for example, Dreher and Schneider, 2006; Schneider, 2007; and Schneider et al., 2010). The currency demand approach can be conveniently applied in the case of Nepal since monetary and fiscal data are well maintained. However, some data required to add other relevant variables in the model are either not available or have limited time series information if available. For example, time series data on the amount of social security contributions are not maintained. Likewise, there is limited time series information/data relating to digital/electronic payment systems in Nepal such as *the number of payments cards per capita*. Recent papers such as by Dybka et al (2019) suggest the inclusion of this variable since it is an important determinant of shadow economic activities.[6]

4.3.2. Data: Variables, Definition, and Sources

Literature has now established two types of demand for cash in the economy: first is the demand for conventional or normal economic activities (called structural demand) and second is the excessive demand for shadow economic activities. Structural demand factors are consumption to GDP ratio as a proxy to the extent of economic activity, and interest rate on deposits as an opportunity cost for holding cash. Excessive demand factors or the shadow economy determinants considered in this study are primarily tax revenue and unemployment rate.

There are some additional variables that affect both the structural and excessive demand for cash such as variables related to the development of electronic payment systems. Due to limited time series information, as mentioned earlier, we could not include this variable in the model. We replaced this variable with the number of commercial bank branches since the growth of commercial banks can be taken as one big step towards the liberalization process

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[6] The introduction of an electronic payment system may either discourage cash transactions (hence shadow economic activities) or may have no impact altogether. In the case of later, an electronic platform may also be used to replace registered cash transactions without having an impact on SE (Dybka et al., 2018).

(financial market reforms) in Nepal and also a key driver towards the introduction of technology in the financial system. The equation also includes a dummy variable to capture the year India demonetized all Indian Rs. 500 & Rs. 1000 banknotes with an objective to curb the prevalence of the shadow economy, promote digital/electronic platforms for transactions and discourage the use of illegal money to finance illegal activity and terrorism. [7] Literature, to date, suggests the mixed effect of demonetization on the Indian economy and its efforts to curb the prevalence of shadow economic activities (see, for example, Nerkar, 2016; Uke, 2017) This demonetization initiative in 2016 would have largely affected the Nepalese economy since India is Nepal's important trading partner, shares an open border and Nepal held a whopping sum of Indian Rs. 950 crores (Rs. 15.2 billion in Nepalese currency)[8] during the time of demonetization and the fate of that money is still undecided. Kose et al (2017) argue that demonetization in India may have had spillovers on the Nepalese economy through trade and remittance channels. It is therefore highly likely that the demand for Nepalese currency would have been largely affected by the demonetization move by India. The equation will be estimated using fully modified OLS (FMOLS). Table 3 lists the variables used in the currency demand model, their definitions, and data sources:

Table 3: Variables used in the currency demand model, their definitions, and data sources

Variables	Definition/Description	Source	Time series data used
Cash outside central Bank (CC/M1)		Quarterly economic bulletin (Nepal Rastra Bank)	1991-2020
Structural demand factors			
Economic activity (Consumption/GDP)	Proxy for economic activity	World Bank – World Bank open data	1991-2020
Bank deposit rate (BD)	Deposit rate on saving accounts: the opportunity cost of holding cash	Quarterly economic bulletin (Nepal Rastra Bank)	1991-2020
Excessive demand factors			
Tax burden (TR/GDP)	Amount of tax revenue collected by the government divided by Gross Domestic Product	World Bank – World Bank open data	1991-2020

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[7] "Modi urges the country to become a cashless society". The Hindu. 27 November 2016.
"Here is what PM Modi said about the new Rs 500, Rs 2000 notes and black money". India Today. 8 November 2016. Retrieved 9 November 2016.
"Notes out of circulation". The Times of India. 8 November 2016

[8] https://kathmandupost.com/opinion/2018/04/22/impact-of-demonetisation

Unemployment Rate (UER)	Unemployment Rate	World Bank – World Bank open data/ILO estimates	1991-2020
Other variables			
Number of commercial banks branches	Proxy for financial sector reforms and penetration of financial innovations (e.g. digital/electronic payment system etc.)	Quarterly economic bulletin (Nepal Rastra Bank)	1991-2020
Dummy for Demonetization in India (DMN)	DMN is equal to 1 for the year 2016 & beyond; 0 for the years before 2016		

4.3.3. Model Specification

Following Tanzi's (1980, 1983) basic model, there are today various versions of CDM used in various countries. In this study, we borrow the CDM version of Dybka et al. (2019) which they argue considers weaknesses inherent in the previous versions. The inclusion of the shadow economy determinants in the model, however, depends upon the availability of the data and the length of time-series data if available. Hence, the following model will be estimated:

$$\frac{Cash\ outside\ banks}{M1} = \alpha + \beta_1 struc_t + \beta_2 excess_t + \beta_1 others_t + \varepsilon_t \ldots\ldots\ldots\ldots (1)$$

Where *t* represents the period (annual data is used in the study). The dependent variable represents the share of cash outside banks in the M1 monetary aggregate. The vectors $struc_t$, $excess_t$, and $others_t$ are three groups of explanatory variables viz., structural demand factors, excessive demand factors, and other factors respectively as defined in Table 1 above.

This study estimates two models: first, equation (1) is estimated with all three groups of explanatory variables as mentioned above and obtains the fitted value of currency demand. This gives the currency demand for both formal and informal economy assuming that the excessive demand factors (such as tax burden and unemployment) would induce demand for cash to conduct informal activities in the economy. Second, equation (1) is re-estimated but without the variables representing excessive demand factors and obtains the fitted value of currency demand. This gives the currency demand for the formal economy only. Hence, the difference between the amount of currency demanded in (formal and informal economy) and without (formal economy) excessive demand factors will then be attributed to the shadow economy. Finally, assuming that the velocity of money is the same in the shadow and total economy, this study will calculate the total amount of cash attributed to the shadow economy.

5. Results and discussion

5.1. National accounts method

5.1.1. Size of the informal sector based on the National Economic Census

The Central Bureau of Statistics (CBS) published an analytical report on the Informal Sector based on National Economic Census (NEC) 2018. NEC has used a sample frame for

conducting various thematic economic surveys, and business registers for large- and small-scale establishments in different sectors of the economy. The NEC is a primary source of benchmark economic statistics providing major data about the structure and functioning of the national economy in both the formal and informal sectors. The survey captured only registered agriculture establishments.

The report on the informal sector informed that a total of 460,422 establishments (49.9 %) are not registered out of total of 923,027 establishments. It does not mean that the size of the informal economy is 49.9 %. We can't use this figure as a proxy for the size of the informal economy too. The survey does not capture many activities such as public administration and defense; compulsory social security, activities of households as employers; undifferentiated goods- and services-producing activities of households for their use, and activities of extraterritorial organizations and bodies. All the activities are included in the national account estimate while estimating the gross domestic product. As indicated in the above figure, the informal sector includes both observed and non-observed economies. Therefore, due to the above-mentioned reasons, the size of non-registered establishments as indicated in the analytical report of the informal sector published by CBS can't be a proxy for the size of the informal economy. However, this proportion of unregistered establishments may be taken as an upper-bound estimate of the size of the informal economy in Nepal.

5.1.2. Size of the informal economy based on National accounts method

In Nepal's economy, the informal sector plays a significant role. Except for public administration and defense, the informal economy permeates all industries, with real estate leading the way, followed by agriculture, forestry, and fishing, as well as accommodation and food service. The lowest is in transportation and storage, followed by financial and insurance activity, information, and communication.

Table 4: Share of Informal Economy based on national account approach (2010/11-2020/21)

Fiscal Year	Share of the informal economy (% of GDP)
2010/11	49.1
2011/12	47.8
2012/13	46.9
2013/14	44.9
2014/15	43.4
2015/16	42.9
2016/17	40.4
2017/18	38.6
2018/19	37.6

2019/20	39.1
2020/21	38.6
Average (2010/11-2020/21)	42.66

Source: Study team's estimates

Figure 3: Share of Informal Economy based on national account approach (2010/11-2020/21)
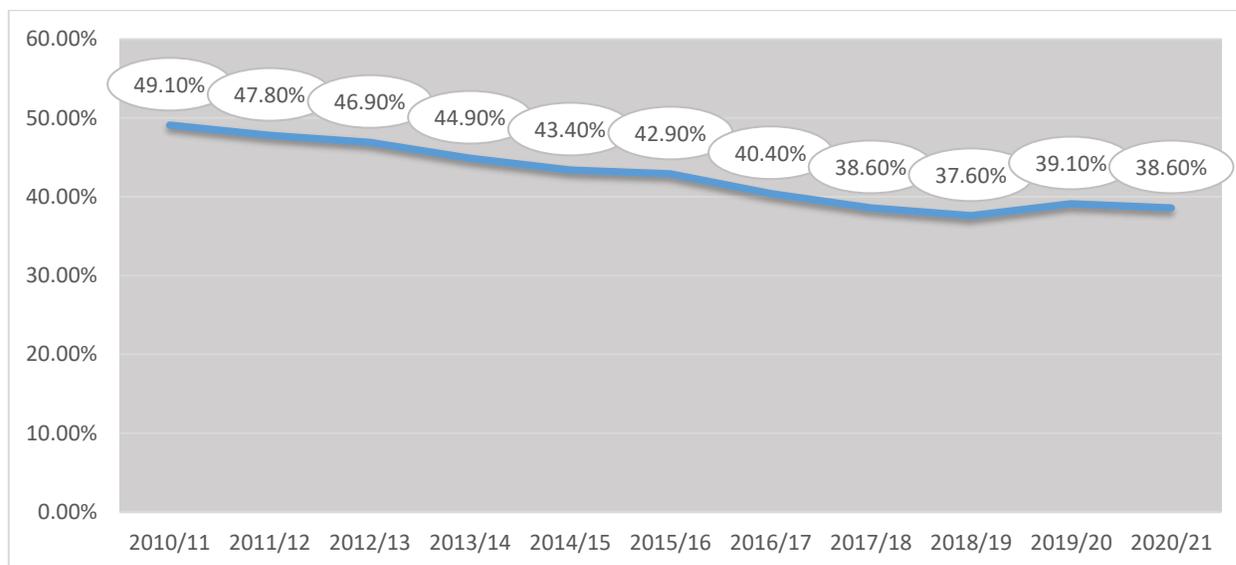
The size and share of Nepal's informal economy are shown in Table 4 and figure 3 above. The share of the informal economy was 49.1% in 2010/11 and 38.6 percent in 2020/21. The average size of the informal economy from 2010/11 to 2020/21 is 42.66 percent of GDP. This approach shows that the share of informal economy has been declining over the years. Appendix Table 1a provides similar information in tabular format by formal and informal categories.

5.1.2. Size of informal economy by sectoral classification

Sector-wise disaggregation in figure 4 shows that there is a high prevalence of informal activities in the real estate sector followed by agriculture, forestry and fishing, and other sectors. More than 95 percent of the total gross value added (GVA) in these two sectors constitutes an informal component of economic activities. Other sectors with high informal components are accommodation and food services (50.42 percent) and art, entertainment, and recreation services (33.69 percent). The informal component in all other sectors is less than 20 percent (See Appendix Table 1b for details). The sector-wise estimates of the informal economy by time period are provided in Appendix 2. The appendix also provides methodological notes for the National Accounts Approach.

Figure 4: Informal economy as a percent of gross value added by sectors (2010/11-2020/21)

Sector	Percent
Arts, entertainment and recreation etc	33.69%
Health and social work	0.33%
Education	0.19%
Public administrtion and defense; compulsary social...	0.00%
Administrative and support service activities	8.66%
Professional, scientific and technical activities	3.10%
Real estate activities	99.97%
Finance and insurance activities	0.11%
Information and communication services activities	0.13%
Accomodation and food services activities	50.42%
Transportation and storage	0.63%
Wholesale and retail trade; repair of motor vehicles...	14.87%
Construction	16.26%
Water supply, sewerage, waste management and...	2.14%
Electricity, Gas, Steam and Air conditioning supply	14.99%
Manufacturing	16.36%
Mining and quarrying	4.95%
Agriculture, forestry and fishing	96.48%

Source: Study team's estimates

Most of the production activities under agriculture, forestry, and fishing have been operated by households and hence informal. In the case of real estate, it includes activities involving owned or leased property, fee or contract real estate activities, and owner-occupied dwelling services. Because of its nature, most of the share is owner-occupied dwelling service, which is treated as informal in this study. Likewise, tax evasion from property undervaluation is quite common in Nepal. In the case of accommodation and food services, most of the lodges and tea shops operated by households are not registered with any government institution and hence informal. Similarly, mobile food carts are also informal in nature.

Table 5: Classification of the sectors by size of the informal economy

Sectoral Classification	Share of informal economy#
Agriculture, forestry, and fishing	Very high
Real estate activities	
Accommodation and food services activities	
Arts, entertainment and recreation etc.	High
Manufacturing	Medium
Electricity, Gas, Steam, and Air conditioning supply	
Construction	
Wholesale and retail trade; repair of motor vehicles and motorcycles	
Mining and quarrying	Low
Water supply, sewerage, waste management, and remediation activities	
Transportation and storage	
Information and communication services activities	
Finance and insurance activities	
Professional, scientific and technical activities	
Administrative and support service activities	
Public administration and defense; compulsory social security	
Education	
Health and social work	

Source: Study team's estimates. #Very high: more than 50%; High: 25% to 50%; Medium: 10% to 25%; and Low: Less than 10%

Table 5 classifies these sectors into four categories: very high; high; medium; and lower. According to this classification, as discussed earlier, real estate activities, agriculture, forestry and fishing sectors, and accommodation and food services constitute a very high share of informal economic activities. Likewise, arts, entertainment, recreation activities, etc. have a high share of informal economic activities. The share of informal components in the case of other sectors is either medium or low.

5.2. Currency demand model

Table 6 and Figure 5 show the extent of the informal economy in Nepal.

Table 6: Share of the informal economy based on currency demand approach (2010/11-2020/21)

Fiscal Year	Share of the informal economy (% of GDP)[#]
2010/11	35.52
2011/12	34.83
2012/13	36.41
2013/14	38.03
2014/15	38.62
2015/16	39.79
2016/17	42.53
2017/18	44.16
2018/19	45.02
2019/20	44.41
2020/21	41.31
Average (2010/11-2020/21)	40.06

Figure 5: Share of Informal Economy based on currency demand approach (2010/11-2020/21)
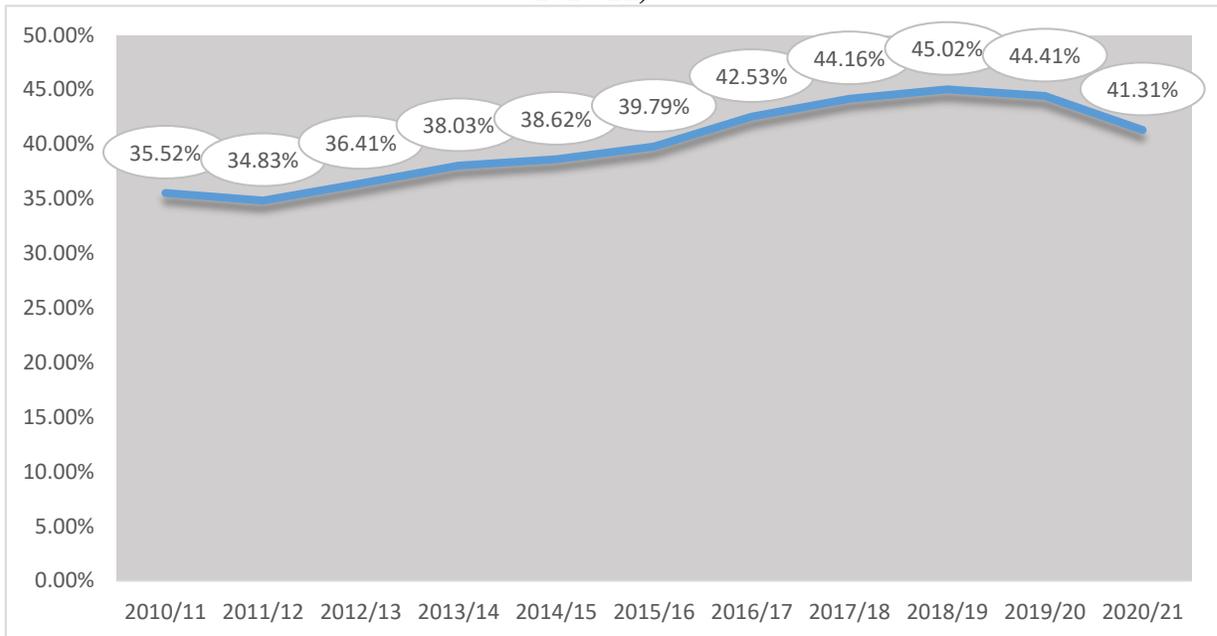
Source: Study team's estimates. [#]For comparability purposes, estimates are reported only for the periods between 2010/11 & 2020/21. Estimates for the full series are reported in Appendix Table 1c.

According to the CDM approach, the estimates of the informal economy ranged between 34.83 and 45.01 percent for the study periods 2010 to 2020. The average account of the informal economy in these periods has been 40.06 percent. This approach shows that the

informal economy increased up to the year 2018/19 and has started declining in recent years. The technical note of the CDM approach is provided in Appendix 3.

6. Comparison among approaches

Depending upon the periods of data used in various methods to estimate the informal economy, this study reports the possible range of the extent of the informal economy in Nepal. National Accounts Approach shows the range of informal economy between 37.6 percent and 49.1 percent of GDP (for the periods between 2010/11 & 2020/21) while estimates using the CDM approach show the range of informal economy between 34.83 and 45.02 percent of GDP for the similar periods. Taking together the estimates from these two methods, the size of the informal economy is estimated to be between 34.83 and 49.1 percent of GDP. Figure 6 shows the average estimate for the period reported by National Accounts and CDM approaches which are 42.66 and 40.06 percent respectively. This means there is a marginal difference of 2.5 percent in the mean of the estimates reported by these two approaches.

Figure 6: Average estimate of the informal economy (as a percent of GDP)
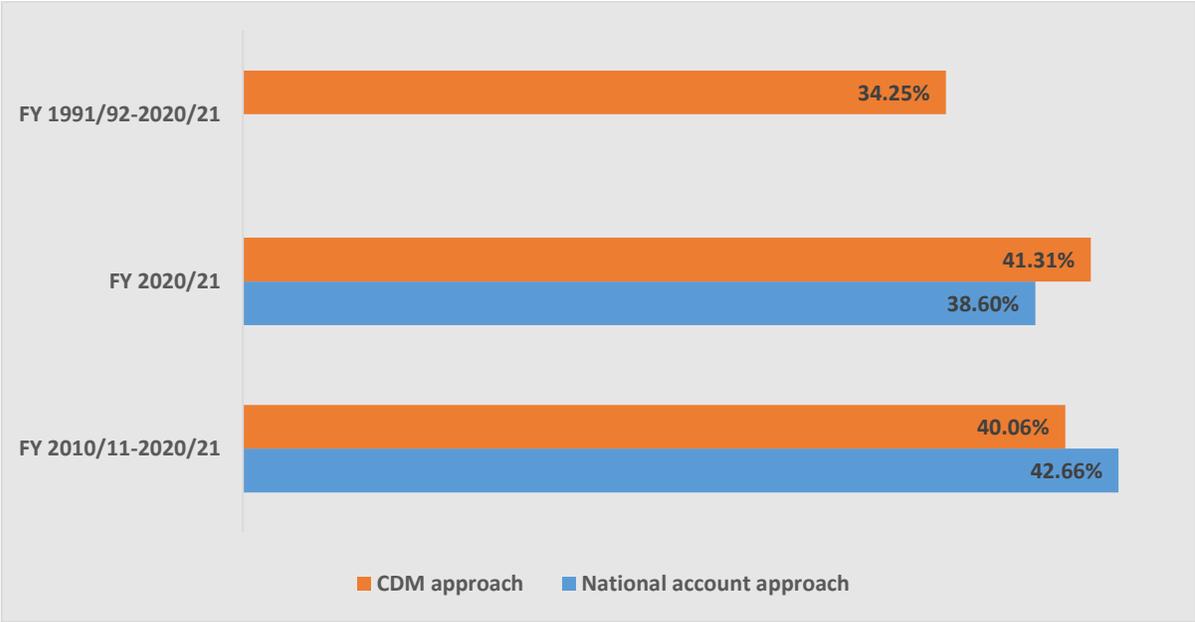
Source: Study team's estimates

Unlike previous studies, this study reports the latest estimates of the informal economy in Nepal. Earlier to this study, the latest estimates were reported by the IMF and the WB. The IMF estimates for 158 countries including Nepal reported for the years 1991-2015 (Medina and Schneider, 2018). Using predictive mean matching (PMM) and the MIMIC method, the average size of the shadow economy for Nepal is estimated at 29.8 and 37.5 percent respectively over the years 1991-2015. The WB uses dynamic general equilibrium (DGE) and MIMIC approaches for the periods 1991-2017 & 1993-2018 respectively (Elgin et al., 2021).

For comparison purposes, the current study compares its estimates (using the CDM approach) with the IMF (using PMM and MIMIC approaches) and the WB (using DGE & MIMIC approaches) estimates for the common periods of the estimates reported by these studies viz., 1993-2015. The current study reports an average size of 32.70 percent over a similar period while IMF estimates report an average size of 29.22 and 37.11 percent using PMM and MIMIC approaches respectively. Likewise, WB estimates report an average size of 37.70 and 36.84 percent using DGE and MIMIC approaches respectively. Hence, the estimates from the current study are close to the WB and IMF estimates. For simplicity in understanding, it can be construed that the estimate of 32.70 percent from the current study is a lower-bound estimate of the informal economy in Nepal. This is not unusual since the CDM approach may underestimate the size of the informal economy as the number of transactions takes place in non-cash form (Medina and Schneider, 2018). Any differences among the estimates can thus be fairly attributed to different methodologies adopted by these studies.

Figure 7: Comparison with IMF and WB estimates (Average over 1993-2015)
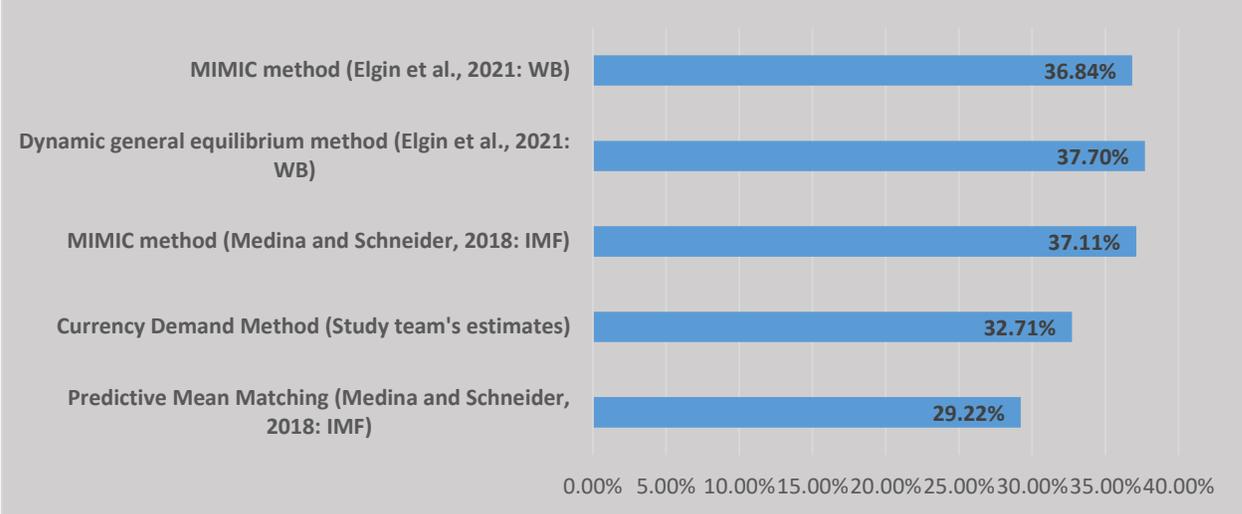
Source: Study team's estimates, IMF (2018) & WB (2021)

7. Conclusion and Way Forward

This study is a renewed attempt to estimate the size of the informal economy in Nepal. The study reports the latest estimate for the year 2020/21 which is 38.66 percent and 41.31 percent of GDP, as reported by the National Accounts and CDM approaches respectively. Likewise, using these two methods, this study reports the estimated size of the informal economy for the periods 2010/11-2020/21 as 42.66 percent and 40.06 percent respectively. Using different methods, the latest available IMF estimates are for the years 1991- 2015 (using PMM & MIMIC approaches) while WB estimates are for the years 1991-2015 (using the DGE approach) and 1993-2018 (using the MIMIC approach). The estimates from these studies for the common periods of 1993-2015 lie in the range of 29.22 and 37.70 percent. The current study reports the estimated size of the informal economy for similar periods at 32.71 percent. This somehow increases the reliability of our estimates. It can also be construed that the

estimate of 32.70 percent from the current study is a lower-bound estimate of the informal economy in Nepal. This is not unusual since the CDM approach may underestimate the size of the informal economy as the number of transactions takes place in non-cash form (Medina and Schneider, 2018). It should also be noted that different methods report different measures of informal economy estimates. This is also clear from the estimates reported by two different methods used in this study as well as by the IMF and the WB estimates that use entirely different methods. Hence, this study primarily relies on averages of the estimates reported by using different methods. Moreover, due to limitations in data and methods, the estimates reported in this study should only be taken as an indicative picture of the size of the informal economy in Nepal. Estimating the informal economy is a complex business given the numerous uncertainties inherent in the estimation methods, data, and nature of informality itself. There is therefore the need to further validate the findings of this study using different and novel methods and quality data. This study has made one such attempt.

Given the extent of the informal economy as revealed by this study, there is a need for further research to understand the nature, type, and coverage of the informal economy in Nepal. There is a need for a survey-based study to diagnose further the identified sectors where such informal transactions take place at large. For example, this study identifies forestry, agriculture, real estate, accommodation, entertainment industries, etc. as having the highest level of informality. Further research may delve into carrying out a diagnostic study to understand the causes and the consequences of high informality in these sectors. A qualitative study involving Key informants and in-depth interviews, consultative meetings with the stakeholders (government, private sectors, experts/scholars), and interviews with the business owners and entities may help to chart out the practical issues and concerns that these sectors are facing and the way they can be addressed. Given that Nepal shares a 1770-kilometer open border with India and that the significant cross-border trades are informal, it may also be helpful to understand how such informal transactions are carried out by businesses operating in the bordering areas. This may involve interviewing stakeholders from the local level in bordering areas (such as small businesses, and security and customs officials, local community) to those at the national level (such as big traders and manufacturers, and security and customs officials).

Also, we can use the microdata Nepal Economics Survey (Central Bureau of Statistics) which maintains a profile of nearly nine lakh registered and unregistered enterprises in the country. The survey reveals that 49.9 percent of these enterprises are not registered with any government entity. Hence, this data set may be useful to understand the nature and type of these businesses, and their company profile including their turnover, employer and employee characteristics, credit history, and capital structure. It can also be used to conduct the impact study to understand whether informality has any effect on these businesses in terms of income earning capacity, access to credit, recruitment of skilled employees, etc.

It is therefore suggested to use a mixed approach involving both quantitative and qualitative approaches to further understand the nature, type, and coverage of the informal economy in Nepal.

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Appendix

Appendix 1: Full series of the share of informal economy in Nepal

Appendix Table 1a: Formal and informal GVA in the economy of Nepal (in million Rs.)/

Size of informal economy (National Accounts Approach) (2010/11-2020/21)

Industry	Gross Domestic Product (GDP) at basic prices	Formal	Informal economy	Share of informal economy (% of GDP)
2010/11	1436072	731589	704483	49.1
2011/12	1618424	844024	774400	47.8
2012/13	1777293	943611	833683	46.9
2013/14	2022455	1114518	907937	44.9
2014/15	2186608	1237707	948901	43.4
2015/16	2341402	1336423	1004979	42.9
2016/17	2720563	1621499	1099063	40.4
2017/18	3011022	1847690	1163332	38.6
2018/19	3342481	2084713	1257768	37.6
2019/20	3454140	2104223	1349916	39.1
2020/21	3733274	2291490	1441784	38.6

Source: Study team's estimates

Appendix Table 1b: Informal Economy by Sectors (Average 2010/11-2020/21)

Sectoral Classification	Share of Informal Gross Value Added (% of GVA)
Agriculture, forestry and fishing	96.48%
Mining and quarrying	4.95%
Manufacturing	16.36%
Electricity, Gas, Steam and Air conditioning supply	14.99%
Water supply, sewerage, waste management and remediation activities	2.14%
Construction	16.26%
Wholesale and retail trade; repair of motor vehicles and motorcycles	14.87%
Transportation and storage	0.63%
Accommodation and food services activities	50.42%
Information and communication services activities	0.13%
Finance and insurance activities	0.11%
Real estate activities	99.97%
Professional, scientific and technical activities	3.10%
Administrative and support service activities	8.66%
Public administration and defense; compulsory social security	0.00%
Education	0.19%
Health and social work	0.33%
Arts, entertainment and recreation etc.	33.69%

Source: Study team's estimates

Appendix Table 1c: Share of informal economy based on CDM approach and comparison with World Bank and IMF estimates (Informal economy as a % of GDP)

Year/Methods	CEDECON estimates	IMF estimates [#]	World Bank estimates[##]	
	Currency Demand Method	MIMIC	Dynamic General Equilibrium	MIMIC
1991	29.22	43.39	44.3	
1992	28.93	40.59	43.9	
1993	28.92	40.88	43.2	37.5
1994	29.72	39.15	42.8	37.1
1995	30.95	39.97	42.0	37.9
1996	30.77	40.59	41.3	38.3
1997	30.76	39.59	40.8	37.8
1998	30.69	38.68	40.2	37.8
1999	30.49	38.04	39.2	36.8
2000	30.68	36.8	39.4	36.8
2001	31.00	37.2	38.8	36.7
2002	30.91	37.7	38.3	36.6
2003	31.08	37.35	37.8	36.4
2004	31.15	36.86	37.2	36.4
2005	31.35	37.6	36.8	36.7
2006	31.15	36.24	36.4	36.6
2007	32.09	36.59	36.0	36.5
2008	32.78	37.09	35.7	36.9
2009	34.30	38.02	35.3	37.4
2010	35.52	36.48	35.0	36.6
2011	34.83	35.7	34.7	36.3
2012	36.41	35.98	34.5	36.7

2013	38.03	33.46	34.2	35.9
2014	38.62	33.42	33.9	35.6
2015	39.79	30.22	33.5	36.0
2016	42.53		33.2	36.1
2017	44.16		32.8	35.5
2018	45.02			35.4
2019	44.41			
2020	41.31			
Average (1993-2015)	**32.70**	**37.11**	**37.70**	**36.84**
Average (1993-2018)	**33.99**			**36.70**
Average (1991-2017)	**33.22**		**37.82**	

Source: Study team's estimates

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Appendix 2: Methodological Note for the National Accounts Approach
1. Agriculture, Forestry, and Fishing

In the economy of Nepal, agriculture, forestry, and fishing constitute the largest share. Its contribution to GDP is decreasing from 33.4 percent in 2010/11 to 25.8 percent in 2020/21. Growing crops, vegetables, and fruits; animal production, forestry and logging, and fishing and aquaculture are the major activities in this industry. Most of the production activities in this industry have been operated by households and hence informal. CBS has compiled and published the annual gross value added, which is the starting point for disaggregating the formal GVA in this industry. Most of the economic activities in this industry are informal in comparison to other industries. The Nepal Commercial Poultry Survey, the Commercial Tea Survey, the Commercial Coffee Survey, the Nepal Fishery Survey, and the Nepal Commercial Floriculture Survey conducted in different years, as well as the economic census conducted in 2017/18, were used to calculate the formal Gross Value Added (GVA) of various agricultural activities. These GVA are backward and forward by using the number of formal agriculture enterprises and the Agriculture Producer Price Index (APPI). Informal GVA is obtained by subtracting formal GVA from overall GVA.

Table 2a shows the formal and informal GVA of the Agriculture, forestry, and fishing industry. This study shows that the share of informal GVA of agriculture, forestry, and fishing industry found 98.5 percent in 2010/11 and gradually decreased and comes to 93.1 percent in 2020/21. It is observed that agricultural activities have become more formalized in recent years.

Appendix Table 2a: Formal and informal GVA of the Agriculture, forestry, and fishing industry (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Agriculture, forestry, and fishing	480326	528851	557940	613094	642713	665553	729269	771875	832887	905344	964429
Formal	7217	8607	10081	13011	16751	21266	27237	34037	41888	53414	66488
Informal	473109	520244	547859	600082	625962	644287	702033	737838	791000	851930	897941
Share informal	98.5	98.4	98.2	97.9	97.4	96.8	96.3	95.6	95.0	94.1	93.1

Source: Study team's estimates

2. Mining and quarrying

The mining and quarrying industry contributes 0.58 percent to the total GDP of the country in 2020/21. The share of Mining and quarrying industries is almost constant from 2010/11 to 2020/21. The majority of the mining activities are formal and contribute a small share. Major

quarrying activities are quarrying of stone, sand, and clay and it contributes nearly 94 percent of the industry.

Economic census 2017/18 and Nepal Living Standards Survey (NLSS) 2010/11 are the major data sources used to estimate the informal GVA of this industry. The number of informal quarrying industries operated by households is estimated from the data of the economic census. The Gross Value Added obtained by households from quarrying activities is estimated by analysis of NLSS data. The GDP deflector of the Mining and quarrying industry published by CBS as a price index and household growth as a volume index are used to move the series backward and forward. The formal GVA of this industry is calculated by subtracting the informal GVA from the total GVA of the industry published by CBS.

Appendix Table 2b: Formal and informal GVA of the Mining and quarrying industry (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Mining and quarrying	8525	9979	10567	12096	12746	13582	15668	18450	21999	20443	21531
Formal	7929	9301	9921	11442	12081	12853	14983	17701	21278	19752	20803
Informal	596	678	645	654	665	729	685	749	721	691	728
share informal	7.0	6.8	6.1	5.4	5.2	5.4	4.4	4.1	3.3	3.4	3.4

Source: Study team's estimates

Table 2b presents the formal and informal GVA of the Mining and quarrying industry. It is observed that the share of informal GVA of the Mining and quarrying industry is 7.0 percent in 2010/11 and gradually declined in recent years.

3. Manufacturing

The manufacturing industry contributes 5 percent to the GDP of Nepal. The share of the manufacturing industry is decreasing in recent years.

For estimation of the national accounts of Nepal, the manufacturing sector is divided into three groups:

1. Modern Manufacturing: Registered establishments engaging ten or more persons

2. Small Manufacturing: Registered establishments engaging less than ten and one or more persons

3. Unorganized Household Manufacturing: Unregistered household enterprises have no regular employees.

Some of the activities in the manufacturing sector are operated by households without registration and having no regular employees and hence informal. Specially tailoring activities, small food processing industries like 'pani gahtta', carpet industries like 'galaicha bunne', furniture industries, the activity of making iron tools "hasiya, kodalo etc. banune, pottery making activities, etc. are operated by household and informal.

Nepal Living Standards Survey (NLSS) 2010/11, Survey of Small Manufacturing Establishment (SSME) 2008/09, Economic Census 2017/18, Manufacturing Producer Price Index (MPPI), and Manufacturing Production Index (MPI) are the major data source to estimate the GVA of informal manufacturing activities. By using the NLSS 2010/11 data, the GVA of informal manufacturing activities has been calculated for the year 2010/11. The number of households engaged in informal manufacturing activities has also been calculated by using NLSS data. The number of households engaged in manufacturing each year has also been calculated using household growth rates. This number of households engaged in informal manufacturing activities is used as a volume indicator and MPPI is used as and price indicator to move the GVA series forward and calculated GVA from 2011/12 to 2020/21. GVA of informal manufacturing activities obtained from the Economic census is used for data validation for the year 2017/18. The formal GVA of this industry is obtained by subtracting the informal GVA from the overall GVA published by CBS. Nepal Labour Force Survey, 2018 is also used to validate the informal GVA.

Appendix Table 2c: Formal and informal GVA of the Manufacturing industry (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Manufacturing	84150	101726	112093	125294	129811	127493	149416	169565	192230	173861	189657
Formal	70432	85346	93770	105404	108776	103968	124695	143345	163614	143819	158443
Informal	13717	16380	18323	19889	21036	23525	24721	26221	28616	30042	31215
share informal	16.3	16.1	16.3	15.9	16.2	18.5	16.5	15.5	14.9	17.3	16.5

Source: Study team's estimates

Table 2c presents the formal and informal GVA of the Manufacturing industry. The share of the informal sector in the manufacturing industry ranges from 15 percent to 19 percent. The highest share is observed in 2015/16 and the lowest in 2018/19. Most of the formal types of manufacturing industries were affected in 2015/16 due to the Terai movement so the informal share is high.

4. Electricity, gas, steam, and air conditioning supply

This industry contributes 1.23 percent to the GDP of Nepal. Electricity share is almost 93 percent within the industry and electricity production, transmission, and distribution activities are formal in Nepal. Nepal has a biogas plant that is operated by households and is informal. There is no significant steam and air-conditioning supply activity in Nepal.

A major data source to calculate the informal share of GVA in this industry is the Gobar Gas Survey conducted by the Central Bureau of Statistics. The cumulative number of Gobar gas plants by size is obtained from the Alternative Energy Promotion Centre (AEPC). The benchmark estimates of biogas are compiled from the Survey of Gobar Gas. First of all, GVA per plant by the capacity of biogas is calculated based on the data. Then these GVA estimates for different capacities of plants are multiplied by the corresponding number of plants in order to derive the total GVA estimates for the benchmark year. The imputed value generation by bio-gas plants in the process of cooking as well as lighting has been considered to estimate the GVA. Due to the unavailability of the price index for Gobar gas, the LPG price is used as a proxy indicator for the series' movement.

Appendix Table 2d: Formal and informal GVA of the Electricity, gas, steam, and air conditioning supply industry (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Electricity, gas, steam, and air conditioning supply	14348	16701	20091	20677	21138	19004	29072	30981	33859	42545	45782
Formal	10941	12819	16043	16705	16998	15754	25908	28166	31294	39504	42449
Informal	3407	3882	4048	3973	4139	3250	3163	2816	2565	3042	3333
share informal	23.7	23.2	20.1	19.2	19.6	17.1	10.9	9.1	7.6	7.1	7.3

Source: Study team's estimates

The formal and informal shares of electricity, gas, steam, and air conditioning supplies are shown in Table 2d above. The informal sector's proportion in the economy is steadily decreasing, from 23.7 percent in 2010/11 to 7.3 percent in 2020/21. The informal sector's GVA appears to have remained relatively steady during the last 11 years period, but the formal sector's GVA has expanded, resulting in a reduction in informal share.

5. Water supply; sewerage, waste management, and remediation activities

The GDP contribution of this industry is barely 0.55 percent. In Nepal, there are three types of water supply mechanisms: Kathmandu Upatyka Khanepani Limited (KUKL), Nepal

Water Supply Corporation, and Drinking Water User Groups. Very few Drinking Water User Groups are not registered and have no regular employees, therefore they are treated as informal. Similarly, some of the waste management and remediation are informal.

Economic Census is the main data source to identify the informal share of this industry. Some of the estimates are based on NLSS 2010/11. The number of informal water user groups and waste management and remediation activities are identified by the economic census. Total revenue collected by informal institutes and intermediate use to generate the service also calculates from the economic census to calculate the GVA. Some waste management and remediation activities operated by households are identified by NLSS and GVA estimates are calculated. Several informal institutions and prices of the industry are used as volume and price indicators to forward and backward the series.

Appendix Table 2e: Formal and informal GVA of the Water supply; sewerage, waste management, and remediation activities (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Water supply; sewerage, waste management, and remediation activities	9145	9997	11029	15532	17032	18238	18669	19488	19724	20124	20481
Formal	8961	9796	10807	15219	16689	17871	18293	19096	19353	19587	19879
Informal	184	201	222	313	343	367	376	392	372	536	602
share informal	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.7	2.9

Source: Study team's estimates

Table 2e shows the GVA of water supply, sewerage, waste management, and remediation activities in both formal and informal terms. The share of informal GVA in this industry is very small and has remained steady over the last 11 years.

6. Construction

Construction is one of the important industries for the development of the nation. Construction accounts for only 5% to 6% of Nepal's GDP. The whole construction activity may be divided between contract construction by construction establishments and own-account construction by households and establishments of different sectors. Considering the prevailing information and the nature of construction, the whole construction activities have been divided into two broad categories: Pakky Construction and Kachhy Construction. Pakky Construction is of the capital-intensive type and uses durable construction materials like

cement, bricks, iron rods, etc., and construction workers like engineers, supervisors, carpenters, mason laborers, etc. as input and is considered formal. On the other hand, Kachhy construction is of the labor-intensive type and uses locally available materials like bamboo, mud, thatch, etc. Kachhy construction is further divided into two categories: Public Kachhy construction like earthen road construction and is considered formal, and residential Kachhy construction like dwellings constructed by households and is considered informal.

The Population Census 2011, the Population Census 2021, and the NLSS 2010/11 are the data sources for the compilation of informal constructions. The total number of households and annual household growth are calculated using data from two censuses. Census data is used to compute the total number of residential Kachhy dwellings, and NLSS 2010/11 is used to estimate the total GVA generated by the construction of such a Kachhy dwelling. To carry the series forward, the GDP deflator is used as a price indicator and the household growth is used as a volume indicator.

Appendix Table 2f: Formal and informal GVA of the construction industry (in million Rs.).

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Construction	92666	107368	115191	129233	138264	151760	182976	217723	234260	204862	211994
Formal	75684	87306	93683	106596	114243	124842	155021	187390	203221	175658	182729
Informal	16983	20062	21508	22637	24021	26918	27955	30333	31040	29204	29265
share informal	18.3	18.7	18.7	17.5	17.4	17.7	15.3	13.9	13.3	14.3	13.8

Source: Study team's estimates

Table 2f shows the formal and informal GVA of the construction industry. The informal sector's share was highest (18.3 percent) in 2010/11, gradually decreasing in the preceding years, and reaching its lowest (13.8 percent) in 2020/21.

7. Wholesale and retail trade; repair of motor vehicles and motorcycles

It is Nepal's second largest industry, accounting for 15.7 percent of the country's GDP in 2020/21. The trade margin generated in the process of trading the goods is the output of wholesale and retail trade, while total revenue collected through the motor vehicle and motorcycle repair services is the output of repairing motor vehicles and motorcycles. Most of the wholesale trade is formal while retail trade and repair activities operated by households without registration are informal. The majority of domestic vegetable and fruit trade activities are operated informally.

The Nepal Living Standards Survey 2010/11, the Economic Census 2017/18, and the Distributive Trade Survey 2008 are the major data sources for the compilation of informal sector GVA in this industry. The NLSS gives the mean trade margin and intermediate consumption of the informal trade enterprises for the year 2010/11. The economic census gives the total number of informal trade enterprises in the country by the starting year of operation. The trade margin survey also provides information on the trade margin of various goods. Based on this information, an informal GVA of the trade industry is calculated. Similarly, the informal GVA of the motor vehicle and motorcycle repair services is calculated using economic census data. The GDP price deflector of the same industry is used as a price indicator, and the number of enterprises per year is used as a volume indicator to forward the series. Formal GVA is calculated by subtracting informal GVA from Total GVA compiled by CBS.

Appendix Table 2g: Formal and informal GVA of wholesale and retail trade; repair of the motor vehicle and motorcycle industry (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Wholesale and retail trade; repair of motor vehicles and motorcycles	220804	242672	274271	313364	340847	350779	401489	473652	543045	519565	585013
Formal	184621	203110	229781	264379	288574	294342	341845	412296	476533	446726	505376
Informal	36183	39562	44490	48984	52274	56436	59644	61355	66512	72838	79637
share informal	16.4	16.3	16.2	15.6	15.3	16.1	14.9	13.0	12.2	14.0	13.6

Source: Study team's estimates

The formal and informal GVA of wholesale and retail trade; repair of the motor vehicle and motorcycle industry is presented in table 2g above. The informal share of GVA in this industry is found 16.4 percent in 2010/11 and gradually decreased in the last years. This indicates that trade enterprises are in the process of formalization in recent years.

8. Transportation and storage

The transportation and storage industry contributed 5.4 percent of GDP in 2020/21. Air transport, land transport, and non-mechanized land transport are the major activities of the transportation sector of Nepal. Non-mechanized land transport activities (like Rickshaws, Tanga, Thelagadi, Gada, etc.) are informal. In Nepal, there are a few cases of water transportation, all of which are of the informal variety. Some cold storages are also informal.

Non-mechanized land transport surveys and economic censuses are major data sources in this industry. The non-mechanized land transport survey estimates the overall informal GVA of the transport sector of the industry, and economic census data is used to estimate the informal GVA of the storage sector. Overall, the informal GVA of the industry is obtained by adding the informal GVA of the transport sector and the informal GVA of the storage sector. The formal GVA of the storage sector is very small compared to the transport sector's GVA. Formal GVA in this industry is obtained by subtracting inform GVA from the total GVA.

Appendix Table 2h: Formal and informal GVA of transport and storage industry (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Transportation and storage	77194	88359	105919	118207	128037	160578	184092	197866	215797	179011	202662
Formal	76442	87513	104997	117252	127085	159623	183256	197112	215073	178373	202068
Informal	753	846	922	955	952	955	836	754	723	638	594
share informal	1.0	1.0	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.4	0.3

Source: Study team's estimates

Table 2h shows the formal and informal GVA of the transport and storage industry. This industry's informal GVA accounts for only 0.3 percent of total GVA in 2020/21, down from 1.0 percent in 2010/11. The main reason for the decreasing share of the informal sector in this industry is that the informal rickshaw has been replaced by the auto-rickshaw, the formal one.

9. Accommodation and food service activities

During the 11 years, accommodation and food services account for approximately 2% to 3% of GDP. Major activities in accommodation services are accommodation services from star hotels, tourist-standard hotels, registered hotels, and lodges operated by households and not registered with any government institution. Similarly, major activities in food service are restaurants and food service activities from restaurants, cafeterias, fast-food restaurants, take-out eating places, mobile food carts, food preparation in a market stall, bars, coffee houses, tea shops, etc. Most of the lodges and tea shops operated by households and not registered with any government institution are informal. Similarly, mobile food carts are also informal.

The Nepal Living Standards Survey 2010/11 and the Economic Census 2017/18 are the two most important data sources for calculating the GVA of this industry's informal sector. NLSS provides household-based accommodation and food services, as well as receiving revenue

from these services. Similarly, the economic census provides information on the number of unregistered enterprises in this sector. These two data sets are used to estimate the industry's informal GVA.

Appendix Table 2i: Formal and informal GVA of Accommodation and food services activities (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Accommodation and food service activities	24510	28857	34778	39234	45907	46276	56149	67315	75650	50261	58173
Formal	11631	14272	17973	20141	24243	22016	29612	38332	45360	17621	23445
Informal	12879	14584	16805	19093	21664	24260	26536	28983	30290	32639	34728
share informal	52.5	50.5	48.3	48.7	47.2	52.4	47.3	43.1	40.0	64.9	59.7

Source: Study team's estimates

Table 2i shows the formal and informal share of GVA for the accommodation and food services industry. It is observed that the share of the informal sector was 52.5 percent in 2010/11 and gradually decreased to 40 percent in 2018/19. The share appears to have increased in 2019/20 and 2020/21. In fact, informal types of accommodation and food services were less affected than formal types due to COVID-19, which increased the share of informal.

10. Information and communication

The share of the information and communication industries has been almost constant, ranging from 2 percent to 3 percent in the past 11 years. All activities in this industry are formal in nature. Very few activities, like cyber centers and telephone booths, operated by households without registration with any government agency are informal, with a very small share.

The Nepal Living Standard Survey 2010/11 and the Economic Census 2017/18 are the two most important data sources for calculating the informal GVA in this industry. The number of informal activities was identified, as with other industries, through an analysis of economic census data, and the average GVA from informal activities in this industry was calculated using NLSS data. By multiplying the total number of informal activities by the average GVA, the total informal GVA is calculated. By subtracting informal GVA from the total GVA of this industry, formal GVA is obtained.

Appendix Table 2j: Formal and informal GVA of information and communication services activities (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Information and communication	31436	37185	40330	51016	56513	60398	68468	70276	74122	77166	81005
Formal	31388	37134	40274	50953	56443	60316	68374	70181	74028	77070	80904
Informal	48	50	56	62	70	82	93	95	94	97	101
share informal	0.15	0.13	0.14	0.12	0.12	0.14	0.14	0.13	0.13	0.13	0.12

Source: Study team's estimates

Table 2j shows the formal and informal GVA of information and communication services activities. The share of informal activities in this industry is very small.

11. Finance and insurance activities

This industry contributes nearly 7 percent to the GDP in 2020/21. This industry covers the activities of Nepal Rastra Bank, commercial banks, development banks, other financial institutions, life and non-life insurance companies, and credit and saving cooperatives. Initially, it was assumed that all activities in this industry were formal. During the data analysis stage, we found some informal activities in this industry. From the economic census data, it was found that most of the women groups (Aama samuha), engaged in the collection and landing of money are not registered in any government institution and have no regular employees. This type of activity is informal and classified into the finance and insurance industry.

The economic census 2017/18 is the major data source to compile the informal GVA of this industry. The total number of intuitions by year is obtained from analyzing the economic census data. The economic census also collected the revenue collection and intermediate expenditure of the enterprises. Outliers are removed from the economic census data before analyzing the data to get the average GVA. Total GVA is calculated by multiplying the total number of institutions and the average GVA of institutions. The GDP deflector of the finance and insurance industry is used as a price indicator and several informal institutions are used as volume indicators to forward and backward the series.

Appendix Table 2k: Formal and informal GVA of finance and insurance services activities (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Financial and insurance activities	68527	74193	81161	92890	107075	127485	158243	186657	207134	235254	256983

Formal	68432	74097	81057	92773	106942	127325	158070	186482	206961	235077	256800
Informal	95	96	104	117	132	159	173	175	173	177	183
share informal	0.14	0.13	0.13	0.13	0.12	0.13	0.11	0.09	0.08	0.08	0.07

Source: Study team's estimates

Table 2k shows the formal and informal GVA of the finance and insurance activities. It is observed that the share of informal GVA was 0.14 percent in 2010/11 and gradually decreased in recent years. Informal share is found only 0.07 percent in 2020/21, which indicates that informal types of institutions in this industry have become formalized in recent years.

12. Real estate activities

This is Nepal's third-largest industry, accounting for 9.43 percent of GDP in 2020/21. This industry includes real estate activities involving owned or leased property, fee or contract real estate activities, and owner-occupied dwelling services. Because of its nature, most of the share is owner-occupied dwelling service, which is treated as informal in this study.

The main data sources for calculating informal GVA in this industry are the economic census, the Nepal living standards survey, and the real estate survey. In general, owner-occupied dwelling service activities and real estate enterprise activities that are not registered and do not employ regular employees are informal. NLSS data has been used to estimate owner-occupied dwelling services. The owner-occupied dwelling service has been estimated using the hedonic regression method. For forecasting the series, the volume indicator is household growth, and the price indicator is the GDP deflator of real estate activities. The activities of informal type enterprises in this industry have been estimated from the economic census data and real estate survey conducted by CBS. The formal GVA of this industry is obtained by subtracting the informal GVA from the overall GVA of this industry.

Appendix Table 2l: Formal and informal GVA of real estate activities (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Real estate activities	143470	154273	174478	186189	191595	216959	244110	264377	295714	317011	352068
Formal	35	38	44	48	52	69	96	116	127	126	149
Informal	143435	154235	174435	186141	191544	216889	244014	264261	295587	316885	351919
share informal	99.98	99.98	99.97	99.97	99.97	99.97	99.96	99.96	99.96	99.96	99.96

Source: Study team's estimates

The formal and informal GVA of the real estate activities is shown in table 2l above. The formal sector's GVA is negligible in comparison to the informal sector's GVA, which is due

to the service of owner-occupied dwellings. Over the last 11 years, the informal sector's share has remained constant.

13. Professional, scientific and technical activities

This industry contributes only 1% to the GDP. This industry's share of GDP has risen in recent years. Legal activities, auditing activities, head office activities, management consultancy activities, architectural and engineering activities and related technical consultancy, technical testing and analysis, scientific research and development, advertising and market research, photographic activities, and other professionals, scientific, and technical activities are all covered under this industry. The share of informal activities is very small in this industry. Photographic activities and legal activities, i.e. the activities of individual lawyers are observed to be informal activities in this industry.

The Economic Census and NLSS are the major data sources in this industry. The economic census has been utilized to obtain the total number of informal enterprises within this industry, and NLSS data has been utilized to obtain the mean GVA of such enterprises by type. Total GVA is obtained by multiplying the mean GVA by the total number of informal enterprises. The number of informal enterprises and GDP deflectors of this industry have been used as volume and price indicators to forward the series. Like in other industries, formal GVA is obtained by subtracting the informal GVA from the total GVA of this industry.

Appendix Table 2m: Formal and informal GVA of professional, scientific, and technical activities (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Professional, scientific and technical activities	12363	14096	16255	18526	20929	23294	26961	29784	32722	35241	39729
Formal	12136	13822	15883	18069	20345	22530	25881	28613	31467	33866	38170
Informal	227	274	372	457	584	765	1080	1172	1255	1375	1559
share informal	1.8	1.9	2.3	2.5	2.8	3.3	4.0	3.9	3.8	3.9	3.9

Source: Study team's estimates

Table 2m shows the formal and informal GVA of professional, scientific, and technical activities. The share of informal activities in this industry was 1.8 percent in 2010/11, and gradually increased to reach 3.9 percent in 2020/21.

14. Administrative and support service activities

This industry contributes less than 1 percent to the GDP. This industry covers rental and leasing activities; employment activities; travel agencies, tour operators, and reservation service; security and investigation activities; cleaning activities; office administrative and support service; photocopying, document preparation, and other specialized office support service; activities of the call center; packaging activities, etc. Most of the enterprises operating these types of activities are formal. Some informalities are found in rental and leasing activities; cleaning activities; office administrative and support services; photocopying, document preparation, and other specialized office support service; activities of the call center; packaging activities.

The economic census 2017/18, NLSS, and some studies conducted by CBS are the major data sources to compile the informal GVA of this industry. The number of enterprises having no at least one regular employee and not registered at any government office has been identified based on economic census data. Similarly, the total GVA of informal types of enterprises by International Standards Industrial Classification rev4 (ISIC) at four-digit levels has been estimated using economic census data. This estimate has been validated by the NLSS data estimate and the study conducted by CBS. The number of informal enterprises and GDP deflectors of this industry have been used as volume and price indicators to forward the series. Like in other industries, formal GVA is obtained by subtracting the informal GVA from the total GVA of this industry.

Appendix Table 2n: Formal and informal GVA of administrative and support service activities (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Administrative and support service activities	5697	6687	8403	10392	12204	14920	16970	19699	25471	27192	28405
Formal	5348	6260	7769	9589	11134	13482	15060	17783	23085	24636	25727
Informal	349	427	634	804	1070	1438	1910	1916	2386	2556	2679
share informal	6.1	6.4	7.5	7.7	8.8	9.6	11.3	9.7	9.4	9.4	9.4

Source: Study team's estimates

Table 2n presents the formal and informal GVA of administrative and support service activities. It is noticed that the share of informal GVA in this industry ranges from 6 percent to 11 percent. The highest share is found in 2016/17 whereas the lowest share is found in 2010/11

15. Public administration and defense; compulsory social security

All the activities within this industry are operated by the government and hence formal. In another word, there is no informality in this industry.

16. Education

In 2020/21, the education industry contributed 8% of the GDP. Pre-primary, primary, secondary, and higher education, as well as sports and recreation education, cultural education, and educational support services, are all included in the education industry. In comparison to the formal sector, the informal sector accounts for a very small portion of the industry. Some household-run tuition centers and dance training centers are considered informal.

Like the other majority of the industry's economic census, NLSS and studies on coaching and tuition centers are the major data sources to compile the informal GVA of this industry. Economic census and NLSS data have been analyzed to estimate the informal GVA of the training center whereas the informal GVA from the tuition center has been calculated using the data of study on tuition and coaching center.

Appendix Table 2o: Formal and informal GVA of education (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Education	75323	91215	102201	126552	143095	161260	197829	219544	251586	288459	300358
Formal	75244	91117	102074	126379	142875	160965	197328	218990	250955	287722	299579
Informal	78	99	127	173	220	295	501	554	631	737	779
share informal	0.10	0.11	0.12	0.14	0.15	0.18	0.25	0.25	0.25	0.26	0.26

Source: Study team's estimates

The formal and informal GVA of the education sector is shown in Table 2o above. The table shows that the informal share was 0.10 percent in 2010/11 and gradually increased and reached 0.26 percent in 2020/21.

17. Health and social work

In 2020/21, this industry contributed 1.7 percent of the GDP. This industry includes human health activities (hospital activities, medical and dental practice activities, and other human health activities), residential care activities, and social work activities without accommodation. Like in the education industry, the informal share is very small in this industry. Some of the traditional medical practices, very few medical clinical activities, and some social activities are informal in this industry.

The economic census, along with NLSS, is the main data source for the compilation of the informal GVA in this industry. The total number of informal types of institutions in this industry has been estimated from economic census data, and the average GVA per institution has been estimated from NLSS data. Total informal GVA is obtained by multiplying the total number by the average GVA.

Appendix Table 2p: Formal and informal GVA of human health and social work activities (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Human health and social work activities	16885	19944	21280	26740	31997	33187	41455	44062	49776	60328	64643
Formal	16855	19905	21229	26671	31908	33072	41265	43865	49560	60072	64377
Informal	30	38	50	68	89	115	190	197	215	256	267
share informal	0.18	0.19	0.24	0.26	0.28	0.35	0.46	0.45	0.43	0.43	0.41

Source: Study team's estimates

Table 2p shows the formal and informal GVA of human health and social work activities. It is observed that the share of the informal sector is less than 0.5 percent in 11 years.

18. Arts, entertainment, and recreation; Other service activities; and Activities of households as employers; undifferentiated goods- and services-producing activities

Due to the small size of the GVA, this industry is a combination of four industries as defined in the International Standard Industrial Classification (ISIC rev4). Arts, entertainment, and recreation; other service activities; activities of households as employers; undifferentiated goods-and-services-producing activities of households for their own use; and activities of extraterritorial organizations and bodies are the four industries combined into one industry for the simplicity of presentation. However, activities of extraterritorial organizations and bodies do not fall within the production boundaries and are not included here. This combined industry contributes only 0.61 percent to the GDP in 2020/21. Activities of households as employers; undifferentiated goods-and-services-producing activities of households for their own use are informal in nature. Some of the other activities like repair of personal and household goods, repair of footwear and leather goods, etc. are informal.

The economic census and NLSS are the main data source for the compilation of the informal GVA in this industry. Informal GVA has been estimated from NLSS and economic census data has been used to verify the results.

Appendix Table 2q: Formal and informal GVA of Arts, entertainment, and recreation; other service activities; and Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use activities (in million Rs.)

Industry	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Arts, entertainment, and recreation; Other service activities; and Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	6664	7710	8679	9948	11654	12811	14787	16050	17933	21364	22892
Formal	4254	4969	5597	6414	7518	8305	9635	10528	12345	15089	16637
Informal	2411	2742	3082	3533	4136	4507	5152	5522	5588	6275	6256
share informal	36.2	35.6	35.5	35.5	35.5	35.2	34.8	34.4	31.2	29.4	27.3

Source: Study team's estimates

Table 2q shows the formal and informal GVA of arts, entertainment, recreation, other service activities; and activities of households as employers; undifferentiated goods and services-producing activities of households for own use. The share of informal GVA in this industry was found 36 percent in 2010/11, gradually decreasing to 26.3 percent in 2020/21.

Appendix 3: Technical details for the currency demand approach

Stationarity test

The study first checks for the stationarity of time series variables used in the regression analysis. This test gives an idea of the stability of the model. The Phillip-Perron test[9] is used to check for the existence of unit root test in the data. The test result in Table 1 shows that all the variables used in the model are I (1) i.e., they are integrated of order 1 (first difference).

Appendix Table 3a: Stationarity test

	Level form (t-statistics)		First difference (t-statistics)	
	Constant	Constant and Trend	Constant	Constant and Trend
LNCCM1	-2.050	-2.541	-6.214***	-5.927***
LNCONGDP	-2.372	-2.308	-5.365***	-4.826***
LNBD	-2.074	-1.827	-4.293***	-4.530***
LNTAXGDP	-0.057	-1.659	-4.640***	-4.807**
LNUNEMP	1.191	-0.208	-3.084**	-3.746**
LNNOC	2.291	-0.397	-2.983**	-4.386***
DMN	-0.394	-1.427	-5.291***	-5.493***

Source: Study team's estimates

The results in Appendix Table 3a indicate that there exists a long-run relationship between the variables.

Engle-Granger Test

The study further confirms the existence of such long-run relationships using the Engle-Granger test. The t-statistics reported in Appendix Table 3b indicate the rejection of null hypotheses of no cointegration at the 1 percent level which is presented as follows.

Appendix Table 3b: Engle-Granger test results for the existence of a long-run relationship

Engle-Granger test	t-statistics
Test Statistics	-6.112***
Critical values	
1%	*-2.647*
5%	*-1.953*
10%	*-1.610*

Source: Study team's estimates

Based on the results from Appendix Table 3a and 3b above, this study employs a vector error correction model (VECM). The model belongs to a category of multiple time series models most used for data where the underlying variables have a long-run stochastic trend i.e.,

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[9] The unit root test result using augmented dickey fuller test is consistent with the result from Phillips-Perron test.

cointegration. It adjusts to both short-run changes and deviation from equilibrium. The lag length criteria suggest choosing one lag for estimating VECM. A crucial parameter in the estimation of the VECM dynamic model is the coefficient of the error correction term which measures the speed of adjustment of growth in the dependent variable to its equilibrium level (Engle Granger, 1987).[10]

Regression Results

The short-run estimates report the error correction parameter to be -0.14 indicating that the speed of adjustment of the dependent variable to its equilibrium level is negative and significant at the 5 percent level. This means that the variable adjusts in the long run. Appendix Table 3c shows the results of VECM (only long-run estimates are reported) where fully modified least squares (FMOLS) is used. FMOLS has an advantage in that it corrects errors when the criteria of the ordinary mean are not fully satisfied i.e. if there exists autocorrelation. Also, this method can be used when there is a problem relating to the coherence of variation for the series of residuals (Park, 1992).

Appendix Table 3c: Regression Results for the currency demand equation (Long run model)

Variables	*With excessive demand factors* Coefficient (Standard Error)	*Without excessive demand factors* Coefficient (Standard Error)
Economic activity (LNCONGDP)	0.535*** (0.091)	0.489** (0.147)
Bank deposit rate (LNBD)	-0.029*** (0.005)	-0.023*** (0.010)
Excessive demand factors		
Tax burden (LNTAXGDP)	0.586*** (0.129)	
Unemployment Rate (LNUNEMP)	0.041*** (0.009)	
Other variables		
Number of commercial bank branches (LNNOC)	-0.041*** (0.007)	0.001 (0.003)
Dummy for Demonetization in India (DMN)	-0.019*** (0.005)	-0.011 (0.013)
Constant	0.345***	0.201**

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[10] The VECM model is not presented here for the convenience purpose. We also run several diagnostics (such as for normality of residuals, serial correlation and model specification tests) and stability tests (such as CUSUSM and CUSUM of squares test). The model passes all the tests (See below).

	(0.071)	(0.093)
Adj R-squared	0.534	0.314
Number of observations	29	29

Robust standard errors in parentheses

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

The results in Appendix Table 3c show the regression results of VECM using FMOLS. Most of the signs of the coefficients are intuitive in both models, irrespective of whether excessive demand factors such as tax burden and unemployment rate are included in the models. The proxy used to indicate the extent of economic activity (Consumption/GDP) is positively related with currency demand while bank deposit rate is negatively associated. Higher consumption standards such as expenses on luxuries may call for higher demand for money for carrying out informal economic activities. The latter, as mentioned above, reflects an opportunity cost of money, and any increase in the interest rate on deposit would reduce the demand for money that could potentially be used to conduct underground economic activities.

The sign of the coefficients of excessive demand factors are also intuitive. They both are positive, suggesting that an increase in tax burden and unemployment rate in the economy would induce economic agents to demand more cash to carry out underground economic activities.
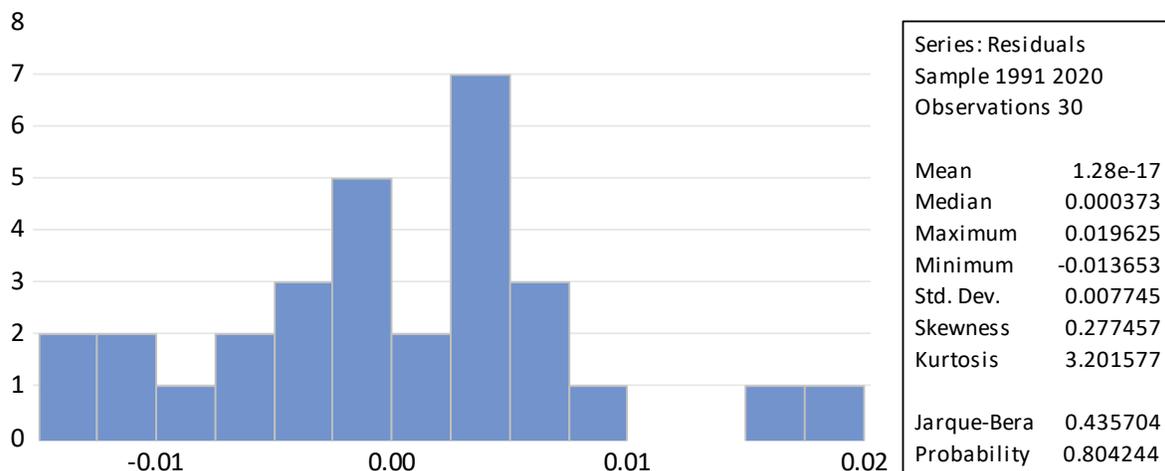
The sign of coefficients of number of commercial banks is negative and significant in the model where excessive demand factors are also significant. This also goes with our expectation suggesting that financial sector reforms and the innovation in the banking system (for e.g., the introduction of digital payment system) would reduce the demand for cash in the economy and thereby reducing the extent of underground economic activities. Likewise, demonetization in India shows a significant negative effect on demand for cash in Nepalese economy suggesting huge interdependence between two economies and any policy change in India would have a significant effect on Nepalese economy. The result, in that respect, indicates to a significant policy message i.e., demonetization in India in 2016 not only reduced the informal economic activities in India but also in Nepal; this may be more possibly in southern borders and other areas of the country where Indian currency is largely used for carrying out economic activities, both formal and informal.

Estimates of informal economy

Next, the study follows the following steps to estimate the size of the informal economy (informal economy). First, the amount of illegal money is calculated by taking the difference in the fitted value between the currency demand including excessive demand factors and currency demand without them. The difference for every time period is then multiplied by M1. This gives the amount of illegal money (IM). The amount of legal money (LM) is then the difference between M1 and LM. Then IM is multiplied by the velocity of money (V) to derive the extent of informal economy. Since V is not directly observable for IM, V is

50

assumed to be equivalent to the velocity of money for LM. In other words, V is derived by dividing GDP by LM.

Appendix 4: Normality test of the residuals of CDM specification

Series: Residuals	
Sample 1991 2020	
Observations 30	
Mean	1.28e-17
Median	0.000373
Maximum	0.019625
Minimum	-0.013653
Std. Dev.	0.007745
Skewness	0.277457
Kurtosis	3.201577
Jarque-Bera	0.435704
Probability	0.804244

Source: Study team's estimates

Appendix 5: Autocorrelation and serial correlation test (CDM)

Date: 08/06/22   Time: 12:22
Sample: 1991 2020
Included observations: 30

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.151	-0.151	0.7555	0.385
		2	-0.220	-0.248	2.4098	0.300
		3	-0.066	-0.158	2.5633	0.464
		4	-0.273	-0.417	5.3216	0.256
		5	0.336	0.151	9.6518	0.086
		6	0.170	0.109	10.809	0.094
		7	-0.244	-0.155	13.301	0.065
		8	-0.115	-0.209	13.883	0.085
		9	-0.150	-0.181	14.913	0.093
		10	0.023	-0.219	14.940	0.134
		11	0.237	-0.152	17.785	0.087
		12	0.010	-0.094	17.790	0.122
		13	-0.242	-0.353	21.090	0.071
		14	0.158	0.042	22.583	0.067
		15	-0.045	-0.150	22.710	0.090
		16	0.141	-0.010	24.068	0.088

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 3 lags

F-statistic	1.053750	Prob. F(3,20)	0.3907
Obs*R-squared	4.094662	Prob. Chi-Square(3)	0.2514

Source: Study team's estimates

Appendix 6: Homoscedasticity test (CDM)

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.378041	Prob. F(6,23)	0.8854
Obs*R-squared	2.692997	Prob. Chi-Square(6)	0.8463
Scaled explained SS	1.742421	Prob. Chi-Square(6)	0.9418

Heteroskedasticity Test: ARCH

F-statistic	1.220857	Prob. F(1,27)	0.2789
Obs*R-squared	1.254564	Prob. Chi-Square(1)	0.2627

Appendix 7: Model Specification test (CDM)

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: LNCCM1 C LNBD LNCONGDP LNTAXGDP LNUER LNNOC
    DMN

	Value	df	Probability
t-statistic	1.252856	22	0.2234
F-statistic	1.569647	(1, 22)	0.2234
Likelihood ratio	2.067519	1	0.1505

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.000116	1	0.000116
Restricted SSR	0.001740	23	7.56E-05
Unrestricted SSR	0.001624	22	7.38E-05

LR test summary:

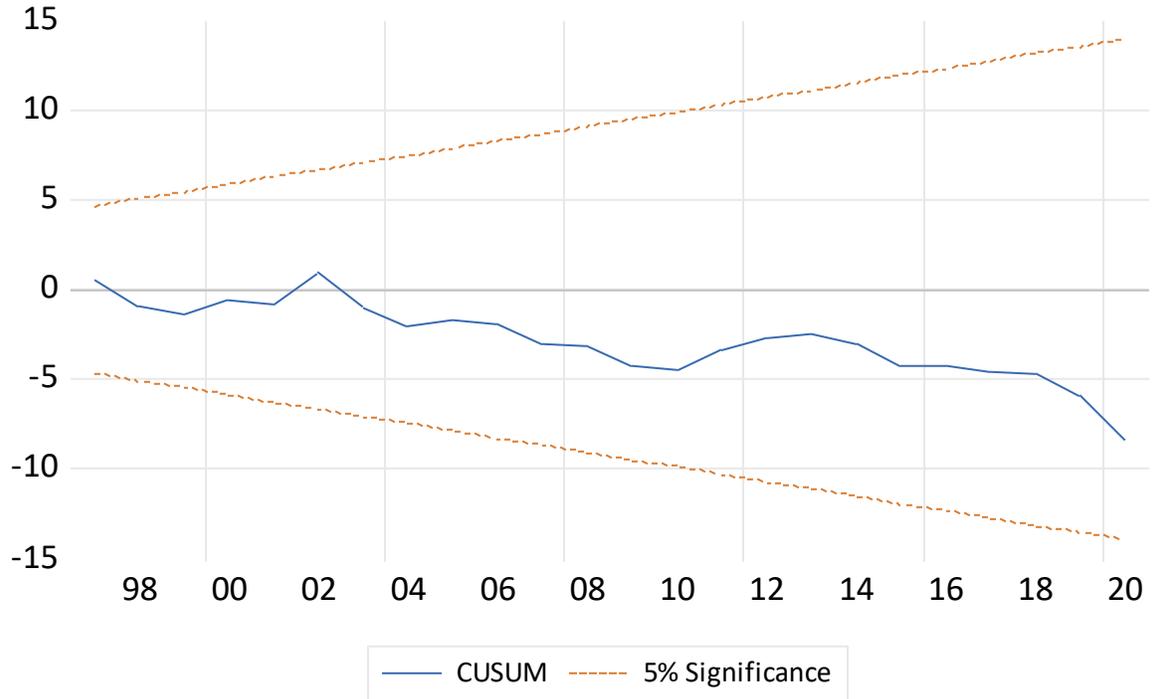|	Value
Restricted LogL	103.7618
Unrestricted LogL	104.7956

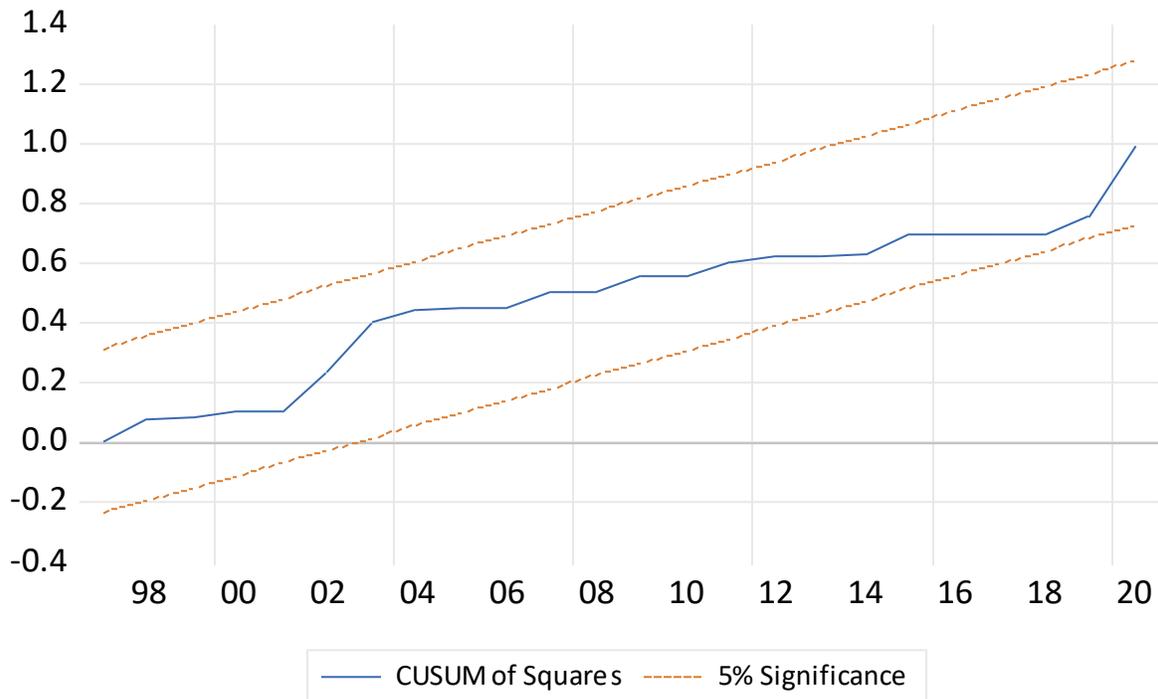*Source*: Study team's estimates

Appendix 8: Model Stability test (CDM)

i)   CUSUSM test

ii)   CUSUSM of squares test

Source: Study team's estimates