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The underground economy in Canada, 1992 to 2011

by Charles Morissette

National Economic Accounts Division



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The following symbols are used in Statistics Canada publications:

- | | |
|----------|--|
| . | not available for any reference period |
| .. | not available for a specific reference period |
| ... | not applicable |
| 0 | true zero or a value rounded to zero |
| 0s | value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded |
| <i>p</i> | preliminary |
| <i>r</i> | revised |
| <i>x</i> | suppressed to meet the confidentiality requirements of the <i>Statistics Act</i> |
| <i>E</i> | use with caution |
| <i>F</i> | too unreliable to be published |
| * | significantly different from reference category ($p < 0.05$) |

Contents

Acknowledgements	4
Acronyms.....	5
1 Introduction	6
2 Definition and scope of the study	6
3 Methodology and data sources	9
4 Results	12
5 Conclusion and further work	17
Appendix A: Underground economy statistical tables.....	18
Appendix B: Related indicators.....	27
Appendix C: Specific methodologies	29
References	52

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Acronyms

ACD	Association of Canadian Distillers
BR	Business Register
CANSIM	CANSIM is Statistics Canada's key socioeconomic database
CMHC	Canada Mortgage and Housing Corporation
CPI	Consumer Price Index
CRA	Canada Revenue Agency
CSNA	Canadian System of National Accounts
CTUMS	Canadian Tobacco Use Monitoring Survey
GST	Goods and Services Tax
GDP	Gross Domestic Product
HRRS	Homeowner Repair and Renovation Survey
HST	Harmonized Sales Tax
LCBO	Liquor Control Board of Ontario
NAICS 2007	North American Industry Classification System (2007)
NEAD	National Economic Accounts Division
NOE	Non-observed economy
OECD	Organisation for Economic Co-operation and Development
SHS	Survey of Household Spending
SNA	System of National Accounts
T1	Tax form for unincorporated businesses in Canada
T2	Tax form for incorporated businesses in Canada
UE	Underground Economy
WHO	World Health Organization

1 Introduction

The aim of the Underground Economy (UE) study is to provide information on the extent of underground economic activity in Canada and the sources of these activities. The impact of these activities on the measurement of published gross domestic product (GDP) for Canada is also of concern.

The measurement of the underground economy at Statistics Canada is not new. The first study was carried out by Berger (1986)¹, followed by Gervais (1994)², then Terefe, Barber-Dueck and Lamontagne (2011)³ and Morissette (2012)⁴. The current study is a continuation of this work, and draws heavily on it, specifically the work of Gervais (1994) and Terefe, Barber-Dueck and Lamontagne (2011).

The current study is largely comparable to the one published in September 2012 for the period 1992 to 2009. It incorporates the revised definitions and classifications used by the Canadian System of National Accounts (CSNA) that were introduced in October 2012. The results are also more timely, covering the period 1992 to 2011. Finally, a volume measure of UE activity is introduced.

Readers should be careful in interpreting the results of this study. First, estimates presented give an upper bound. In order to derive these bounds, assumptions were made to estimate the maximum potential underground activity beyond what is already included in GDP using standard methods. Second, by its very nature, it is difficult to obtain information on UE activities so that the estimates necessarily rely on assumptions, weak indicative information and various indirect methods. Third, the official GDP already includes some implicit and explicit adjustments for UE activity.⁵ For these reasons the estimates calculated in this study cannot simply be added to the official GDP to arrive at a measure of GDP including UE activity.

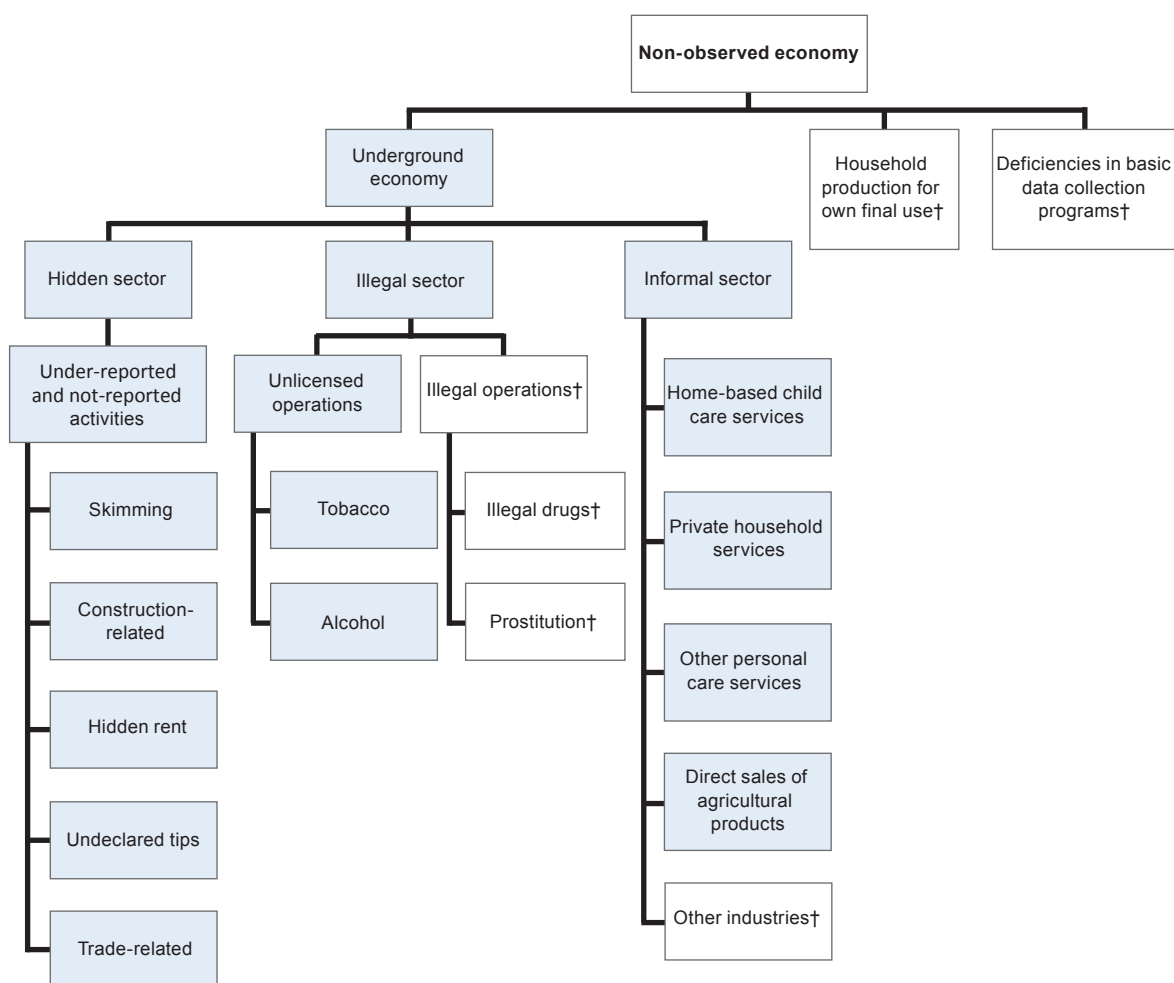
The report is organized as follows. The next section deals with the definition and scope of the study. This is followed by a section on data sources and methods. Results are presented in Section 4 for GDP aggregates of the expenditure, income and industry accounts for selected years over the period 1992 to 2011, but available on request for all years. The report concludes with a summary and recommendations for future work. Included in appendices are various statistical tables and detailed methodology.

2 Definition and scope of the study

According to the Handbook for the Measurement of the Non-observed Economy, the five groups of activities that are collectively said to comprise the non-observed economy (NOE) are: (1) the hidden or underground sector, (2) the illegal sector, (3) the informal sector, (4) household production for own final use, and (5) deficiencies in the basic data collection programme (see Chart 1).⁶

The scope of this study is limited to market based productive activities carried out in selected components of the hidden, illegal, and informal sectors of the economy (i.e., the shaded areas in Chart 1). Some illegal production and all household production for own final use will not be included in the estimates. Statistical issues related to deficiencies in the basic data collection programme will not be addressed either.

-
1. Berger, Seymour 1986, *The Unrecorded Economy: Concepts, Approach and Preliminary Estimates for Canada, 1981*, Canadian Statistical Review, Ottawa, Ontario.
 2. Gervais, Gylianne 1994, *The Size of the Underground Economy in Canada*, Statistics Canada, Catalogue no 13-603-MPE1994002. Ottawa, Ontario.
 3. Terefe, Barber-Dueck, Lamontagne 2011, *Estimating the Underground Economy in Canada, 1992-2008*, Statistics Canada, Income and Expenditure Accounts Division, Ottawa, Ontario.
 4. Morissette, Charles 2012, *The underground economy in Canada, 1992 to 2009*. Statistics Canada, The Daily, September 21st 2012. Ottawa, Ontario.
 5. Some underground activity is explicitly adjusted for in the accounts (e.g., contraband tobacco). Other activities may be implicitly included through the balancing adjustments made to the accounts.
 6. "Measuring the Non-Observed Economy: A Handbook" (Organisation for Economic Co-operation and Development, International Monetary Fund, International Labour Organisation and CIS STAT (2002)).

Chart 1 Framework for non-observed economy and underground economy**Notes:**

Three of the five non-observed economy (NOE) sectors, the hidden, the illegal, and the informal together make up the underground economy.

The categories marked with a dagger (†) are not included in the scope of the study. They are household production for own final use, deficiencies in basic data collection programs, illegal operations, illegal drugs, prostitution, and other industries.

Source: Statistics Canada.

2.1 Hidden sector

The hidden sector (also referred to as underground production in the Organisation for Economic Co-operation and Development (OECD) handbook) is defined as “those activities that are productive and legal but are deliberately concealed from public authorities”⁷ generally for the following reasons:

- to avoid payment of income, value added or other taxes;
- to avoid payment of social security contributions;
- to avoid having to meet certain legal standards such as minimum wages, maximum hours, safety or health standards, etc.;
- to avoid complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms.

7. Ibid., p. 37-38.

The hidden sector includes both non-reported and under-reported production. In the latter case, it takes the form of under-reporting of revenues (or gross output), or over-reporting of costs (or intermediate inputs) in order to understate profits (or value added) to authorities or statistical agencies. This is labeled as skimming. In the former case, revenues, costs and profits are simply not reported.

In Canada, the hidden sector consists of skimming, construction-related activity, hidden rent, undeclared tips and export-related underground activities.

2.2 Illegal sector

The illegal sector represents illegal production of goods and services whose production, sale, distribution or mere possession is forbidden by law, as well as productive activities which are usually legal but become illegal when carried out by unauthorized or unlicensed producers.

Based on Blades (1983),⁸ the following general types of illegal production are identified:

- production and distribution of illegal goods, such as banned drugs or pornographic material;
- production of illegal services, such as prostitution (in countries where this is illegal);
- production activities which are usually legal but which become illegal when carried out by unauthorized producers, such as unlicensed medical practices, unlicensed gambling activities, unlicensed production of alcohol;
- poaching, e.g., illegal fishing, hunting, tree cutting;
- production and sale of counterfeited products, such as watches and other products with false trade-marks and unauthorized copies of artistic originals, e.g., software, compact discs (CD) and videos;
- smuggling, in particular of tobacco, weapons, alcohol, food, people, both wholesale and retail;
- fencing (resale) of stolen goods;
- bribery;
- money laundering.

Unlicensed operations represent those productive activities which are usually legal but become illegal when carried out by unauthorized producers. This study includes the illegal manufacturing, sales and imports (smuggling) of alcohol and tobacco, which are the two most important cases of unlicensed operations in Canada.

Illegal operations represent the production of goods and services whose sale, distribution or mere possession is forbidden by law, such as the production and sale of narcotic drugs. This study does not attempt to measure activity that is forbidden by law, due to the difficulty of obtaining reliable source data in these areas.

2.3 Informal sector

The informal sector represents informal production activities associated with establishments that are not registered with fiscal or social security authorities. As a result, they are generally missing from survey frames of statistical agencies, such as the Business Register (BR) used by Statistics Canada.^{9,10} These entities include unincorporated businesses operating legally as unregistered establishments of the self-employed with and without informal employees.

The informal production activities included in this study are child-care in the home, private household services, other personal care services, and direct sales of agricultural products. Although household expenditure on these services is likely captured by the Survey of Household Spending (SHS), and is part of expenditure-based GDP, it is believed that income from these activities could be potentially missing from the income side of GDP.

8. Blades, D. W. 1983. "Crime: What Should Be Included in the National Accounts and What Difference Would It Make." *The Economics of the Shadow Economy*, Proceedings of the International Conference on the Economics of Shadow Economy, University of Bielefeld, Series in Contemporary Economics, vol. 15.

9. The BR is a repository of information reflecting the Canadian business population and exists primarily for the purpose of supplying frames for all economic surveys at Statistics Canada. Only businesses with a business number issued by the Canada Revenue Agency are represented on the BR. For more details, see Definitions and Concepts Used in the Business Register, Business Register Division, Statistics Canada (February 13, 2009).

10. In Canada, small businesses with total taxable revenues before expenses of \$30,000 or less in the last four consecutive calendar quarters and in any single calendar quarter do not have to charge GST/HST to customers.

The estimate of direct sales of agricultural products represents undeclared income of individuals selling farm produce such as fruits, vegetables, eggs and honey on road sides or temporary stands directly to consumers. This income is potentially missing from the income component of the retail industry or implicitly included elsewhere through national accounts balancing adjustments. The expenditure on these products is captured by the SHS and is in the published GDP numbers.

Firms or establishments operating in other industries without being registered with the fiscal or social security authorities are not included in this study. Although it is possible that underground activity exists in other industries, they have been excluded until further research determines the magnitude of this missing productive activity.

2.4 Household production for own final use

Production of households for own final use is defined as those productive activities that result in goods or services consumed by the households that produced them.

All goods produced by households on own-account are included in the CSNA production boundary, however, in Canada, in practice, only food grown by farmers for own-consumption is included. Services produced by households, on the other hand, are not included within the production boundary (e.g., cleaning, laundry) except for own-account rent, which already has a measurement methodology. Owner-occupied rent is counted in the official GDP, but not considered in this study.

2.5 Deficiencies in basic data collection program

The term “basic data collection program” is used to describe the statistical infrastructure and survey procedures that collect and process basic economic data.

The Canadian System of National Accounts (CSNA) and its feeder programs within Statistics Canada have developed a wide range of methods and procedures that address deficiencies in basic data collection. Statistics Canada data sources, from surveys or administrative forms, are subject to a quality assurance process that closely monitors and adjusts the data sampling and collection frames, employs a rigorous follow-up of surveys and subjects all data responses to validation checks to ensure the correctness and consistency of data.

After appropriate transformation to national accounting concepts, these datasets are used in the national accounts compilation process. Where these basic data are inadequate, the data gaps are filled and inconsistencies are resolved using indirect compilation methods that model the missing data using other related data (indicators) and that enforce accounting identities.

Given the various stages of data verification, integration and reconciliation carried out in the statistical system, this particular source of mis-measurement of the official GDP is not considered significant, and is not considered in this study.

3 Methodology and data sources

3.1 Broad methods of measurement

The OECD Handbook suggests four broad methods for measuring the non-observed economy. They include:

- upper bound estimation;
- special surveys and other supplementary data;
- data confrontation and discrepancy analysis;
- macro-model methods.

The **upper bound method** is used in Statistics Canada studies.¹¹ As mentioned in the OECD Handbook, “the essence of the procedure is to consider systematically for each component of GDP the maximum possible amount of non-observed economy (NOE) activities and to total the results to obtain an upper bound. The procedure can be applied by any or all of the expenditure, income and production approaches.”¹² An example of this would be child care services; given the number of children under the age of five, and the proportion of families using child care services, it is possible to calculate an upper bound estimate of spending on child care.

Another method entails the use of **special surveys and other supplementary data**. The OECD Handbook indicates that “these are surveys that are not part of the basic data collection programme. They can take a variety of forms, being special surveys of expenditure, income, labour, time use, and opinion surveys. They can be designed to target any or all of the NOE problem areas – underground, illegal, informal sector and household production for own use. They can be conducted by the national statistical office or by other agencies including, for example, sample audits by the tax authorities.”¹³ For instance, this study examines tax audit files and compares them to survey information and to original revenues and expenses reported in tax returns. One difficulty associated with this approach is that the different sources of information are not always comparable. Consequently, differences between them may simply be due to misreporting as opposed to UE.

A third method suggested in the OECD Handbook is **data confrontation and discrepancy analysis**. The OECD highlights the fact that confrontation of data from different sources is an integral part of national accounts compilation. Examples of possible data confrontation are also listed in the OECD handbook,¹⁴ and used in the regular production process of the CSNA:

- Enterprise survey data *versus* taxation data; wages paid *versus* taxes raised; sales of goods and services due to value added tax *versus* value added tax raised; and production *versus* production related taxes;
- Enterprise survey data measuring the production of commodities *versus* enterprise survey data measuring purchases of commodities; supply of goods and services *versus* the use of them;
- Expenditure survey data *versus* retail trade survey data; household expenditures *versus* retail trade;
- Expenditure survey data *versus* income or taxation data; household expenditures *versus* available income;
- Enterprise survey data *versus* labour force survey data; use of labour *versus* supply of labour; turnover, value added, intermediate consumption, etc. *versus* the use of labour.

Macro-model methods are discussed in Chapter 12 of the OECD Handbook but are not recommended as accurate measures of the underground or non-observed economy. The OECD suggests that these methods do not properly measure underground activity and provide very divergent results depending on the assumptions used.¹⁵

3.2 Overview of the CSNA estimation methodology

This study uses each of the first three methods listed above. The upper bound method is used to create most of the UE estimates relating to household spending and construction. Supplementary data is used for alcohol and tobacco and to refine estimates where possible and provide information on industry allocation. Data confrontation provides further indicators of the industrial distribution of UE activity.

Before explaining the approach used to measure UE GDP, the three ways to measure GDP are summarized. First, the final expenditure approach consists of summing the final expenditures on goods and services (household and government final spending, business investment outlays, and net exports). Second, the income approach consists in summing all the factor incomes (compensation of employees, gross operating surplus, and mixed income) generated in the production process plus net taxes on products and on production. Third, the industry or value-added approach consists of measuring the total production of each industry and removing the cost of intermediate inputs. When summed across all industries this results in the GDP at basic prices, GDP at market prices is obtained by adding taxes less subsidies on products to the GDP at basic prices.

11. Gervais, Gylianne 1994, The Size of the Underground Economy in Canada, Statistics Canada, Catalogue no. 13-603-MPE1994002. Ottawa, Ontario. And Statistics Canada (2011) “Estimating the Underground Economy in Canada, 1998-2008”.

12. “Measuring the Non-Observed Economy: A Handbook” (Organisation for Economic Co-operation and Development, International Monetary Fund, International Labour Organisation and CIS STAT (2002)). p. 54.

13. Ibid., p. 59.

14. Ibid., p. 51.

15. Ibid., p. 187.

Estimates of UE activity in Canada are most easily measured using the first approach mentioned above, by examining final expenditures by the various sectors in the economy: households, corporations, government, non-profit institutions serving households and non-residents. It is assumed here that final expenditures of government and non-profit institutions serving households are not underreported. For the other sectors, most of the estimates use the upper bound approach (see Appendix C for more detail). In the household sector, specific methodologies are used for final consumption of tobacco, alcohol, tips, and rents while an upper bound approach is used for all other commodities purchased by households. In this case, the UE activity is referred to as skimming.

In gross fixed capital formation,¹⁶ in the corporate sector, the upper bound method is also used. Residential construction is considered the only investment activity that is prone to underground transactions. In the non-resident sector, UE exports are based on upper bound assumptions and imports, a deduction in the calculation of GDP, are estimated using a lower bound approach. While there could be some UE activities in the components of final demand where the study assumes no such activity (e.g. non-profit organizations and government), the assumption is that it is negligible.

Income-based UE GDP is benchmarked to the expenditure-based UE GDP estimate, and allocated to wages, surplus or mixed income based on assumptions outlined in Appendix C. It is important to note that returns to labour in the underground economy are assumed to be all in the form of wages, that is, there are no additional employer costs (e.g., EI and CPP/QPP premiums, employer pension contributions, etc.). Finally, consistent with the assumption made for the expenditure-side estimates, no revenue is assumed to flow directly to government from UE activities.¹⁷ In other words, taxes collected and subsidies paid out are not hidden.

The industry-based UE GDP estimate is also benchmarked to the expenditure-based UE GDP estimate at the total level. For all the components that have a specific methodology in the GDP expenditure-based approach, the allocation by industry is done directly. This covers tobacco, alcohol, tips, construction, exports and imports. For the estimates of skimming, a confrontation approach using two different methods to allocate the UE activity by industry is used. First, the estimates of skimming (see explanation in Sections C.1.1.1 and C.3.2 in Appendix C) are allocated to the industry in which they are produced. Second, information from tax audit files from CRA is utilized to confront and adjust this distribution.

To summarize, several key assumptions are used throughout the study, namely:

- small business are more likely to participate in UE activities than large businesses;
- unincorporated businesses are more likely to engage in UE activities than incorporated businesses;
- the non-profit and government sectors do not take part in underground activity;
- corporate investment in machinery and equipment as well as intellectual property is not subject to underground activity.

Assumptions like these are necessary, given the limited amount of direct information available on underground transactions. While debatable, they are considered reasonable for current purposes. If new information became available or more realistic assumptions were determined, they would be taken into account.

Appendix C explains in more detail the specific methodologies and assumptions used throughout the study.

3.3 Volume

With this study, a measure of the real underground economic activity (i.e., adjusted for inflation) is introduced. This is done using the same approach as used for the published real GDP, the Chain Fisher method.¹⁸ The Chain Fisher method is considered the best approach to estimate the growth in volume and prices. The reference year chosen was 2007, the same as for the official GDP, which facilitates the comparison with official estimates.

16. This is the national accounts terminology for investment in physical assets.

17. This does not exclude the possibility that UE activities could indirectly contribute to government income. In fact income from UE activities eventually finds its way back into the formal economy, and thus generates tax revenue.

18. See Chapter 2 of *Guide to the Income and Expenditure Accounts*, Statistics Canada, Catalogue no. 13-017-XWE.

The volume component of UE activity is measured by dividing the nominal value of a given series by an appropriate price index. This is referred to as deflation. For the UE estimates, the deflation of a series (such as household spending on alcohol) occurs at the lowest possible level for which a representative price index can be found. The deflated series are then aggregated together to derive various totals.

Real UE gross domestic product (UE GDP) is estimated from 124 series. The nominal values in these series are derived as described in the preceding sections. The price indexes are adjusted to remove tax for the household spending categories, as tax is not paid on UE purchases. Prices for gross fixed capital formation and exports are already “without taxes”. The prices for imports are not adjusted because of a lack of information.

3.4 Data sources summary

Several data sources are used in this study. CSNA estimates, available in June 2013, were used extensively. Among them, the 2009 Input-Output tables were used to prepare all conversion matrixes relating industry information to household spending information. The Canadian productivity accounts were used to derive GDP by industry on a nominal basis. The income and expenditure accounts provided the time series for household spending and gross fixed capital formation.

Census of Population, Census technical reports and the SHS were used for households and dwelling estimates used in the estimation of rent and the analysis of UE spending on a household basis. The SHS was also used to validate skimming estimates for some categories of spending.

LCBO annual reports and information were used as a basis to estimate illegal alcohol.

The overall consumer price index (CPI) was used to derive the threshold (in terms of gross business income at constant prices) that define “small” businesses in this study. It was used in conjunction with tax databases maintained at Statistics Canada by the Tax Data Division.¹⁹ These databases pertain to unincorporated (from the T1 income tax form) and incorporated business (from the T2 income tax form) income tax returns. By using this tax information it was possible to obtain the operating revenues and operating expenses on a NAICS basis for businesses in Canada. These were used as the main input into the skimming estimates.

The Tax Data Division also provided a tax audit data file for incorporated businesses showing the original information provided on the tax return and the latest information after all audits by the CRA. This file was used to estimate reassessment rates by industry. The estimates derived from this file were used to obtain a better industry allocation of skimming.

4 Results

As mentioned earlier, CSNA makes both explicit and implicit adjustments to account for UE in the official GDP. This study applies assumptions to derive upper limit estimates of UE based on the various components of GDP. As such, these estimates expand the scope of UE already covered in the CSNA.

In 2011, total underground economy activity was \$40.9 billion at an estimated upper bound. This is equivalent to 2.3% of GDP (see Chart 2).²⁰ This proportion trended down during the mid- to late 1990s from a high of 2.6% in 1994. However, from 2001 to 2011, the proportion was relatively stable at 2.3%.

In 2011, UE activity was 4.1% higher (in nominal terms) than in 2010, a slower pace of increase than GDP²¹ (+5.8%). When taking out the effect of inflation, UE activity increased 1.3% in 2011, much slower than the 2.5% measured by real GDP.

From 2001 to 2011, UE activity increased 56% in nominal terms, similar to GDP (+55%). This contrasts with the 1992 to 2000 period when UE activity increased at a slower pace (+37%) than GDP (+54%). The same pattern is observed when removing the effect of inflation. Among the reasons that explain the slower growth in the 1990s, is the fact that some of the sectors in which UE activity is most prevalent, grew more slowly than the rest of the economy.

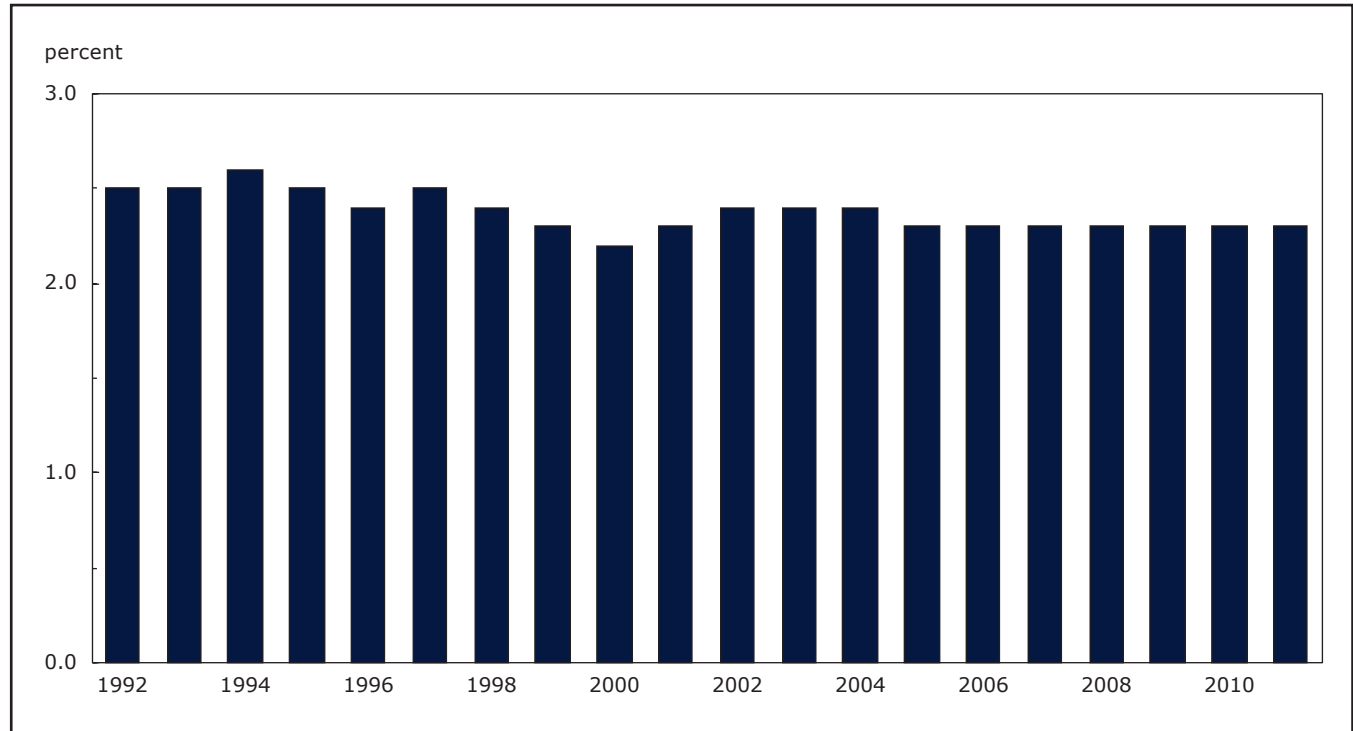
19. The use of the CPI to establish thresholds is described in Appendix C, Section C.1.1.1.

20. As suggested in the OECD handbook, the UE share of the total economy is calculated as UE GDP divided by (Official GDP + UE GDP). The share should be viewed as an indicator of the true size of UE since an unknown portion of UE is already included in the official GDP. The known portion related to tobacco smuggling is removed from the official GDP in this calculation. Any estimates relating to the out of scope UE activity, namely illegal activity like drug trafficking and solicitation for prostitution would need to be added to this share.

21. In Section 4, GDP refers to official GDP.

To assess how well GDP tracks overall economic activity, including UE, one can compare the growth of the total economy (official GDP plus UE) with GDP alone. When doing this comparison, we can conclude that GDP accurately tracks economic growth. The largest difference between the two growth rates was 0.3% in 1994. For all other years, the difference varies between 0.1% and -0.1%.

Chart 2 Share of underground economy in Canadian economy, 1992 to 2011



Source: Statistics Canada.

4.1 UE activities in expenditure-based GDP

Household final consumption expenditure accounted for about 65% of UE activities in 2011. Business gross fixed capital formation accounted for another 28%, exports 10%, and imports -2.8%.²²

4.1.1 Household final consumption expenditure on consumer goods and services

UE activities related to household final consumption expenditure represent those outlays on goods and services supplied by firms that practice skimming (underreporting of their revenue and over-reporting of their expenses), contraband tobacco, illegally manufactured wine and spirits, undeclared rental payments and tips.

In 2011, UE activities related to household final consumption expenditure (\$26.4 billion) were equivalent to 2.7% of the total household final consumption expenditure estimate at an upper bound, the same as in 2010. Historically, this ratio reached a high of 3.6% in 1993 but trended down in the 1990s and has stabilized since the year 2000.

Some categories of spending are more prone to UE activities. As much as 14.6% of tobacco related spending could be carried out underground. Other important categories of spending where UE is considered significant, at the limit, include paid rental fees for housing (9.5%), food and beverage services (9.1%), alcoholic beverages (9.3%), and social services, which include child care (7.7%).

UE activities related to household final consumption expenditure could have amounted to as much as \$1,948 per household in 2011. The top five categories are food and beverage services (\$405 per household), paid rental fees for housing (\$369 per household), tobacco (\$154 per household), alcoholic beverages (\$142 per household) and food (\$113 per household). Together these items accounted for 61% of UE related spending in household final consumption.

22. In the calculation of GDP by the expenditure approach, imports are excluded to measure only the domestic production (i.e., $Y = C+I+G+X-M$).

In 2011, skimming and non-reported UE activity related to household final consumption expenditure was as high as \$20.3 billion under the assumptions made in the study. A higher share (71%) of UE from skimming and non-reporting was associated with the acquisition of services as opposed to goods (29%). This reflects the assumption that skimming is more likely in services than goods. It also reflects the fact that small businesses are more prevalent in the service sector and the assumption that skimming is more prevalent for small businesses.

Household spending on illegal tobacco²³ was \$2.1 billion in 2011, accounting for 5.1% of total UE activities. The share of illegal tobacco in UE is highly volatile; it reached 11% in 1993 before bottoming out at 0.9% in 1996. The illegal tobacco trade accounted for 5.8% of UE activity in 2005, although its share has gradually declined since then.

Household spending on illegally manufactured wine and smuggled spirits in 2011 was \$1.7 billion at the upper limit, accounting for 4.2% of UE activities. This activity was more significant in the early 1990s when its relative contribution to UE activity reached 7.6%. Its relative importance declined as per capita drinking consumption fell in the early 1990s. Since 2004, however, its share grew from 2.5% to 4.2% in 2011.

Households spent as much as \$1.0 billion on underground rental of residential units in 2011. Rentals have accounted for about 2.4% of UE activity since 1992.

Undeclared tips paid out by households in 2011 could have been as high as \$1.7 billion. This figure reflects tips paid on expenditures on recreational services, personal care, taxis and restaurant and accommodation services. Over half is estimated to have been related to tips for restaurant and accommodation services. Households' undeclared tips as a percentage of UE have declined gradually since 2001 when they represented 4.8% of UE activity. In 2011, the proportion was 4.2%.

4.1.2 Business gross fixed capital formation – residential structures

UE activities related to gross fixed capital formation in residential structures are assumed to be all related to new residential construction and renovations.²⁴

UE in residential construction accounted for as much as \$11.5 billion in 2011. After skimming, this is the second largest component of UE. It accounted for 28.1% of UE activities in 2011, its highest share on record (dating back to 1992). It represents \$847 per household; or \$1,250, if only homeowner households are considered.

New construction accounted for just over half of the UE residential construction estimates since 2005 with the exception of the recession year, 2009, when renovations comprised 54%.

4.1.3 Exports

Export-related UE activities accounted for as much as \$4.2 billion in 2011. These activities represented 10% of total UE activity; similar to their share in the early 2000s. Exports of goods²⁵ are estimated at \$2.8 billion. UE related exports of services²⁶ are estimated at \$1.4 billion in 2011.

4.1.4 Imports

UE imports consist of two estimates: one for contraband spirits and another for contraband tobacco. The estimated value of contraband spirits and tobacco smuggled into Canada in 2011 was \$1.2 billion. Illegal imports of tobacco and alcohol have displayed different trends over the period of study, both declined in the 1990s before climbing back throughout the 2000s. The trend in each component of imports is closely related to UE household final consumption expenditures in these categories.

23. As of 1997, the estimates for contraband tobacco have been explicitly included in the published GDP numbers. As a result, the published household final consumption expenditure on tobacco products already include this estimate for illegal tobacco as well as estimates for legal expenditure on tobacco products.

24. No UE activity is assumed in the case of ownership transfer costs. See Appendix C, Section C.1.2.3.

25. These goods are in the following categories: Farm and fishing products [X111], Food and tobacco intermediate products [X112], Food, beverage and tobacco products [X221], Cleaning products, appliances, and miscellaneous goods and supplies [X226]. See Appendix C, Section 1.3 for details.

26. UE related to exports of services consist of potential underreporting of selected commercial services as explained in Appendix C, Section C.1.3.

4.2 UE activities in income-based GDP

Wages paid under the table and undeclared tips accounted for an estimated \$19.7 billion in 2011 at an upper bound, equivalent to 2.2% of the published estimates of compensation of employees. This amount represents \$1,406 for every job in the business sector in 2011. Wages and tips had the highest share (48%) of income-based UE activities. Gross operating surplus of corporations (28%) had the second highest share, and gross mixed income, which is the income of unincorporated businesses, was next (24%).

The bulk of UE compensation of employees stems from activities related to skimming and exports. Undeclared tips accounted for 8.8% of the estimate while wages paid to workers related to underground residential construction and renovations accounted for 29% (or \$4,108 per job in the business sector construction industry in 2011.)

The UE surplus of corporations involved in construction activities in 2011 was worth an estimated \$3.7 billion at an upper bound. Skimming or non-reporting and surplus associated with UE exports accounted for another \$7.8 billion.

UE activities contributed \$9.7 billion to the income of unincorporated business in 2011. This represented 24% of total UE. Skimming, construction, and contraband tobacco made the largest contributions.

Undeclared income from contraband spirits, illegally manufactured wine, licensee mark-up on illegal alcohol and undeclared rental income together accounted for \$1.7 billion in 2011.

4.3 UE activities in industry-based GDP

In 2011, the four most significant sectors in terms of UE activity were construction (28%), finance, insurance, real estate, rental and leasing and holding companies (FIRE, 13%), retail trade (12%) and accommodation and food services (12%). These four industries together accounted for almost 65% of the total UE value added. UE activities in the retail trade industry declined in the last two years. In 2009, the retail share of UE activity was estimated at 14%.

UE is highly concentrated in a few industries with the top four being construction, FIRE, retail trade and accommodation and food services (see Table 1).²⁷ However when looking at the share of UE in proportion to the industry GDP, the picture is somewhat different. The top five industries in terms of their share of UE are: accommodation and food services with as much as 12.5% of its output being the result of underground activity followed by other services (except public administration) with a share at most of 9.1%, fishing, hunting and trapping (9.0%), crop and animal production (8.6%) and construction (8.5%).

At the total economy level, the inclusion of UE has a limited impact on the ranking of industries in Canadian economy. As shown in the last column of Table 1, the only change pertains to the accommodation and food industry, which went from 15th to 14th place, compared to the official ranking of industries (Column 3 in Table 1).

27. Official GDP estimates by industry, in nominal terms, are only available for 2009 due to the comprehensive revision of the System of National Accounts.

Table 1 Industry estimates, official, upper bound underground economy and total economy, Canada, 2009

Industry	Official estimates			UE upperbound estimates			Total economy (official and UE upperbound)				
	GDP at basic prices	Share of official GDP	Rank	GDP at basic prices	Share of UE GDP	Rank	GDP at basic prices	Share of UE in total economy	Rank of UE share in total economy	Share of total economy GDP	Rank in total economy
	millions of dollars	percent	number	millions of dollars	percent	number	millions of dollars	percent	number	percent	number
Government	263,647	17.9	1	0	0.0	23	263,647	0.0	23	17.5	1
Finance, insurance, real estate, rental and leasing and holding companies (FIRE)	172,940	11.7	2	5,051	13.4	3	177,991	2.8	10	11.8	2
Manufacturing ¹	156,643	10.6	3	2,572	6.8	5	158,795	1.6	12	10.5	3
Owner occupied dwellings	115,564	7.8	4	537	1.4	13	116,101	0.5	17	7.7	4
Construction	103,008	7.0	5	9,515	25.3	1	112,522	8.5	5	7.5	5
Mining, quarrying, and oil and gas extraction	90,535	6.1	6	92	0.2	17	90,628	0.1	19	6.0	6
Professional, scientific and technical services	81,509	5.5	7	1,956	5.2	7	83,465	2.3	11	5.5	7
Retail trade ¹	79,342	5.4	8	5,088	13.5	2	82,748	6.1	7	5.5	8
Wholesale trade	77,466	5.3	9	234	0.6	15	77,700	0.3	18	5.2	9
Transportation and warehousing	59,552	4.0	10	739	2.0	10	60,291	1.2	15	4.0	10
Information and cultural industries	47,742	3.2	11	303	0.8	14	48,044	0.6	16	3.2	11
Health care and social assistance	40,742	2.8	12	1,437	3.8	9	42,178	3.4	9	2.8	12
Administrative and support, waste management and remediation services	40,465	2.7	13	623	1.7	12	41,088	1.5	13	2.7	13
Utilities	33,508	2.3	14	0	0.0	22	33,508	0.0	22	2.2	15
Accommodation and food services	31,279	2.1	15	4,470	11.9	4	35,749	12.5	1	2.4	14
Other services (except public administration)	23,006	1.6	16	2,310	6.1	6	25,315	9.1	2	1.7	16
Non-profit institutions serving households	20,101	1.4	17	18	0.0	20	20,119	0.1	20	1.3	17
Crop and animal production	16,911	1.1	18	1,599	4.3	8	18,509	8.6	4	1.2	18
Arts, entertainment and recreation	10,979	0.7	19	718	1.9	11	11,697	6.1	8	0.8	19
Forestry and logging	3,108	0.2	20	44	0.1	19	3,151	1.4	14	0.2	20
Educational services	2,843	0.2	21	223	0.6	16	3,066	7.3	6	0.2	21
Support activities for agriculture and forestry	1,415	0.1	22	1	0.0	21	1,416	0.1	21	0.1	22
Fishing, hunting and trapping	878	0.1	23	86	0.2	18	964	9.0	3	0.1	23
Economy ¹	1,473,181	...	...	37,614	...	...	1,508,694	...	...	...	...

... not applicable

Notes:

GDP: Gross domestic product

UE: Underground economy

1. Total economy GDP is equal to official GDP plus UE GDP, adjusted to remove the double count of tobacco.

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

5 Conclusion and further work

This study presented upper bound estimates of the underground economy that could be missing from official GDP in Canada from 1992 to 2011. The estimates make use of strong, but plausible, assumptions on the potential magnitude of UE activity in the economy. As such, they provide an indication of the extent to which UE activity impacts the macroeconomic aggregates for each of the three measures of GDP: income, expenditure, and industry.

The estimates indicate that UE as a share of the official GDP has been quite stable in the last decade. It also indicates that UE is concentrated in certain categories of spending and in certain industries.

This study introduces several improvements. Estimates are now more timely, and include adjustments for the effects of inflation and are based on the revised CSNA 2012 framework that reflects the international SNA 2008 guidelines.

One purpose of this study was to assess the quality of the official estimates produced by Statistics Canada. It finds that at most the GDP could be understated by 2.3% and that incorporating UE in official estimates would not change significantly the overall growth pattern of the economy.²⁸

There are other applications for this type of study. For instance, it may be used as a starting point for specialized studies on specific underground activities and sensitivity analysis of the various assumptions and approaches taken in this field of work.

In terms of future work, there are several avenues to explore. Among them, expanding this study to a provincial and territorial basis would be both useful for Statistics Canada and respond to requests from users. Regarding national level estimates, several avenues may be explored in the future. First, methodologies for specific portions of UE, especially the household spending expenditures could be improved. Second, it would be useful to clarify with more precision what portion of UE is already accounted for in the official estimates. Such a study would provide useful information for policy analysis as well as for examining the accuracy of official GDP estimates. Third, an avenue to explore is the sensitivity of UE estimates to the various data sources, methods and assumptions made. Fourth, the scope of the analysis could be expanded to examine in more detail UE spending on copyrights, software piracy, internet trade, prostitution or illegal drugs. Finally, further work could be carried to explore the possibility of expanding the industry information to a more disaggregated level.

28. It is worth noting that it is difficult to assess the impact of UE on overall growth during period of recession since there are only a few comparison points.

Appendix A: Underground economy statistical tables

Table A.1 Underground economy, by expenditure-based GDP components, Canada, 2006 to 2011

	2006	2007	2008	2009	2010	2011
	millions of current dollars					
Final consumption expenditure	23,641	24,667	25,612	25,417	25,839	26,397
Household final consumption expenditure	23,641	24,667	25,612	25,417	25,839	26,397
Non-profit institutions serving households' final consumption expenditure	...	...	...	...	...	...
General governments final consumption expenditure	...	...	...	...	...	...
Gross fixed capital formation	9,118	9,879	10,356	9,539	10,914	11,480
Business gross fixed capital formation	9,118	9,879	10,356	9,539	10,914	11,480
Residential structures	9,118	9,879	10,356	9,539	10,914	11,480
Non-residential structures, machinery and equipment	...	...	...	...	...	...
Intellectual property products	...	...	...	...	...	...
Non-profit institutions serving households' gross fixed capital formation	...	...	...	...	...	...
General governments gross fixed capital formation	...	...	...	...	...	...
Investment in inventories	...	...	...	...	...	...
Exports of goods and services	3,170	3,310	3,770	3,633	3,624	4,157
Less: imports of goods and services	-799	-949	-951	-974	-1,111	-1,159
Statistical discrepancy	...	...	...	...	...	...
Gross domestic product at market prices	35,130	36,908	38,788	37,614	39,266	40,875
Final domestic demand	32,759	34,547	35,969	34,956	36,753	37,877

... not applicable

Notes:

GDP: Gross domestic product

Data is available from 1992 to 2011 in supplementary tables available on request.

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

Table A.2 Underground economy, by income-based GDP components, Canada, 2006 to 2011

	2006	2007	2008	2009	2010	2011
	millions of current dollars					
Compensation of employees	17,032	17,848	18,745	18,084	18,901	19,690
Gross operating surplus	9,649	10,230	10,792	10,450	10,970	11,512
Net operating surplus: corporations	9,649	10,230	10,792	10,450	10,970	11,512
Construction	2,851	3,113	3,263	3,031	3,492	3,670
Exports	1,585	1,655	1,885	1,816	1,812	2,078
Skimming	5,213	5,462	5,644	5,602	5,666	5,764
Consumption of fixed capital: corporations	...	...	...	...	...	...
Consumption of fixed capital: general governments and non-profit institutions serving households	...	...	...	...	...	...
Gross mixed income	8,448	8,829	9,251	9,081	9,395	9,673
Net mixed income	8,448	8,829	9,251	9,081	9,395	9,673
Tobacco	1,376	1,457	1,557	1,593	1,463	1,520
Alcohol	699	810	840	937	1,097	1,143
Wine	279	251	276	284	337	316
Spirits	420	559	564	652	759	827
Rent	378	402	414	428	442	446
Rooming and boarding	104	111	114	108	115	120
Residential construction	1,708	1,826	1,915	1,738	1,965	2,070
Skimming	4,183	4,223	4,410	4,276	4,313	4,375
Consumption of fixed capital: unincorporated businesses	...	...	...	...	...	...
Taxes less subsidies on production	...	...	...	...	...	...
Taxes less subsidies on products and imports	...	...	...	...	...	...
Statistical discrepancy	...	...	...	...	...	...
Gross domestic product at market prices	35,130	36,908	38,788	37,614	39,266	40,875

... not applicable

Notes:

GDP: Gross domestic product

Data is available from 1992 to 2011 in supplementary tables available on request.

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

Table A.3 Underground economy, GDP by industry, Canada, 2006 to 2011

		2006	2007	2008	2009	2010	2011
		millions of current dollars					
Input-Output Industry Classification (IOIC) System (NAICS based)¹							
Code	Industry name						
[BS11A]	Crop and animal production	1,258	1,441	1,936	1,599	1,530	1,675
[BS113]	Forestry and logging	62	57	52	44	51	48
[BS114]	Fishing, hunting and trapping	88	94	98	86	75	75
[BS115]	Support activities for agriculture and forestry	1	1	1	1	6	17
[BS210]	Mining, quarrying, and oil and gas extraction	87	94	111	92	105	121
[BS220]	Utilities	0	0	0	0	0	0
[BS23A]	Residential construction	9,088	9,842	10,313	9,508	10,881	11,446
[BS23B]	Non-residential building construction	...	...	...	...	...	...
[BS23C]	Engineering construction	...	...	...	...	...	...
[BS23D]	Repair construction	...	...	...	...	...	...
[BS23E]	Other activities of the construction industry	5	6	6	7	7	8
[BS3A0]	Manufacturing	2,370	2,448	2,692	2,572	2,593	2,849
[BS410]	Wholesale trade	216	223	230	234	209	226
[BS4A0]	Retail trade	4,910	5,065	5,109	5,088	5,002	4,743
[BS4B0]	Transportation and warehousing	745	744	759	739	725	714
[BS510]	Information and cultural industries	268	277	295	303	297	359
[BS5B0]	Finance, insurance, real estate, rental and leasing and holding companies	4,694	4,748	4,923	5,051	5,185	5,451
[BS53C]	Owner occupied dwellings	483	513	528	537	558	565
[BS540]	Professional, scientific and technical services	1,771	1,853	1,948	1,956	1,917	2,167
[BS560]	Administrative and support, waste management and remediation services	562	598	628	623	711	761
[BS610]	Educational services	210	221	226	223	233	238
[BS620]	Health care and social assistance	1,215	1,300	1,373	1,437	1,596	1,835
[BS710]	Arts, entertainment and recreation	711	734	736	718	688	639
[BS720]	Accommodation and food services	4,122	4,320	4,451	4,470	4,644	4,751
[BS810]	Other services (except public administration)	2,250	2,310	2,356	2,310	2,245	2,178
[FC100]	Repair, maintenance and operating and office supplies	...	...	...	...	...	...
[FC200]	Advertising, promotion, meals, entertainment, and travel	...	...	...	...	...	...
[FC300]	Transportation margins	...	...	...	...	...	...
[NP000]	Non-profit institutions serving households	15	17	18	18	8	10
[GS610]	Government education services	...	...	...	...	...	...
[GS620]	Government health services	...	...	...	...	...	...
[GS911]	Other federal government services	...	...	...	...	...	...
[GS912]	Other provincial and territorial government services	...	...	...	...	...	...
[GS913]	Other municipal government services	...	...	...	...	...	...
[GS914]	Other aboriginal government services	...	...	...	...	...	...
	Total economy	35,130	36,907	38,788	37,614	39,266	40,875

... not applicable

Notes:

GDP: Gross domestic product

Data is available from 1992 to 2011 in supplementary tables available on request.

1. The Input-Output Industry Classification (IOIC) system is based on the North American Industry Classification System (NAICS). The classifications of the Input-Output tables can be found at the following link <http://www.statcan.gc.ca/nea-cen/hr2012-rh2012/data-donnees/aggregation-agregation/aggregation-agregation-eng.htm>. The alphanumeric codes appearing in square brackets besides each industry title represent the IOIC identification code. The IOIC identifies both Institutional Sectors and Industries based on the North American Industry Classification System (NAICS). The first two characters of the IOIC alphanumeric codes represent the sector. IOIC codes beginning with a BS represent Business Sector industries, codes beginning with an NP represent Non-Profit Institutions Serving Household (NPISH) Sector industries, and codes beginning with a GS represent Government Sector industries. The IOIC is a hierarchical classification. IOIC codes consisting of four alpha-numeric characters represent industries at the Summary (S) level of aggregation and IOIC codes consisting of eight alpha-numeric characters represent industries at the Detailed (D) level of aggregation.

Source:

Statistics Canada, National Economic Accounts, 2013, special tabulation.

Table A.4 Underground economy by expenditure-based GDP components, Canada, 2006 to 2011, chained dollars (2007)

	2006	2007	2008	2009	2010	2011
	millions of chained (2007) dollars					
Final consumption expenditure	24,241	24,667	24,959	24,293	24,349	24,437
Household final consumption expenditure	24,241	24,667	24,959	24,293	24,349	24,437
Non-profit institutions serving households' final consumption	...	...	...	...	...	...
General governments final consumption expenditure	...	...	...	...	...	...
Gross fixed capital formation	9,647	9,879	10,015	9,257	10,456	10,845
Business gross fixed capital formation	9,647	9,879	10,015	9,257	10,456	10,845
Residential structures	9,647	9,879	10,015	9,257	10,456	10,845
Non-residential structures, machinery and equipment	...	...	...	...	...	...
Intellectual property products	...	...	...	...	...	...
Non-profit institutions serving households' gross fixed capital formation	...	...	...	...	...	...
General governments gross fixed capital formation	...	...	...	...	...	...
Investment in inventories	...	...	...	...	...	...
Exports of goods and services	3,302	3,310	3,309	3,310	3,365	3,361
Less: imports of goods and services	-781	-949	-934	-908	-978	-971
Statistical discrepancy	...	...	...	...	...	...
Gross domestic product at market prices	36,414	36,907	37,347	35,962	37,184	37,658

... not applicable

Notes:

GDP: Gross domestic product

Data is available from 1992 to 2011 in supplementary tables available on request.

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

Table A.5 Rates of underground economy by household final consumption expenditure category, Canada, 2011

		Household spending including taxes ¹	Underground activity	Percent relative to spending ²
		millions of current dollars		percent
Expenditure category				
Code	Category name			
[C11]	Food and non-alcoholic beverages	89,231	1,649	1.8
[C111]	Food	79,126	1,533	1.9
[C112]	Non-alcoholic beverages	10,105	116	1.1
[C12]	Alcoholic beverages and tobacco	33,064	4,006	10.8
[C121]	Alcoholic beverages	18,808	1,918	9.3
[C122]	Tobacco	14,256	2,088	14.6
[C13]	Clothing and footwear	39,684	961	2.4
[C131]	Clothing	33,873	822	2.4
[C132]	Footwear	5,811	138	2.3
[C14]	Housing, water, electricity, gas and other fuels	226,328	5,177	2.2
[C141]	Paid rental fees for housing	47,902	5,003	9.5
[C142]	Imputed rental fees for housing	142,349	0	0.0
[C143]	Maintenance and repair of the dwelling	2,970	67	2.2
[C144]	Water supply and sanitation services	5,337	0	0.0
[C145]	Electricity, gas and other fuels	27,770	106	0.4
[C15]	Furnishings, household equipment and other goods and services related to the dwelling and property	53,044	1,499	2.7
[C151]	Furniture, furnishings, carpets and other floor coverings	15,225	315	2.0
[C152]	Household textiles	2,995	50	1.6
[C153]	Household appliances	6,923	116	1.7
[C154]	Tools and equipment for house and garden	4,967	73	1.5
[C155]	Other goods and services related to the dwelling and property	22,934	945	4.0
[C16]	Health	41,182	399	1.0
[C161]	Medical products, appliances and equipment	21,058	205	1.0
[C162]	Out-patient services	17,548	194	1.1
[C163]	Hospital services	2,576	0	0.0
[C17]	Transport	141,962	1,899	1.3
[C171]	Purchase of vehicles	54,638	186	0.3
[C172]	Operation of transport equipment	68,431	1,509	2.2
[C173]	Transport services	18,893	204	1.1
[C18]	Communications	23,633	10	0.0
[C181]	Communications	23,633	10	0.0
[C19]	Recreation and culture	84,322	1,844	2.1
[C191]	Audio-visual, photographic and information processing equipment	14,970	227	1.5
[C192]	Other major durables for recreation and culture	5,754	85	1.5
[C193]	Other recreational items and equipment, garden products and pets	19,058	641	3.3
[C194]	Recreational and cultural services	37,530	770	2.0
[C195]	Newspapers, books and stationery	7,010	121	1.7
[C21]	Education	13,915	291	2.1
[C211]	Education	13,915	291	2.1
[C22]	Food, beverage and accommodation services	64,452	5,975	8.5
[C221]	Food and beverage services	55,131	5,493	9.1
[C222]	Accommodation services	9,321	482	4.9

See end of table for notes and sources.

Table A.5 Rates of underground economy by household final consumption expenditure category, Canada, 2011 (continued)

	Household spending including taxes ¹	Underground activity	Percent relative to spending ²
	millions of current dollars		percent
[C23] Insurance and financial services	79,215	64	0.1
[C231] Insurance	22,775	0	0.0
[C232] Financial services indirectly measured	25,588	0	0.0
[C233] Other financial services	30,852	64	0.2
[C24] Miscellaneous goods and services	49,239	2,624	5.1
[C241] Personal care	21,943	1,323	5.7
[C242] Personal effects	6,646	147	2.2
[C243] Social services	11,603	962	7.7
[C244] Other services	9,047	192	2.1
[C25] Net expenditure abroad	16,714	0	0.0
[C251] Expenditure by Canadians abroad	36,459	0	0.0
[C252] Expenditure by non-residents in Canada	-19,745	0	0.0
[C] Household final consumption expenditure	955,985	26,397	2.7
[CG] Goods	430,331	9,699	2.2
[CD] Durable goods	117,689	1,289	1.1
[CSD] Semi-durable goods	69,680	1,520	2.1
[CND] Non-durable goods	242,962	6,891	2.8
[CS] Services	525,654	16,698	3.1

Notes:

1. Statistics Canada. CANSIM Table 380-0067 - Household final consumption expenditure. (accessed: 2013-06-03).
2. Calculated as Underground / (Household spending + Underground), adjusted to remove the double count of tobacco.

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

Table A.6 Potential understatement of household final consumption due to underground economy, by expenditure category, Canada, 2011

	Household spending including taxes ¹	millions of dollars		Total potential understatement	
		Skimming	Other	percentage	percentage
Food	79,126	1,533	0	1,533	1.9
Non-alcoholic beverages	10,105	116	0	116	1.1
Alcoholic beverages	18,808	184	1,734	1,918	10.2
Tobacco	14,256	0	2,088	2,088	14.6
Garments	28,962	699	0	699	2.4
Cleaning of clothing	1,449	51	0	51	3.5
Clothing materials, other articles of clothing and clothing accessories	3,462	73	0	73	2.1
Footwear	5,811	138	0	138	2.4
Paid rental fees for housing	47,902	4,558	446	5,003	10.4
Imputed rental fees for housing	142,350	0	0	0	0.0
Materials for the maintenance and repair of the dwelling	2,604	53	0	53	2.0
Services for the maintenance and repair of the dwelling	366	14	0	14	3.9
Electricity	17,379	0	0	0	0.0
Gas	6,369	0	0	0	0.0
Other fuels	4,022	106	0	106	2.6
Water supply and sanitation services	5,337	0	0	0	0.0
Furniture and furnishings	14,579	303	0	303	2.1
Carpets and other floor coverings	646	12	0	12	1.9
Household textiles	2,995	50	0	50	1.7
Major household appliances	5,300	94	0	94	1.8
Small electric household appliances	1,623	23	0	23	1.4
Major tools and equipment	2,749	35	0	35	1.3
Small tools and miscellaneous accessories	2,218	38	0	38	1.7
Other semi-durable household goods	5,819	102	0	102	1.7
Other non-durable household goods	6,877	96	0	96	1.4
Repair of personal and household goods except vehicles	2,703	172	0	172	6.4
Renting and leasing of personal and household goods except passenger vehicles	3,227	83	0	83	2.6
Other services related to the dwelling and property	4,308	492	0	492	11.4
Therapeutic appliances and equipment	3,465	82	0	82	2.4
Pharmaceutical products and other medical products	17,593	123	0	123	0.7
Out-patient services	17,548	194	0	194	1.1
Hospital services	2,576	0	0	0	0.0
New passenger cars	16,867	0	0	0	0.0
New trucks, vans and sport utility vehicles	23,246	0	0	0	0.0
Used motor vehicles	11,168	137	0	137	1.2
Other vehicles	3,357	49	0	49	1.5
Spare parts and accessories for vehicles	13,548	264	0	264	2.0
Fuels and lubricants	41,796	290	0	290	0.7
Maintenance and repair of vehicles	8,406	771	0	771	9.2
Parking	2,294	94	0	94	4.1
Passenger vehicle renting	1,059	18	0	18	1.7
Other services related to the operation of transport equipment	1,328	72	0	72	5.4
Railway transport	239	0	0	0	0.0
Urban transit	3,688	0	0	0	0.0
Interurban bus	1,002	35	0	35	3.5
Taxi and limousine	1,066	130	39	169	15.8
Air transport	10,166	0	0	0	0.0
Water transport	395	0	0	0	0.0
Other transport services	2,337	0	0	0	0.0
Postal services	1,319	0	0	0	0.0

See end of table for notes and sources.

Table A.6 Potential understatement of household final consumption due to underground economy, by expenditure category, Canada, 2011 (continued)

	Household spending including taxes ¹	millions of dollars		Total potential understatement	
		Skimming	Other	percentage	percentage
Telecommunication equipment	848	10	0	10	1.2
Telecommunication services	21,466	0	0	0	0.0
Information processing equipment	4,204	47	0	47	1.1
Recording media	2,735	75	0	75	2.7
Audio-visual and photographic equipment	8,031	106	0	106	1.3
Major durables for outdoor recreation	4,678	56	0	56	1.2
Musical instruments and major durables for indoor recreation	1,076	28	0	28	2.6
Games, toys and hobbies	5,068	85	0	85	1.7
Equipment for sport, camping and open-air recreation	4,797	99	0	99	2.1
Garden products, plants and flowers	3,151	97	0	97	3.1
Veterinary and other services for pets	2,455	212	0	212	8.7
Pets and pet food	3,587	148	0	148	4.1
Recreational and sporting services	8,949	525	0	525	5.9
Cable, satellite and other program distribution services	8,930	19	0	19	0.2
Cinemas	1,145	0	0	0	0.0
Photographic services	929	79	0	79	8.6
Other cultural services	2,456	146	0	146	6.0
Games of chance	15,121	0	0	0	0.0
Books	2,901	50	0	50	1.7
Newspapers and periodicals	2,187	33	0	33	1.5
Miscellaneous printed matter and stationery and drawing materials	1,922	38	0	38	2.0
University education	6,934	0	0	0	0.0
Other education	6,981	291	0	291	4.2
Food and non-alcoholic beverage services	45,725	3,591	1,077	4,668	10.2
Alcoholic beverage services	9,406	540	286	825	8.8
Accommodation services	9,321	294	187	482	5.2
Life insurance	9,247	0	0	0	0.0
Health insurance	5,585	0	0	0	0.0
Insurance related to transport	5,798	0	0	0	0.0
Property insurance	2,145	0	0	0	0.0
Implicit loan charges	13,863	0	0	0	0.0
Implicit deposit charges	11,725	0	0	0	0.0
Stock and bond commissions	3,544	0	0	0	0.0
Other actual financial charges	9,506	64	0	64	0.7
Trusted pension funds	4,111	0	0	0	0.0
Mutual funds	13,691	0	0	0	0.0
Personal grooming services	8,193	818	245	1,064	13.0
Electrical appliances for personal care	570	8	0	8	1.3
Other appliances, articles and products for personal care	13,180	252	0	252	1.9
Jewellery, clocks and watches	3,927	65	0	65	1.7
Other personal effects	2,719	63	19	81	3.0
Child care services outside the home	4,216	729	0	729	17.3
Child care services in the home	1,116	23	0	23	2.1
Other social services	6,271	209	0	209	3.3
Undertaking and other funeral services	1,843	61	0	61	3.3
Legal and other services	7,204	131	0	131	1.8

See end of table for notes and sources.

Table A.6 Potential understatement of household final consumption due to underground economy, by expenditure category, Canada, 2011 (concluded)

	Household spending including taxes ¹	Skimming	Other	Total potential understatement	
	millions of dollars			percentage	
Expenditure by Canadians abroad	36,458	0	0	0	0.0
Expenditures by non-residents in Canada	-19,745	0	0	0	0.0
Durables	117,689	1,289	0	1,289	1.1
Semi-durables	69,680	1,501	19	1,520	2.2
Non-durables	242,962	3,069	3,822	6,891	2.8
Services	525,654	14,418	2,280	16,698	3.2
Household final consumption expenditure	955,985	20,276	6,121	26,397	2.8
Of which, sub-total, expenditure categories with no UE activity	363,356	...	...	...	...

... not applicable

Note:

1. Statistics Canada. CANSIM Table 380-0067 - Household final consumption expenditure. (accessed: 2013-06-03).

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

Appendix B: Related indicators

Table B.1 Published GDP – expenditure-based, Canada, 2006 to 2011

	2006	2007	2008	2009	2010	2011
	millions of current dollars					
Final consumption expenditure	1,093,845	1,158,635	1,221,774	1,248,242	1,305,119	1,361,897
Household final consumption expenditure	784,654	831,218	868,042	872,738	915,271	955,985
Non-profit institutions serving households' final consumption expenditure"	20,017	21,134	22,748	23,457	23,502	24,138
General governments final consumption expenditure	289,174	306,283	330,984	352,047	366,346	381,774
Gross fixed capital formation	342,709	366,111	386,526	348,304	387,976	412,037
Business gross fixed capital formation	287,670	306,278	319,275	275,288	307,240	334,223
Residential structures	98,160	108,869	107,247	99,666	111,240	116,195
Non-residential structures, machinery and equipment	155,646	161,935	174,466	143,586	160,463	180,104
Intellectual property products	33,864	35,474	37,562	32,036	35,537	37,924
Non-profit institutions serving households' gross fixed capital formation"	2,174	1,572	2,647	2,111	2,235	2,688
General governments gross fixed capital formation	52,865	58,261	64,604	70,905	78,501	75,126
Investment in inventories	10,636	8,938	8,843	-7,030	125	7,659
Exports of goods and services	527,187	537,413	567,339	445,689	483,212	540,657
Less: imports of goods and services	-487,233	-504,141	-538,867	-468,702	-514,821	-562,525
Statistical discrepancy	-226	-1,056	359	504	1,146	286
Gross domestic product at market prices	1,486,918	1,565,900	1,645,974	1,567,007	1,662,757	1,760,011
Final domestic demand	1,436,554	1,524,746	1,608,300	1,596,546	1,693,095	1,773,934

Notes:

GDP: Gross domestic product

Data is available from 1992 to 2011 in supplementary tables available on request.

Source:

Statistics Canada, CANSIM Table 380-0064 - Gross domestic product, expenditure-based. (accessed: 2013-06-03).

Table B.2 Published GDP – income-based, Canada, 2006 to 2011

	2006	2007	2008	2009	2010	2011
	millions of current dollars					
Compensation of employees	742,228	782,621	816,942	812,983	839,376	883,753
Wages and salaries	644,759	684,981	716,170	705,172	727,617	766,597
Employers' social contributions	97,469	97,640	100,772	107,811	111,759	117,156
Gross operating surplus	419,743	440,726	482,330	404,611	460,731	497,803
Net operating surplus: corporations	234,186	241,113	264,530	176,451	232,293	258,459
Consumption of fixed capital: corporations	144,531	155,205	168,622	176,126	173,719	180,793
Consumption of fixed capital: general governments and non-profit institutions serving households	41,026	44,408	49,178	52,034	54,719	58,551
Gross mixed income	164,559	175,199	183,034	185,990	193,368	202,270
Net mixed income	126,028	133,715	138,460	139,511	145,645	152,969
Consumption of fixed capital: unincorporated businesses	38,531	41,484	44,574	46,479	47,723	49,301
Taxes less subsidies on production	63,604	67,089	69,737	70,101	71,775	73,598
Taxes less subsidies on products and imports	96,558	99,209	94,290	93,826	98,653	102,874
Statistical discrepancy	226	1,056	-359	-504	-1,146	-287
Gross domestic product at market prices	1,486,918	1,565,900	1,645,974	1,567,007	1,662,757	1,760,011

Notes:

GDP: Gross domestic product

Data is available from 1992 to 2011 in supplementary tables available on request.

Source:

Statistics Canada, CANSIM Table 380-0063 - Gross domestic product, income-based. (accessed: 2013-06-03).

Table B.3 Population and estimated number of households, Canada, 2006 to 2011

	2006	2007	2008	2009	2010	2011
	thousands					
Population ¹	32,576	32,928	33,318	33,727	34,127	34,484
Households ²	12,789	12,985	13,199	13,417	13,378	13,549

Notes:

1. Statistics Canada. CANSIM Table 051-0001 - Estimates of population, by age group and sex for July 1. (accessed: 2013-06-03).

2. Estimates based on: Census of population (1991, 1996, 2001, 2006), Census coverage reports (1991, 1996); Survey of Household Spendings (1997-2011).

Appendix C: Specific methodologies²⁹

C.1 Specific methodology and data sources for components of expenditure-based GDP

C.1.1 Household spending

Household final consumption expenditure on goods and services accounts for 54.3% of GDP in 2011. It is divided into four broad categories by type of expenditure, durable goods (vehicles, furniture, appliances, etc.), semi-durable goods (clothing and footwear, household furnishings, etc.), non durable goods (food, beverages and tobacco, motor fuels, energy, etc.) and services (rent, restaurants, health, education, recreation, etc.). These series are estimated using a wide variety of sources including business and household surveys as well as administrative data.

Along with residential construction, sales to households are the other major area where underground transactions take place. Alcohol, tobacco and domestic services are examples of goods and services that can be purchased 'under the table'. In relation to underground expenditures, household final consumption falls into three categories:

1. those where such transactions are absent;
2. those where they have little or no effect on the estimation of GDP;
3. those where they result in an underestimation of GDP (tobacco, alcoholic beverages, repairs, meals in restaurants, etc.).

Many goods and services cannot be purchased under the table. This is the case for new motor vehicles, motor fuel, heating fuel, electricity, gas, water charges, medical and hospital care, telephone, postage, cable television, urban transit, tickets from the provincial lotteries, insurance. Businesses selling or providing these types of services are unlikely to understate their receipts. Their operating expenses may be imperfectly measured, but are not underestimated on account of hidden transactions.

Finally, some expenditure items do not reflect monetary transactions at all: they are imputations accounting for non-market activities with a close parallel in the market economy (services of owner-occupied dwellings and services rendered without specific charge by financial institutions being the major ones).³⁰ There are some marginal imputations in other categories of household spending to account for such things as meals and lodging or parking paid "in-kind" to workers. These imputations are not considered as a source of UE in this study.

In total, expenditures on goods and services that are deemed not to be purchased under the table and expenditures that do not reflect monetary transactions amounted to \$363 billion, or 38% of household final consumption in 2011, leaving 62% subject to underestimation due to underground transactions.^{31,32}

Underground transactions will generally result in some underestimation of GDP without any offset (except for rents and cross border shopping, see text box below and section C.1.1.4). The problem is likely more serious for services. Goods are 'visible' (import duties and GST on purchases, invoices, inventories), whereas services are not. As a rule also, statistical coverage is less extensive for services, and independent data sources on supply and demand do not always exist. This lack of information, combined with the fact that the output of many services is purchased almost entirely by households at the final demand level, makes underground transactions in services very difficult to detect even through the commodity flow balancing approach used in the input-output system.

To estimate the possible magnitude of UE related to household final consumption, the potential skimming of business receipts will be estimated first. To this will be added separate estimates for certain categories of expenditure, which are not covered under the heading of skimming. All estimates should be interpreted as an upper limit of what could be missing from GDP on account of underground transactions. Estimates for smuggled tobacco are the exception to the upper limit interpretation. In this case, the estimates come directly from the official GDP calculations and are considered "best estimates" of the magnitude of the phenomenon.

29. Many of the sections in this appendix are based on previous work of Gervais (1994) and Barber-Dueck, Terefe and Lamontagne (2011).

30. Barter and trade is an example of a non-monetary transaction that could be subject to UE. According to CRA, barter trade is subject to taxation so only the cases where taxes are not paid would be classified under UE. While there are some organizations that facilitate barter, we could find no estimates of its magnitude in Canada. Barter trade is not included in this study but it may be considered in future work.

31. Household final consumption expenditure includes taxes.

32. There are still a few imputations embedded in the categories that are subject to UE, but they are marginal.

Why cross-border shopping would not lead to an underestimation of GDP

Too low estimates of cross-border shopping, declared or undeclared, would also lead to an underestimation of imports, but unlike smuggling, not to an underestimation of Canada's GDP.¹ Purchases made outside the country for personal consumption only (that is, not for resale) do not give rise to any mark-up or profit in Canada needing to be counted in our GDP. Their effect on imports is entirely offset by their effect on household final consumption expenditure. Whatever the level of purchases made across the border, the same amount would be recorded in household final consumption expenditure with a positive sign, and in imports with a negative sign, leaving GDP unchanged.

This is not to say there is no tax evasion with respect to cross-border shopping. The point is that underestimation of cross-border shopping does not result in an underestimation of GDP and can be ignored here. Undervaluation of non-merchandise imports can also be disregarded. The addition of 'missing' service imports would either leave measured GDP unchanged, or even reduce it (if the imported services missing under the heading of imports already showed up elsewhere in final demand).

1. See Katharine Kemp, "Cross-Border Shopping - Trends and Measurement Issues", *National Income and Expenditure Accounts*, Catalogue no. 13-001, third quarter 1992.

C.1.1.1 Skimming³³

The phenomenon known as 'skimming' occurs when legitimate businesses fail to declare part of their business income. Skimming occurs when firms under report revenue or over report expenses. Businesses engaged in skimming are not necessarily operating underground like smugglers, and often do so without the knowledge of their customers. But skimming does constitute tax evasion, and can lead to an underestimation of GDP at the margin, so it must be considered here.

What is at issue here is the small average underreporting of sales that could easily go undetected. A business may avoid declaring some receipts, but will likely be detected if it hides too much income, in relation to its operating costs or in comparison to other businesses. Similarly, in the national accounts, since the total supply of a commodity is equal to the total demand for it in the input-output tables, a large and systematic underreporting of sales would also be detected and corrected (See box 'Skimming at the margin compared to statistical imbalance').

Skimming can be determined through audits conducted by the tax authorities over many years, to which Statistics Canada now has access.³⁴ Changes like electronic invoices that were introduced in Quebec recently for the food and beverage services industry could prevent skimming. The introduction of value-added taxes like the GST/HST was also meant to make skimming more difficult, or at least less attractive for businesses, which need to collect GST/HST on their sales to credit against GST/HST paid on their intermediate purchases.

Skimming is more likely to occur in small businesses. It seems unlikely, but not impossible, that large businesses would engage in skimming. It would be complicated for large organizations, often provincial or national in scope, with hundreds or thousands of employees, to do so. Moreover, incorporated businesses are subject to more regulations and have more "checks and balances" than unincorporated businesses. Hence, skimming is more likely to be in unincorporated businesses.

Understatement of business receipts does not necessarily translate into an underestimation of GDP. Businesses selling to other businesses (intermediate demand) rather than households (final demand) may engage in skimming. However, at the intermediate level, the practice is probably much less common, because one firm's revenue is another's expense, and this second firm needs a receipt for its accounts. More fundamentally, regardless how firms account or do not account for their purchases, they will pass on all their costs (whether in the books or off the books) to their customers. The market price of goods and services sold to consumers automatically embodies all the skimming that may have gone on at the intermediate level. Intermediate skimming is not missing in GDP any more than intermediate sales. If it were to be treated as missing production and added to the total, part of the economic production would be counted twice, or more.

33. The approach to skimming in previous studies was concentrated on the retail sector and the services sector. In this study, the approach is extended to cover all goods and services consumed by the household sector. In practice this is a marginal change but it enables accounting for direct sales to households by industries that usually sell most of their products to other industries. An example of this would be direct sales by a sawmill to a household.

34. Tax audited files are available from the CRA for the incorporated businesses for the period 2006 to date. This is labeled reassessment estimates in this study.

Only skimming of receipts by businesses selling to households can lead to an underestimation of GDP and needs to be estimated. This is illustrated in the box 'Illustration of the effect on GDP of skimming between firms and skimming on final sales' below.

Skimming at the margin compared to statistical imbalance

Let us consider the example of household furniture retailing and assume for simplicity that there is no household furniture wholesaling. As the manufacturing, imports and exports of household furniture are reliably measured, if household furniture retailers in the aggregate were understating their sales by too much, say 25%, total demand (retail sales plus exports) would be much lower than total supply (production plus imports plus margins). Part of the imbalance could be resolved by increasing inventories, but only up to a point. If business were flourishing (other sources like the SHS may confirm the higher demand) and estimates on the supply side were believed to be reliable, the imbalance would be corrected by increasing domestic sales or inventories on the demand side rather than by recording a loss for the industry as a whole on the income side. In this instance, balanced version 2 in the table below would likely be adopted because it is more realistic.

Such imbalances are a common occurrence in the construction of input-output tables. Most of them reflect errors of transcription or tabulation, and problems of classification, valuation, timing or coverage affecting the estimates both on the demand and the supply side. The cross-checking inherent in the approach yields sound results, notably for goods, and helps to resolve some inconsistencies, but not all. This approach is particularly efficient at the economy-wide level, but a small average underreporting of sales could easily go undetected, and result in the estimation of a lower surplus or higher inventories than would otherwise be the case.

Explanatory table 1 Hypothetical case of domestic sales underreported by 25%

	Statistics originally recorded	Balanced supply and demand	
		Version 1 ¹	Version 2 ²
		dollars	
Production	100	100	100
Imports	30	30	30
Transport margins	10	10	10
Profit	10	-5	10
Total domestic supply	150	135	150
Exports	10	10	10
Domestic sales	100	100	125
Inventories	15	25	15
Total demand	125	135	150

Notes:

1. The imbalance between supply and demand is corrected by lowering profits by 15 dollars and increasing inventories by 10 dollars.

2. The imbalance between supply and demand is corrected by increasing domestic sales by 25 dollars.

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

Illustration of the effect on GDP of skimming between firms and skimming on final sales**Case 1:** No skimming, all information reported correctly – GDP correctly measured**Case 2:** Skimming on intermediate sales between Firm 1 and Firm 2 – GDP not affected by skimming**Case 3:** Skimming on final sales by Firm 2 – GDP underestimated due to skimming**Explanatory table 2 Effects on GDP of skimming between firms**

	Case 1	Case 2	Case 3
	No Skimming, all information reported - GDP measured correctly	Skimming on intermediate sales between firm 1 and firm 2 - GDP not affected by skimming	Skimming on final sales by firm 2 - Underestimation of GDP due to skimming
dollars			
Statement of results – two firms economy			
Firm 1			
Exports	10	10	10
Domestic sales	90	80	90
Sales to consumers	70	70	70
Sales to firm 2 ¹	20	10	20
Total sales	100	90	100
Imports	70	70	70
Wages	20	20	20
Total costs	90	90	90
Profit	10	0	10
Firm 2			
Exports	15	15	15
Domestic sales	60	60	50
Sales to consumers ²	60	60	50
Sales to firm	0	0	0
Total sales	75	75	65
Goods from firm 1 ¹	20	10	20
Imports	10	10	10
Wages	15	15	15
Total costs	45	35	45
Profit	30	40	20
GDP calculations			
Expenditure-based			
Consumption	130	130	120
Exports	25	25	25
Imports	-80	-80	-80
GDP	75	75	65
Income-based			
Labour compensation	35	35	35
Operating surplus	40	40	30
GDP	75	75	65
Industry-based			
Gross output	175	165	165
Intermediate consumption	100	90	100
GDP	75	75	65

Notes:

GDP: Gross domestic product

1. In Case 2, 'Sales to firm 2' and 'Goods from firm 1' are underrepresented by 10 dollars to illustrate effects of skimming.

2. In Case 3, 'Sales to consumers' is underrepresented by 10 dollars to illustrate effects of skimming.

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

To summarize the key assumptions made in this study regarding skimming:

- skimming affecting the estimation of GDP is only related to sales to households;
- skimming does not occur in highly regulated sectors, e.g., sales of electricity;
- skimming is more likely to occur in the services sector than the goods sector;
- skimming occurs only in small businesses;
- skimming is more likely to occur in unincorporated businesses than incorporated businesses.

The starting point in the estimation of skimming is the operating revenues of small businesses. ‘Small’ businesses are defined to include incorporated and unincorporated businesses with annual operating revenues of less than \$2 million.³⁵ Operating revenues were derived from tax files. For unincorporated businesses, T1 data were available on a NAICS basis from 2005 to date.³⁶ For incorporated businesses, T2 data were available on a NAICS basis from 1997 to date.³⁷ All NAICS codes were normalized to the NAICS 2007 classification which forms the basis of the Input-Output Industry Classification (IOIC) system in the CSNA.

These data were transposed from an industry basis to a commodity basis using information derived from the 2009 Input-Output tables.³⁸ This was done in several steps:

- a) Converting the industry operating revenues (used as a proxy of output in the CSNA) into revenue by commodity;
- b) Applying a ratio³⁹ to each commodity to reflect the proportion of revenue attributable to household spending;
- c) Aggregating the results from the previous step to the published categories of household spending;
- d) Applying skimming rates to the estimates from the previous step.

Skimming rates were set as follows:

- a) 0% for categories estimated with independent methodologies (tobacco, imputed rent);
- b) 0% for categories where skimming is very unlikely because they are highly regulated or because of the nature of the services (e.g., electricity, gas, water supply, hospital services, new cars and trucks, most of the transportation services, telecommunication services, cinemas, games of chances, most of the insurance and financial services);
- c) For some categories, skimming rates were not standard because only a portion of the category is subject to skimming (out-patient services (2.1%), other actual financial charges (11.5%), legal and other services (11%), and pharmaceutical products (5.5%));
- d) Other non-standard skimming rates were used for taxi services (17%) and food and non-alcoholic beverages (30%) based on analysis done in previous studies;
- e) The standard rate for remaining categories of goods was 15.5% (40 categories);
- f) The standard rate for remaining categories of services was 22% (22 categories).

While the standard rates are slightly different than used in previous studies, they still represent reasonable upper bounds on the skimming that could be present in the remaining categories of goods and services purchased by households.⁴⁰

35. The all-item CPI (1992 = 100) was used to adjust for inflation. As a result, for example, in 2011 firms with operating revenues of less than \$2,854,762 were selected as “small” firms.

36. T1 tax data are only revised in the current fiscal year. This leads to an underestimation of revenues from unincorporated businesses due to late filers and non-reporters. Studies conducted in the CSNA at the time of the comprehensive revision in 2012 indicate that the underestimation would be around 8-9%. Adjustment ratios were derived for 30 industry groups, and used in this study to adjust the operating revenues of unincorporated businesses.

37. T2 tax data on incorporated businesses are revised on a continuous basis due to late filers and non-reporters. Research carried out by the CSNA indicates that the T2 tax data were underestimated by 2.9% after two years, 1.7% after three years, 0.9% after four years, and by 0.4% after five or more years. These ratios were used in this study to adjust the operating revenues of incorporated businesses.

38. 2009 Input-Output tables were used because this is the first year for which the new CSNA commodity, industry and final demand classification were introduced. An implicit assumption here is that the 2009 structure is valid for the entire time series. In future studies, the conversion matrix will be developed annually.

39. These ratios were derived by reorganizing the Input-Output tables into supply-disposition tables.

40. With this study, methodological changes were introduced due to the revised structure in the CSNA classification of industries and commodities. In the previous study, skimming rates were applied to selected retail trade and services industries; they were 15% for goods producing industries and 25% for services producing industries. In the current methodology skimming rates are applied on both the commodity and the industry levels and covers a wider range of industries. The rates presented here are at the commodity level, the corresponding rates at the industry level are identical to the previous study for retail and services industries. The rates used at the industry level are presented in Appendix C, Section C.3.2.

The final step was to validate the results by comparing them with results of the industry approach (see Section C.3.2 in Appendix C).

Under these assumptions, skimming by small businesses selling to households could have amounted to as much as \$20.3 billion in 2011, or 2.1% of household spending; 1.4% for goods, 2.7% for services. These results should be considered an upper limit for several reasons. First, skimming occurs at the margin. Unless retailers can also hide costs (rent, salaries, cost of goods purchased for resale), they will be unable to hide more than a fraction of their receipts without declaring a loss.⁴¹ And they cannot declare false losses⁴² and stay in business without alerting tax auditors. Businesses in services can more easily hide a higher proportion of receipts, thus the higher skimming percentage adopted, but would still have to hide a significant proportion of costs not to arouse suspicion.

These assumptions are adopted here for the sole purpose of estimating an upper bound to underground transactions and their impact on GDP. The results should not be construed in any way as implying that all small businesses are defrauding, let alone in these proportions.

C.1.1.2 Tobacco

The phenomenon of tobacco smuggling has received much attention in the last 20 years. Since the beginning of the 1990s, the CSNA has explicitly included estimates for underground activity related to tobacco products.

The methodology to obtain those estimates is well described in the Guide to the Income and Expenditure Accounts.⁴³ The estimation of personal expenditure on tobacco products on an annual basis results from a reconciliation of several data sources. Among the main sources on the demand side are the revenues from specific taxes imposed on tobacco products. These figures are drawn from the federal, provincial and territorial public accounts, as well as corresponding legislated tax rates. Also noteworthy are data from surveys on Canadians' consumption habits: the Canadian Tobacco Use Monitoring Survey (CTUMS) and the SHS. On the supply side, the main data source consists of the domestic sales reported by the Production and Disposition of Tobacco Products survey, supplemented by declared international imports, obtained from the International Trade Division.

The first step of the methodology is calculating the quantity or volume of cigarettes, cigars and fine cut tobacco sold legally based on tax data. This volume, which is expressed in terms of cigarettes and is obtained by dividing tax revenues by the specific rates levied in each province and territory, is then compared to data from household surveys and to the domestic sales reported by manufacturers, supplemented by international imports.⁴⁴

The total volume of tobacco consumed in Canada (including contraband tobacco products), on the other hand, is now calculated annually based on trends observed in household survey data, on price and level, on the domestic sales reported by manufacturers as well as on the price-elasticity of demand for tobacco products.⁴⁵

The total volume consumed in Canada is then distributed by province or territory, using data drawn from the Canadian Tobacco Use Monitoring Survey, conducted by Statistics Canada for Health Canada since 1999. The consumption of contraband tobacco is then calculated residually for each province and territory by comparing, among other things, the total volume consumed to the quantity derived from tax sources on tobacco products.

41. In a limited number of instances, skimming is facilitated because the hidden costs are ones incurred 'under the table'. Examples are contraband spirits or stolen car parts purchased for resale and wages paid to illegal immigrants.

42. In practice, there is more chance that businesses practicing skimming at the margin will report lower profit margins instead of losses. This is implicit in the "skimming estimates methodology" but is more evident when skimming estimates by industry are estimated from audited tax files, see Section C.3.2.

43. Guide to the Income and Expenditure Accounts, Statistics Canada, Catalogue no. 13-017-XWE, Ottawa, 2008. Paragraphs 7.68 to 7.73.

44. Respondents to household surveys tend to underestimate their tobacco consumption, generally resulting in a marked difference with the volumes derived from tax data. However, it has been found that in some provinces, especially those where specific taxes are the highest; the quantities obtained from tax data are below the reported consumption, a situation generally attributed to contraband. This would suggest that many smokers are turning to the black market for their cigarettes and fine cut tobacco. This would also explain the fact that domestic sales reported by manufacturers have declined more substantially than the trends reported in household surveys each time major increases in specific tobacco taxation rates have been imposed in Canada.

45. Up to the period 2001 to 2002, the domestic sales reported by manufacturers were generally a good estimator of the total volume of tobacco consumed in Canada, since the contraband tobacco consisted largely of cigarettes produced by major manufacturers and purchased by illegal wholesalers for resale on the black market. With the federal and provincial tobacco tax increases of 2001 and 2002 the illegal tobacco trade adapted. Since then, the wholesale prices of tobacco sold by the major manufacturers increased in accordance with the taxes. Since contraband cigarettes from unlicensed manufacturers and the cigarettes smuggled in from other countries took a greater share of the market, the domestic sales reported by the legal manufacturers of tobacco could not be used as a reliable estimator of domestic consumption anymore.

Finally, consumer unit prices are applied to the volumes estimated by province and territory. The prices retained for the volumes sold on the legal market are drawn from the related consumer price index covering Canada's main population centres, while the prices paid for contraband tobacco are obtained from various sources, particularly media reports and press clippings.

Legal and estimated illegal sales of cigarettes in volume are reproduced in Table C.1. Included in the volume and value of the legal and estimated illegal sales are not only manufactured cigarettes, but also the fine cut tobacco made into cigarettes.⁴⁶ These estimates can be validated by looking at the implied average daily consumption per smoker. The average has declined slowly, from 21.6 cigarettes per day in 1998 to 19.0 in 2011. These estimates appear quite plausible. It is noteworthy that the share of contraband in total tobacco sales has ranged from 32% to 38% since 2006, well above the shares observed in the previous decade.

Table C.1 Legal and estimated contraband sales and consumption of cigarettes, Canada, selected years

	1992	1994	1996	1998	2003	2007	2008	2009	2010	2011
	billions of cigarettes									
Legal sales	38.4	43.7	49.7	48.2	36.9	27.4	25.9	26.2	28.0	28.4
Estimated illegal sales	12.1	7.1	2.0	5.2	7.4	15.1	16.2	16.2	13.0	13.2
Total consumption	50.5	50.7	51.7	53.4	44.4	42.5	42.1	42.4	41.1	41.5
	percent									
Market share of illegal sales	24.0	13.9	3.8	9.7	16.7	35.4	38.5	38.3	31.8	31.7
	index (1992 = 100)									
Index, legal sales	100.0	113.8	129.5	125.7	96.3	71.5	67.4	68.2	73.0	73.9
Index, total consumption	100.0	100.5	102.4	105.8	87.9	84.3	83.4	84.0	81.4	82.3
	millions									
Population (person aged 12 and over)	23.6	24.2	24.8	25.4	27.1	28.6	29.0	29.3	29.7	30.0
	percent									
Proportion of smokers ¹	..	29.3	27.6	26.6	23.0	22.0	21.4	20.1	20.8	19.9
	cigarettes per day per smoker									
Daily cigarettes consumption (smokers)	..	19.6	20.7	21.6	19.5	18.5	18.6	19.7	18.2	19.0
of which legal	..	16.8	19.9	19.5	16.2	12.0	11.4	12.2	12.4	13.0
of which illegal	..	2.7	0.8	2.1	3.3	6.6	7.2	7.5	5.8	6.0

.. not available for a specific reference period

Notes:

Data is available from 1992 to 2011 in supplementary tables available on request.

1. Statistics Canada, CANSIM Table 105-0501, Health indicator profile and CANSIM Table 104-0027, Smoking status. (accessed: 2013-06-03).

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

The figures in Table C.2 show the impact on GDP of illegal tobacco activities. From the expenditures perspective, household expenditures on illegal tobacco amounted to \$2.1 billion, and imports were estimated at \$568 million in 2011. From the income perspective, tobacco smugglers had a net income of \$382 million while income from mark-ups on illegal tobacco at the retail level reached \$1.1 billion. Overall, illegal tobacco transactions represented only 0.1% of Canadian GDP in 2011.

46. The conversion factor for the fine cut tobacco is one gram per cigarette.

Table C.2 Effect on GDP of potential illegal tobacco transactions, Canada, 2011

Income-based GDP		Expenditure-based GDP	
	2011		2011
	millions of dollars		millions of dollars
Mixed income, smuggler mark-up	382	Household expenditure, illegal tobacco	2,088
Mixed income, licensee mark-up	1,137	Imports of contraband tobacco	-568
Potential amount missing from GDP	1,520	Potential amount missing from GDP	1,520
Percentage of official GDP (%)	0.09	Percentage of official GDP (%)	0.09

Note:

GDP: Gross domestic product

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

C.1.1.3 Alcoholic beverages

Underground transactions in this area are the illegal manufacturing of wine and the smuggling of spirits. Lower taxes and higher transportation costs make the smuggling of wine and beer unprofitable. Contrary to cigarettes, the smuggled spirits are not generally produced in Canada and therefore the volume estimates of the contraband are more speculative. The same is also true of illegally-manufactured wine. For illustrative purposes, we will assume that the figures put forward by the LCBO⁴⁷ and the Association of Canadian Distillers (ACD), very close to one another, are accurate and constitute an upper limit of what is imported or manufactured illegally.

The estimation approach is as follows: Starting from LCBO estimates of the volume of illegal sales in Ontario, a volume of illegal sales for Canada is derived based on the adult population.⁴⁸ Then this estimate is converted to monetary terms using a price that is 60% of the selling price before HST, GST and PST.⁴⁹ The nominal sales are then split between sales to consumers and sales to licensees.⁵⁰ For the latter, a mark-up is applied. The sum of sales to consumers plus sales to licensees (including mark-up) constitutes the effect on the household spending portion of GDP due to illicit alcohol sales. The final effect on GDP is obtained by removing the proportion of illicit sales that are obtained from imports (not part of Canadian production). The licensees mark-up is estimated at 300% for spirits⁵¹ and 200% for wine. The lower mark-up for wine reflects the stronger competition from low-cost wine. As mentioned in the first paragraph, imports are only applicable to spirits and are estimated at 50% of its black market value. It is assumed that there are no illegal sales of beer.

Following this methodology, illicit transactions are estimated to have been as much as \$316 million in 2011, of which \$57 million were sales through licensees. This amount corresponds to 51.3 million bottles of wine, of which 46.1 million were sold directly to households at an average price of \$5.61 and 5.1 million were sold through licensed establishments to customers at an average price of \$11.21.

Similar to wine, illegal spirits are not all sold directly to consumers. Part of the supply goes to licensed bars and restaurants. For 2011, illicit transactions are estimated to have been as much as \$1,418 million, of which \$354 million were sales through licensees. This amount corresponds to 77.8 million bottles of spirits (750ml), of which 70.1 million were sold directly to households at an average price of \$15.17 and 7.8 million were sold to customers at an average price of \$45.52.

47. In the appendix of LCBO annual reports, estimates of sales of "illegal" spirits and wines are reported. This is sometimes reported in volume and sometimes in value terms.

48. The adult population is used to derive a blow-up factor to obtain Canadian estimates as in previous Statistics Canada studies. Population is used instead of volume of legal sales to avoid any distortion resulting from underground transactions themselves.

49. The average black market price, calculated at 60% of the official price, is on the high side: smugglers sell a carton of cigarettes for as little as 30% of the legal retail price.

50. Sales to consumers and sales to licensees are split 90% to consumers and 10% to licensees. This puts the "illicit" proportion of alcohol in licensed establishments at about 25%. This is deemed an upper bound because the licensee cannot replace a large portion of legal purchases by illicit ones without arousing suspicion. The same proportion is used for spirits and wines.

51. According to the national accounts, the average mark-up on alcohol sold in licensed outlets (including tips) was 170% in 2009, the last benchmark year. If one removes 10% for tips, the 170% mark-up becomes 153%, or \$40 on a bottle of liquor of \$26, for a total of \$66. If the contraband bottle bought at \$15 is sold at the same price, the mark-up is \$51, or 340%. The mark-up of the previous study, 300%, was used in the current estimates.

Table C.3 Effect on GDP of potential underground transactions related to alcoholic beverages, Canada, 2011

Income-based GDP		Expenditure-based GDP	
	2011		2011
	millions of dollars		millions of dollars
Mixed income, illegal wine	259	Household expenditure, illegal wine	259
Mixed income, smuggler mark-up on spirits	532	Household expenditure, contraband spirits	1,063
Mixed income, licensee mark-up on contraband spirits	295	Household expenditure, licensee mark-up on contraband spirits	354
Mixed income, licensee mark-up on illegal wine	57	Household expenditure, licensee mark-up on illegal wine	57
		Imports of contraband spirits	-591
Potential amount missing from GDP	1,143	Potential amount missing from GDP	1,143

Note:

GDP: Gross domestic product

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

The effect of these underground transactions on GDP for 2011 is illustrated in Table C.3. The sales of illegally-produced wine, estimated at \$259 million, would result at the most in an increase of the same magnitude in household final consumption expenditure and in net income of unincorporated business. It is probably less because the purchase of wine-making ingredients and supplies would be deducted from household final consumption expenditure and shifted to intermediate demand, thereby also decreasing net income. The black market sales of the smuggled liquor, estimated at \$1,063 million, would lead to an identical increase in household final consumption expenditure, offset by a \$591 million increase in imports. To this should be added the licensee mark-ups, \$354 million on spirits and \$57 million on wine, for a net effect on GDP of \$1,143 million, or 0.1% of GDP in 2011. This would be balanced on the income side of GDP by an equivalent increase, most of which would probably be recorded under net income of unincorporated business.

At this point it is important to validate these estimates: are they realistic upper bounds? Globally alcohol consumption can be broken down between recorded consumption and unrecorded consumption. It can be reasonably inferred that recorded consumption is equal to sales.⁵² The unrecorded consumption includes: home-made alcohol, illegally produced alcohol, smuggled alcohol and surrogate alcohol.⁵³ In its “Global status report on alcohol and health – 2011” the World Health Organization (WHO) estimates that the Canadian average per capita recorded consumption of pure alcohol between 2003 and 2005 stood at 7.8 litres, a number that is in line with sales published in Canada.⁵⁴ Their estimates for unrecorded consumption stood at 2.0 litres. As shown in the bottom part of Table C.4, our upper limit estimates of the volume of underground consumption/production of illicit alcohol stands at an average of 0.5 litres per adult aged over 15, well below the number reported by the WHO. This estimate seems realistic since it leaves 1.5 litres of pure alcohol per Canadian adult attributable to home-made and surrogate consumption, which are not “underground”. Based on the estimates of the WHO, it could be argued that the estimate for illegal alcohol could be higher. But given that 2011 estimates for illegal spirits are about the same volume as LCBO legal sales and that the estimated volume of illegal wine represents a little less than 30% of LCBO legal sales, it is difficult to imagine an even larger operation that would keep itself “underground”.

Last, what do these estimates imply about the market share of illicit production/consumption of spirits and wine? In 2011, illicit spirits could have accounted for as much as 21.8% of the spirits market while the illicit wine could have been as much as 7.6% of the wine market. These market shares are lower than what they were in the beginning of the 1990s. They are nevertheless high enough given the limited anecdotal evidence on this type of activity.

52. This is the assumption made by the WHO.

53. Home-made alcohol for own use and surrogate alcohol are not illegal, and out of scope here. Surrogate alcohols include mouthwash, perfumes, and eaux de Cologne.

54. Statistics Canada, CANSIM Table 183-0019, Volume of sales of alcoholic beverages in litres of absolute alcohol and per capita 15 years and over, fiscal years ended March 31.

Table C.4 Legal and estimated contraband sales and consumption of spirits and wines, in volume, Canada, selected years

	1992	1994	1996	1998	2000	2002	2004	2006	2008	2010	2011
	millions of litres										
Spirits											
Legal sales	136.8	127.0	128.1	138.3	155.4	182.3	197.5	202.6	210.8	209.3	209.8
Estimated illicit sales ¹	48.1	56.9	46.5	40.8	27.9	29.2	26.3	35.3	47.4	58.5	58.4
Total consumption	184.9	183.9	174.7	179.1	183.3	211.6	223.8	237.9	258.2	267.8	268.2
	percent										
Market share of contraband	26.0	30.9	26.6	22.8	15.2	13.8	11.7	14.9	18.3	21.8	21.8
	index (1992 = 100)										
Index, legal sales	100.0	92.8	93.7	101.0	113.6	133.3	144.3	148.1	154.1	153.0	153.3
	litres per capita (person aged 15 and older)										
Consumption per capita (15+) - legal	6.6	5.7	5.7	6.3	7.4	8.4	8.7	8.5	8.2	7.8	7.7
Consumption per capita (15+) - illegal	2.1	2.5	2.0	1.7	1.1	1.1	1.0	1.3	1.7	2.1	2.0
Consumption per capita (15+) - total	8.7	8.2	7.7	8.0	8.5	9.5	9.7	9.8	9.9	9.9	9.7
	millions of litres										
Wine											
Legal sales	231.3	226.9	241.0	259.9	287.6	316.7	343.3	378.8	425.3	456.5	470.0
Estimated illicit sales ¹	104.3	104.5	91.0	72.2	48.9	36.5	40.1	37.8	35.8	41.9	38.5
Total consumption	335.6	331.4	332.0	332.1	336.5	353.2	383.4	416.7	461.1	498.4	508.4
	percent										
Market share of contraband	31.1	31.5	27.4	21.7	14.5	10.3	10.4	9.1	7.8	8.4	7.6
	index (1992 = 100)										
Index, legal sales	100.0	98.1	104.2	112.4	124.4	136.9	148.5	163.8	183.9	197.4	203.2
	litres per capita (person aged 15 and older)										
Consumption per capita (15+) - legal	9.4	9.0	9.5	10.0	10.6	11.1	11.7	12.8	13.5	13.8	14.0
Consumption per capita (15+) - illegal	4.6	4.5	3.9	3.0	2.0	1.4	1.5	1.4	1.3	1.5	1.3
Consumption per capita (15+) - total	14.0	13.5	13.4	13.0	12.6	12.5	13.2	14.2	14.8	15.3	15.3
	litres per capita (person aged 15 and older)										
Absolute alcohol											
Spirits - legal	2.2	2.0	1.9	1.9	2.0	2.1	2.1	2.2	2.2	2.2	2.1
Spirits - illegal ²	0.8	0.9	0.7	0.6	0.4	0.3	0.3	0.4	0.5	0.6	0.6
Spirits - total	3.0	2.9	2.6	2.5	2.4	2.4	2.4	2.6	2.7	2.8	2.7
Wine - legal	1.1	1.1	1.1	1.2	1.3	1.4	1.5	1.6	1.8	1.8	1.9
Wine - illegal ²	0.5	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.2
Wine - total	1.6	1.6	1.5	1.5	1.5	1.6	1.7	1.8	1.9	2.0	2.1
Beer - legal	4.5	4.3	4.3	4.2	4.3	4.2	4.2	4.2	4.2	4.2	4.0
Beer - illegal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beer - total	4.5	4.3	4.3	4.2	4.3	4.2	4.2	4.2	4.2	4.2	4.0
Total - legal	7.8	7.4	7.4	7.3	7.6	7.7	7.8	8.0	8.2	8.2	8.0
Total - illegal	1.3	1.4	1.1	0.9	0.6	0.5	0.5	0.5	0.6	0.8	0.7
Total	9.1	8.8	8.4	8.2	8.2	8.2	8.3	8.5	8.8	9.0	8.7

Notes:

Data is available from 1992 to 2011 in supplementary tables available on request.

1. This is an estimate derived from LCBO information.

2. The conversion factors are derived from CANSIM Tables 183-0006 and 183-0019 for legal sales. The factors are applied to illicit consumption.

Sources:

LCBO, annual reports;

Statistics Canada, CANSIM Table 183-0006 Sales of alcoholic beverages, Table 183-0019 Volume of sales of alcoholic beverages in litres of absolute alcohol and Table 051-0001 Estimates of population. (accessed: 2013-06-03).

C.1.1.4 Rent, rooming and boarding

Rent

In the GDP, rents are calculated as the product of the average rent and the rental housing stock. Any undercount in the stock will lead to an understatement of rents. Such an undercount may be related to the underground economy when apartments are overlooked by census enumerators because they were purposely hidden (dwellings with a concealed entrance or no separate entrance, for instance) by owners who rent them on the black market. How can the number of these purposely hidden rented dwellings be approximated?

The upper-limit approach is used to estimate the value of rents that could result from underground economic activity. The starting point is to calculate the maximum number of rented dwellings and to subtract from it the number of rented dwellings used for the rent estimates in the official economic accounts. The difference is then multiplied by an average rent to produce the value of the rents that could have been paid on the black market.

However, these hidden rented apartments are located in houses erroneously enumerated as single dwellings or duplexes and counted in the stock of owner-occupied dwellings. The rent imputed to an owner-occupied dwelling in the national accounts is deemed equivalent to the average rent for a tenant-occupied dwelling, adjusted by a coefficient reflecting the difference in the average area and quality of each type of dwelling. The coefficient attributed to houses with a hidden apartment in the basement or on the upper floor would have been too high, and their imputed rent must therefore be reduced to derive the overestimate of imputed rents.

Finally, the difference between the underestimate of paid rents and the resulting overestimate of imputed rents is not included in the GDP. The process of estimating rents paid for dwellings rented on the black market begins with the number of missed dwellings. There are three sources of information on the number of households in Canada: the Census of Population, the SHS, and the Business Special Surveys and Technology Statistics (BSSTS) Division.⁵⁵ The census estimates are never revised, although post-census studies provide a fairly precise measurement of the undercount. The household estimates from the SHS go back to 1997 and cover the whole of Canada for some years and only the provinces for other years. The estimates from the BSSTS are based on information about dwellings in Canada. This source is used in calculating rents for the economic account estimates.

To determine the upper limit for rented dwellings, we used the higher of the census count of households adjusted for undercoverage and the estimate from the SHS.

The overall undercoverage rates for the 1991 and 1996 censuses were 2.2% for Canada, with substantial variation among the provinces. For 2001, the difference between the SHS and the Census was 2.3%. For 2006, the SHS estimate did not cover all of Canada, but a reasonable estimate yields an undercoverage rate of 2.8%. For estimation purposes, household time series were estimated for each province and territory between 1991 and 2011. The number of missed households was estimated by subtracting the ICSD estimates used in the economic accounts from the upper-limit estimates. The number of missed renter households was estimated with the ratio of missed renter households to total missed households from the 1991 Census. That ratio, 77%, was used for all years, provinces and territories.

To calculate the understatement of rents due to underground transactions, the number of purposely hidden rented dwellings is simply deemed equal to half of the estimated number of missed renter households. This is certainly an upper limit, since nearly 40% of missed households were living outside census metropolitan areas, where covert rentals would probably be rare. In addition, a large number of dwellings were probably missed simply by mistake, while the assumption made here is that they were missed because they were purposely hidden.

The stock of hidden rented dwellings is multiplied by an average rent, which is set, as an upper limit, at 90% of the average space rent⁵⁶ to reflect the fact that these dwellings are small apartments usually rented below the market rate. This yields the potential understatement of paid rents.

55. Since each private household resides in a private dwelling it is possible to measure either of the two concepts using household-based information or dwelling-based information.

56. Space rent excludes landlord expenses for utilities, janitorial services, and so on, which are accounted for separately in personal expenditure. In recent years, it has been estimated at about 85% of gross rent.

Table C.5 Effect of potentially missing covert rentals, Canada, 2009 to 2011

	2009	2010	2011
1 Missed households ('000)	368	367	372
1a Proportion of missed households living in rented dwelling (%)	77	77	77
2 Missed households living in rented dwellings ('000)	282	281	285
3 Missed rented dwellings, 50% of L2 ('000)	141	141	142
3a Average monthly gross rent (\$)	764	773	781
4 Average annual gross rent, L3a*12 (\$)	9,163	9,272	9,372
5 Average annual space rent, 85% of L4 (\$)	7,788	7,881	7,966
6 Average annual space rent, covert rentals, 90% of L5 (\$)	7,010	7,093	7,170
7 Paid rents, missed rented dwellings, L3*L6 (million of dollars)	989	997	1021
8 Average number of rooms, owner-occupied dwellings (number of room)	7.30	7.30	7.30
9 Average number of rooms, rented dwellings (number of room)	4.40	4.40	4.40
10 Rent blow-up factor, owner-occupied dwellings, L8/L9	1.7	1.7	1.7
11 Average annual space rent imputed to owner-occupied dwellings, L5*L10 (\$)	12,922	13,075	13,217
12 Owner-occupied dwellings affected, repeat L3 ('000)	141	141	142
13 Rents imputed to owner-occupied dwellings affected, L11*L12 (million of dollars)	1,824	1,839	1,882
14 Corrected rents imputed to owner-occupied dwellings affected, 70% of L13 (million of dollars)	1,276	1,287	1,317
15 Overstatement of rents imputed to owner-occupied dwellings affected, L13-L14 (million of dollars)	547	552	565
16 Net effect on GDP, L7-L15 (million of dollars)	442	446	456

Note:

GDP: Gross domestic product

Data is available from 1992 to 2011 in supplementary tables available on request.

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

As previously mentioned, these hidden rented apartments are located in houses erroneously enumerated as single dwellings or duplexes and counted in the stock of owner-occupied dwellings. Consequently, the space coefficient attributed to houses with a hidden apartment in the basement or on the upper floor would have been too high, and their imputed rent must therefore be reduced by about 30% to derive the overestimate of imputed rents. The adjustment coefficient used is based on the average number of rooms for rented dwellings and owner-occupied dwellings in the 1991, 1996, 2001 and 2006 censuses for the provinces and territories.

The net effect of the potential understatement of rents due to covert rentals is calculated as the difference between the underestimate for missed dwellings and the overestimate of rents imputed to owner-occupied dwellings. The various steps in the estimation of rents in this study are shown in Table C.5.

Rooming and boarding

Rooming and boarding could also be subject to the UE. Similar to the UE rental estimates, the average market rent for a room is likely higher than the average rent imputed per room in owner-occupied dwellings. Any increase in spending on "rooming and boarding" to account for hidden rentals would be partially offset by a drop in imputed rent on owner-occupied dwellings. Assuming the offset is about 75%, this leaves only a 25% mark-up of the landlord to be added to GDP.

As an upper limit this study is assuming that "rooming and boarding" could be underestimated by 50% and that 40% of rooming and boarding is the result of homeowners' activities. Since only 25% of homeowner's hidden rooming and boarding activity enters GDP, this leaves an upper bound estimate of \$120 million that could be missing from GDP in 2011.

C.1.1.5 Tips

Tips estimated for the UE study are in addition to those already included in the official CSNA numbers. Estimates of tips in the official statistics are derived first by using administrative and survey sources of information. However, it is believed that these include only a portion of the total tips paid/received in the Canadian economy. Consequently, another adjustment to account for the missing portion of tips is made in the CSNA official estimates. This adjustment

is derived by applying fixed percentage “tipping rates” to specific gross business receipts. As an example, a tipping rate of 10% is applied to gross receipts from “Taxi and limousine services”. In 2009, about \$3.2 billion of tips were recorded in official estimates.

In this study, tips over and above the amount already included in official statistics, are calculated to obtain an upper bound. First, an amount is added for undeclared tips on income from services not reported (skimming). Second, an amount is added for income reported and not reported from occupations where tips contribute a significant portion. The first amount, tips on skimming, corresponds to the standard approach used in the CSNA but applied to potentially missed income due to underground transactions. The second amount helps to cover tips income not

Table C.6 Potential underestimation of tips due to underground transactions, Canada, 2009

	Accommodation services	Food and non-alcoholic beverage services	Alcoholic beverage services	Other commodities	Total
millions of dollars					
Potential undervaluation of revenues					
Taxi and limousine service	...	...	...	132	132
Traveller accommodation	287	234	87	...	608
Food services and drinking places	...	3,165	755	...	3,920
Personal care services and other personal services	...	...	...	804	804
Total	287	3,399	842	936	5,465
percentage					
Tipping rate used in the study¹					
Taxi and limousine service	...	...	...	10	...
Traveller accommodation	3	10	10	...	...
Food services and drinking places	...	10	10	...	...
Personal care services and other personal services	...	...	...	10	...
millions of dollars					
Tips underestimations					
Taxi and limousine service	...	...	...	13	13
Traveller accommodation	9	23	9	...	41
Food services and drinking places	...	317	76	...	392
Personal care services and other personal services	...	...	...	80	80
Total	9	340	84	94	526
millions of dollars					
Tips income not reported by unincorporated businesses (20% of revenues undervaluation)					
Taxi and limousine service	...	...	...	26	26
Traveller accommodation	57	47	17	...	122
Food services and drinking places	...	633	151	...	784
Personal care services and other personal services	...	...	...	161	161
Total	57	680	168	187	1,093
millions of dollars					
Total tips adjustments					
Taxi and limousine service	...	...	...	40	40
Traveller accommodation	66	70	26	...	162
Food services and drinking places	...	950	227	...	1,176
Personal care services and other personal services	...	...	...	241	241
Total	66	1,020	253	281	1,619

... not applicable

Note:

1. With the latest comprehensive revision, tipping rates were revised in CSNA. These changes lowered some tipping rates compared to those used in this study. There was no change for “other commodities” and “accommodation services”. Tipping rate was lowered to 9% for “Alcoholic beverages services”. The largest change is for “Food and non-alcoholic beverage services” where the tipping rate was lowered to 4% to account for the fact that fast-food services are included in this category. Hence the tipping rate used in the UE study are upper bound assumptions.

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

reported by unincorporated businesses. The upper limits of undeclared tips on income from services not reported (skimming) is calculated as a fixed percentage of estimated skimming and of the sales of illegally manufactured wine and contraband liquor in licensed establishments.

The second adjustment is also derived using the upper-bound approach. This adjustment is calculated as 20% of potential undervaluation of revenues (skimming). This is without doubt an upper bound estimate since the official statistics already aim to capture this phenomenon.

Table C.6 shows the potential underestimation of tips due to underground transactions for 2009. The resulting total is \$1.6 billion, or 50% of the \$3.2 billion already added in GDP for undeclared tips in 2009.

C.1.2 Gross fixed capital formation

Gross fixed capital formation includes tangible or intangible assets which are produced as outputs from production processes and which are themselves used repeatedly or continuously in other production processes for more than one year. In the simplest terms, any expenditure that gives rise to an asset could be considered investment; or, spending on an item whose expected life equals or exceeds one year could be considered investment. However, investment spending must be linked to future use in production.⁵⁷

In the CSNA, gross fixed capital formation is presented under three categories: construction, machinery and equipment and intellectual property products. The construction of new dwellings and home renovations and alterations are considered prime areas where underground transactions occur.

One point should be clarified at the outset. Spending by homeowners and landlords on minor repairs and maintenance is treated as an intermediate expense, not as gross fixed capital formation, in the national accounts. It is offset against gross rents in the calculation of net rental income. Any underestimation/overestimation of spending on repairs by landlords and homeowners translates into an overestimation/underestimation of net rental income, leaving GDP unchanged. At issue here, therefore, are only underground transactions related to investment in residential construction.

One way to assess the validity of the national accounts estimates for residential construction (new construction and renovations) is to compare them to sales of lumber and building material dealers (as a proxy for the total use of lumber and building materials). The ratio of one to the other, shown in line 9 of Table C.7, gives an approximation of the building materials content of residential construction.

As sales of lumber and building materials are reliably captured in the statistical system, a plausible and relatively stable ratio of materials to output (line 9) implies that the measured output is also plausible. Many factors contribute to marginal increases and decreases in the material content observed over the years. First, in periods of downturn, building contractors are forced to reduce their margins or risk bankruptcy. This would lead to an increase in the material content ratio. In addition, homeowners, overall, have less money to spend on renovations and have more time to do work themselves. This would also lead to an increase in the material content ratio. The reverse is true in periods of upturn. Second, an increase in the material content may indicate that underground transactions are growing: sales of building materials are well captured, but contract and labour costs could be increasingly 'missed'. Other things being equal, a higher ratio suggests that some output may be missing.

CSNA official estimates of gross fixed capital formation in residential construction are fairly reliable regardless of underground activity because they are largely independent of the receipts declared or reported by businesses and self-employed workers in the industry. However, the possibility that some underground transactions in construction are still missing from GDP cannot be ruled out. In order to determine how much these could plausibly amount to, it is necessary to review how the national accounts estimates in this area are put together.

57. It is on this basis that expenditure on consumer durable goods is excluded from investment in the national accounts.

Table C.7 Gross fixed capital formation in residential construction and sales of lumber and building materials, Canada, 2004 to 2011

	2004	2005	2006	2007	2008	2009	2010	2011
	millions of dollars							
Official estimates in the CSNA¹								
1 Residential structures (2 + 3 + 4)	82,501	89,359	98,160	108,869	107,247	99,666	111,240	116,195
2 New construction	41,618	43,322	47,082	51,101	50,970	39,782	48,428	49,905
3 Renovations	27,100	30,271	33,692	37,567	39,182	41,034	42,821	43,848
4 Ownership transfer costs	13,783	15,766	17,386	20,201	17,095	18,850	19,991	22,442
5 Of which new construction, renovations and alterations (2 + 3)	68,718	73,593	80,774	88,668	90,152	80,816	91,249	93,753
	millions of dollars							
Direct and derived information from the Wholesale trade survey								
6 Sales lumber, millwork, hardware and other building supplies merchant wholesalers ²	30,670	32,645	34,292	35,721	34,100	31,986	35,959	35,244
7 of which, exports (estimated ³)	4,334	3,960	3,379	2,609	1,876	1,395	1,624	1,650
8 of which, domestic sales (6 - 7)	26,336	28,685	30,912	33,112	32,224	30,591	34,335	33,594
9 Ratio of sales lumber, millwork, hardware and other building supplies merchant wholesalers to new construction, renovations and alterations (8/5)	0.383	0.390	0.383	0.373	0.357	0.379	0.376	0.358

Notes:

1. Statistics Canada. CANSIM Table 380-0068, Gross fixed capital formation. (accessed: 2013-06-03).
2. Statistics Canada. CANSIM Table 081-0011, Wholesale trade, sales by the North American Industry Classification System (NAICS). (accessed: 2013-06-03)
3. In 2004, estimated as 14.1% of total sales based on 1992 estimates. For the following years, movement of the exports of Lumber and other sawmill and millwork products was derived from CANSIM Table 228-0059 - Merchandise imports and exports, customs and balance of payments basis for all countries, by seasonal adjustment and North American Product Classification System (NAPCS), CANSIM (database). (accessed: 2013-06-03) was used.

C.1.2.1 New residential construction

In the CSNA, the estimation of the value of new housing construction⁵⁸ combines housing starts, average values of building permits and work put in place coefficients. The latter measure, by month of start, province and type of dwelling (single dwellings, semidetached dwellings, row housing and apartments), the volume of work on an average 'start' usually carried out in each construction period. In the case of single dwellings, 50% of the work is normally done in the first quarter, about 40% in the second quarter, and the remainder, in the third quarter after the start. The value of work put in place in a given period is calculated by multiplying these coefficients by the value of housing starts (itself derived as the product of the number of starts and average building permit values) for that period and previous periods, and summing the results. The value of construction work on conversions (from one type of dwelling to another) and on cottages is based on building permits, and that of mobile homes, on manufacturers' shipments. Finally, an estimate of costs other than for the construction itself (legal, architectural and mortgage fees, land development fees imposed by municipalities and GST), not reflected in building permit values, is added on separately.

Statistics on housing starts come from the Canada Mortgage and Housing Corporation (CMHC) and are considered reliable. It is difficult to build a dwelling without obtaining a permit. In addition to the monthly survey of building permits carried out by Statistics Canada, covering municipalities where 95% of the Canadian population resides, the CMHC has access to records of municipalities and hydro companies and has its own information from buyers getting CMHC approved mortgages. It verifies when the construction work authorized on the building permit actually begins and identifies housing starts in areas where no permit is required or where construction is undertaken before permit is issued. A small number of starts are probably missed, but not on account of underground activity.

Values reported on building permits on the other hand are subject to understatement. Builders have a twofold interest in understating the cost of construction: to facilitate the hiding of income (coming from work done outside the original contract, for instance), and to save on the cost of the permit itself, usually proportional to the cost of construction excluding overhead costs and profit. But municipalities have the opposite interest and will not issue a building permit for a house with a value that is unreasonably low. The price of new homes on the market is also well advertised, and is a good gauge of their cost of construction. Building permits issued by municipalities are thus in some sense already 'adjusted' for undervaluation. Builders may undervalue a dwelling at the margin, perhaps by 10% or 15% at the most.

58. See Statistics Canada Catalogue no. 13-017-XWE, Section 9.2 for a full explanation. For details on the calculation of work put in place, see survey number 5016 on Statistics Canada web site.

In addition, Statistics Canada makes another upward adjustment to average building permit values to reflect the builders' margin, undervaluation and omitted material costs such as landscaping. These blow-up factors vary by type of dwelling and province, and are above average for Quebec where building permit values are more easily understated. In 2011, for Canada as a whole, they were 9% for single dwellings, 10% for semi-detached dwellings and 19% for row housing and apartments.

Notwithstanding these adjustments, there could still be some understatement of building permit values through undervaluation at the margin or the omission of part of the work contracted out after issuance of the permit. At the most, it could reach:

- 10% for single dwellings (\$2,364 million in 2011);
- 5% for semidetached dwellings and row housing (\$286 million in 2011);
- 5% for apartments (\$585 million in 2011);
- 10% for mobile homes (\$33 million in 2011).

on which work may also be done outside the original contract. The assumption of a greater average undervaluation for single houses simply takes into account that they are subject to wider variations in value and that most of the expensive, custom built dwellings fall in this category. It does not contradict the fact that the average profit margin (as indicated by the blow-up factor) may be lower for single dwellings than for row housing and apartments.

The value recorded in GDP for construction of cottages is already adjusted for undercoverage and undervaluation, because the survey information is believed to be inadequate. As an example, the increase in the stock of seasonal dwellings was estimated at 4,707 units for 2011 while fewer than 622 building permits were issued for cottages that year.⁵⁹ Reported building permit values are also blown-up, much more than for new dwellings. The substantial upward adjustments in the number and the average value of new cottages are not intended specifically to account for possible underground transactions in this area, but they are probably sufficient to capture them nonetheless. Another upward adjustment of 25% to account for what might still escape measurement would yield \$7 million in 2011 and has to be considered an upper limit.

The underestimation could be much higher for conversions from one type of dwelling to another (from a single to duplex and vice versa, and 'winterization' of cottages for example). Municipalities do not have as good a yardstick to judge the construction costs being reported: few permits of this kind are issued and the work is less standardized than for new dwellings. On the other hand, many municipalities have inspectors who verify some of the work undertaken for compliance with building codes and standards and for assessment purposes, so that those who do request a permit may understate their costs, but again only up to a point. The problem is that there is no way to estimate the construction work carried out without a permit. Unlike new dwellings, conversions can be hidden. What is lacking in this instance is a reliable volume measure equivalent to housing starts.

A ratio of two hidden conversions for a reported one is conceivable. Although there are no other statistics to go by, the hidden conversion, usually the addition of an apartment, is probably one where the average cost of the work is lower since it is on a smaller scale than the conversion of a double dwelling into a single one. It is more difficult to hide a large-scale conversion from municipal inspectors. If this is the case, a hypothetical adjustment of 200% would actually reflect a ratio of hidden to reported conversions higher than two to one, and could be considered an upper limit.

Some supplementary costs do not give rise to underground transactions (GST, land development fees, mortgage fees and insurance). The other costs under that heading (essentially legal and architectural fees and surveying costs) are mainly incurred for new dwellings and probably not subject to widespread hidden transactions. They are estimated as a percentage of the value of construction work put in place and as a result could be underestimated in the same proportion, roughly by 10%.

To summarize, the underground transactions related to residential construction possibly escaping measurement in the official GDP could amount at the most to \$5,953 million in 2011, broken down as follows:

59. Statistics Canada, Survey 5169 – Stocks of Fixed Residential Capital.

Table C.8 Potential underestimation of residential construction due to underground transactions, Canada, 2011

	millions of dollars
Single dwellings	2,364
Semi-detached dwellings and row housing	286
Apartments	585
Mobile homes	33
Cottages	7
Conversions	1,770
Supplementary costs	907
Total	5,953

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

C.1.2.2 Renovations and alterations

The SHS is the main source of information used to produce estimates of renovations and alterations.⁶⁰ The results from this survey are examined in light of other indicators such as renovation permits, sales of building materials and loans outstanding for renovations of residential property.⁶¹

For the purpose of producing UE estimates, ratios describing the allocation of renovations and alterations between various groups of households are still used. Homeowners account for over 93% of that type of spending, landlords, for over 3%, cottage owners and tenants, for the remainder.

The following upper bound assumptions are used on the contract work portion of the renovations and alterations estimates of the CSNA.⁶² For homeowners, 20% of contract work could be hidden. The same proportion is used for vacation homes while an upper bound proportion of 10% is used for tenants and landlord renovations.

This percentage may not seem very high. One must keep in mind though that a portion of what is reported for contract work is spent on building materials. The implied underreporting of the value added (wages and profit) in contract work under this assumption would thus be higher than 20% on average, and this percentage is applied to amounts reported by homeowners, not by contractors.

Overall, under these assumptions, the upper bound estimates for renovations in 2011 would be \$5,785 million dollars which correspond to 12.6% of the official estimates.

C.1.2.3 Ownership transfer costs

The last component of investment in residential construction is ownership transfer costs related to the resale of dwellings, such as GST, land transfer taxes and real estate commissions. The concern for this study is real estate commissions which make up over 80% of the total transfer costs.

In CSNA, a value of real estate commissions was established in 1992 by analysing the GST file obtained from the Tax Data Division. Since 2000, annual benchmarks have been established using the Annual Survey of Service Industries: Real Estate Agents, Brokers, Appraisers and Other Real Estate Activities and the SHS. Estimates of real estate commissions are also based on the monthly report of listings through the Multiple Listing Service (MLS) of the Canadian Real Estate Association. This report provides monthly data, by province, on the number of houses sold and their average selling price. In the absence of direct information on commissions actually received and because the extent of commission discounting is not known, estimates in this area may be on the high side. In this study we make the assumption that real estate commissions are well covered by the current approach used in CSNA and that there is no need to incorporate an additional adjustment.

60. The Homeowner Repair and Renovation Survey (HRRS) was used up until 2002.

61. Supplementary data for loans outstanding for renovations of residential property are obtained from administrative data supplied to the Office of the Superintendent of Financial Institutions and the Quarterly Financial Statements.

62. The contract work portion is derived from proportion taken from the HRRS survey. These proportions were quite stable for the years where the survey was conducted.

C.1.3 International exports

Merchandise exports may be underestimated through smuggling or through undervaluation of declared transactions. However, there are few goods or services for which underground transactions relating to exports are evident or suspected, and there would appear to be no example of a Canadian product smuggled out of the country on a large scale.⁶³

The upper bound method is used to estimate underground activities related to a selected group of international exports. For merchandise trade, goods typically exported by very large businesses or traded at international prices are deemed not to be subject to underground transactions.⁶⁴ In 2011, these goods accounted for about 88% of Canada's exports and involved energy products; metal and non-metallic ores, mineral and products; chemical, plastic and rubber products; forestry products; industrial machinery; electronic and electrical equipments and parts; motor vehicles and parts; aircraft and other transportation equipment and parts; clothing, footwear and textile products; paper and publishing products; pharmaceutical products; and furniture and fixtures; etc.. This leaves a group of commodities where some underground transactions could take place. The upper bound assumption is that exports in this group of commodities could be undervalued by 5% at most. These commodities are:

- Farm and fishing products [X111];
- Food and tobacco intermediate products [X112];
- Food, beverage and tobacco products [X221];
- Cleaning products, appliances, and miscellaneous goods and supplies [X226].

Trade in services comprises four categories: travel, transportation, commercial services and general governments' services. As in trade of merchandise, the upper bound method is used to estimate underground activities related to a selected group of international exports. It is assumed that there is no UE on government services. The same assumption is made for transportation because international transport is highly regulated and mostly done by large businesses. There could be some UE in the travel exports, but these are not identified here and, instead, are embedded in the estimation of skimming (see household spending section). The last category, commercial services includes a wide variety of services, provided by small and large businesses, often for custom-made services that are not readily identifiable commodities. As such, commercial services, is a category of export transactions lending itself to some underestimation due to underground transactions, through non-reporting or undervaluation. Within that group, most of the market belongs to large, well-established and often regulated companies engaged in the trade of "standardized" commodities.⁶⁵ It is assumed in this study that there is no UE on this subset of commercial services. This leaves a group of commercial services where some underground transactions could take place because service receipts are deemed easier to hide. The upper bound assumption is that exports in this group could be undervalued by 10% at most. These commodities are:

- maintenance and repair services;
- construction services;
- non-financial commissions;
- advertising and related services;
- research and development;
- miscellaneous services to business;
- other personal, cultural and recreational services.

63. Possibilities of illegal exports are rare birds whose capture is forbidden, as well as fish and arms, but such trade would be statistically negligible. Canada is not an important arms manufacturer, and the fish stocks are at an all time low. Illegal sales of uranium or plutonium could bring in billions of dollars, but production and exports are very strictly controlled.

64. Also, exports of these goods are most likely done above board as it is very hard to ship significant quantities of any of these items across the border without being detected.

65. For example, in 2011, about 76% of business service receipts came from communication services; insurance services; financial services; computer and information services; Charge for intellectual property; equipment rentals; management services; Architectural, engineering, and other technical services; and Audio visual services; etc.

Whether on transactions on goods or on services, transfer pricing is sometimes mentioned as a source of underground transactions. Transfer prices are prices at which services, tangible property, and intangible property are traded across international borders between related parties. Transfer pricing is used by companies to manage profit and loss ratios within the company. The rules governing the transfer pricing are set up by taxation authorities, but the general idea is that transfer pricing can be used if the price reflects the fair market value of a particular item. As such, transfer pricing is legal and does not constitute an instance of underground production. However, “wrongful” transfer pricing motivated by the need to shift profits abroad would fall under the “underground economy” category. Transfer pricing of that sort is beyond the scope of this study.

C.1.4 International imports

In Canada the only legal goods smuggled into the country in sufficient volume to be worth considering are tobacco, alcoholic beverages, internet postal trade and precious jewellery. Imports of goods are understated, at a minimum, by the value of the tobacco and alcohol smuggled into the country. But this understatement, in itself, does not necessarily have an incidence on GDP. Imports do not enter GDP, because they are not part of domestic production, they are a deduction against GDP on the expenditure side.

This does not mean that the omission of the value of smuggled goods has no impact on GDP, but rather that this value itself is not missing from GDP. Consider the impact of a smuggled product on GDP. The black market value of the product is omitted from household final consumption expenditure and their import value is omitted from imports. Since household final consumption expenditure enters GDP with a positive sign, and imports, with a negative sign, what is missing in GDP due to smuggling is the difference between black market value and import value, that is, the aggregate mark-up or profit of the smugglers and sellers. The same reasoning can be applied for undeclared cross-border shopping, but in this case there would be no mark-up to include in GDP. Hence cross-border shopping does not lead to an underestimation of Canada GDP.⁶⁶

For the alcohol, imports are estimated at half the illegal operations revenues on spirits. For tobacco, the estimates of illegal imports are obtained directly from CSNA; these are estimated as the difference between the total number of illegal cigarettes sold in Canada and the Canadian production for which no taxes were paid.

C.1.5 Volume estimates

As stated in the Guide to the Income and Expenditures accounts,⁶⁷ growth in the current dollar gross domestic product (GDP) or any other nominal value aggregate can be decomposed into two elements: a price element, or the part of the growth linked to inflation, and a volume element, which covers the change in quantities and quality of the aggregate. The volume element is presented in the System of National Accounts by what is referred to as the real economic activity series (such as the real GDP). Real GDP is the key economic indicator of the trend-cycle growth pattern of the economy. Calculating real GDP and its expenditure components is, therefore, an important undertaking.

With this round of UE estimates, a measure of the real underground economic activity (i.e., adjusted for inflation) is introduced. This is done using the same approach as used for the published real GDP, the Chain Fisher method.⁶⁸

The volume component of UE activity is measured by dividing the nominal value of a given series by an appropriate price index. This is referred to as deflation. For the UE estimates, the deflation of a series (such as household spending on alcohol) occurs at the lowest possible level for which a representative price index can be found. The deflated series are then aggregated together to derive various totals.

Real UE gross domestic product (UE GDP) is estimated from 124 series. The nominal values in these series are derived as described in the preceding sections. The price indexes are adjusted to remove tax for the household spending categories. Prices for gross fixed capital formation and exports are already “without taxes”. The prices for imports are not adjusted because of a lack of information. The implicit assumption here is that UE prices are highly correlated with the “official market price”. This assumption is reasonable, since it only means that UE entrepreneurs are following closely the change in the market conditions to preserve their market share and income.

66. See Katharine Kemp, “Cross-Border Shopping - Trends and Measurement Issues”, National Income and Expenditure Accounts, Catalogue no. 13-001, third quarter 1992.

67. See Statistics Canada, Catalogue no. 13-017-XWE, Section 2.3.

68. See Chapter 2 of *Guide to the Income and Expenditure Accounts*, Statistics Canada, catalogue 13-017-X.

The level of detail at which the UE series are deflated is as follows:

- household consumption expenditures (100 categories);
- gross fixed capital formation (11 categories);
- international exports (11 categories);
- international imports (2 categories).

The Chain Fisher method is considered the best approach to estimate the growth in volume and prices. However, it results in estimates of aggregates in real terms that are non-additive. In the current UE study, separate aggregates were produced for the four aggregates shown above and for the UE related GDP.

C.2 Specific methodology for components of GDP income

As mentioned in Section 3.2, UE estimates for income-based GDP are obtained by distributing GDP expenditure-based estimates into wages, surplus or mixed income. It is important to note that returns to labour from UE activity go entirely to the wages component of labour income, on the assumption that there are no “fringe benefits” paid out. It is also assumed that governments are not engaged in UE activity and consequently receive no income from it.

As shown in Table C.9, rent, tobacco and alcohol (including their import components) are entirely allocated to mixed income, thus income of unincorporated businesses.⁶⁹ Tips are classified as compensation of employees. All other components (exports, gross fixed capital formation) of UE expenditure-based are allocated on the income side on a 50/50 basis to compensation of employees and to either operating surplus (incorporated business) or mixed income (unincorporated business).

Table C.9 Allocation of underground economy GDP expenditure-based components into income-based GDP components

	GDP - income based components		
	Compensation of employees	Operating surplus	Mixed income
	percentage		
GDP - expenditure based components			
Household final consumption expenditure	...	...	...
UE tobacco	...	...	100
UE alcohol	...	...	100
UE rent, room and board	...	...	100
UE tips	100	...	...
Skimming of receipts selling to household	...	...	...
Unincorporated	50	...	50
Incorporated	50	50	...
Business gross fixed capital formation	...	...	...
Residential construction	...	...	...
Unincorporated	50	...	50
Incorporated	50	50	...
Exports of goods and services	50	50	...
Imports of goods and services	...	...	100

... not applicable

notes:

GDP: Gross domestic product

UE: Underground economy

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

69. Mixed Income is defined as the entrepreneurial income generated in the production of goods and services of unincorporated businesses. It includes both the income that accrues to the capital factor of production as well as the income that accrues to the labour factor of production (remuneration for work undertaken by the owner(s)). In the Canadian System of National Accounts, the net imputed rental income generated by owner-occupied dwellings is added to mixed income.

C.3 Specific methodology for GDP by industry

Industry-based UE GDP estimates are compiled using a direct allocation for some specific cases and using a confrontation and reconciliation approach for the skimming portion.

C.3.1 Direct allocation

Tobacco-related activities are allocated between the retail trade industry, for the smugglers' mark-up and licensees' mark-up, and the manufacturing industry, for the remaining portion of this activity.

Illegal alcohol-related activities are mainly due to imports and redistribution. The estimates are thus mostly allocated to the retail trade and the accommodation and food services industries. A small portion, specifically related to wine production, is allocated to manufacturing industries.

Rent and rooming and boarding are entirely allocated to the owner occupied dwelling industry. A small portion of undeclared tips is allocated to the transport industry (taxi) while the bulk of it is allocated to the accommodation and food services industry. Undeclared tips related to personal services are allocated to the "Other services (except public administration)" industry.

Residential construction is almost entirely allocated to the "residential construction" industry with a small portion allocated to manufacturing; this portion relates to mobile home UE activities.

Exports were originally estimated by commodity as explained in this Appendix (Section C.1.3). The allocation by industry was done using internal information derived by the Industry Accounts Division of Statistics Canada.

C.3.2 Allocation of skimming estimates

The estimates of skimming by industry rely on the same tax data as used to estimate skimming by household spending category. For unincorporated businesses (T1) data were available on a NAICS⁷⁰ basis from 2005 to date. For incorporated businesses (T2) data were available on a NAICS basis from 1997 to date. The operating revenues of small businesses (defined as incorporated and unincorporated businesses with annual operating revenues of less than \$2 million, at constant 1992 prices) were calculated by industry.⁷¹

Two sets of ratios are then applied, separately for incorporated businesses and unincorporated businesses. The first set, identify which portion of the industry operating revenues stems from household spending. The second set gives upper bound "skimming ratios" which vary by industry and whether the businesses are incorporated or not. Applying these two ratios and adding the results for incorporated and unincorporated businesses produces the estimates of skimming by industry.⁷²

The first set of ratios is calculated with information derived from the 2009 Input-Output tables.⁷³ For example, only 3.3% of the output of the "Couriers and messengers" ends up in household spending, while 79.6% of the "Food services and drinking places" output ends up in household spending.

The second set of skimming ratios for small businesses is determined as follows:

- a) no skimming is assumed for most of mining, manufacturing, energy distribution industries, telecommunications and data processing, most of the financial services industries and offices of dentists and physicians;
- b) no skimming is assumed for non-profit organizations and government services;
- c) in cases where there is a specific methodology and allocation is done directly, like rent and construction, no additional skimming is assumed;
- d) selected agricultural industries and selected manufacturing industries producing dairy products, beers and wine to account for direct sales of food: 20%;
- e) retail sector industries: 15%;

70. All NAICS codes were normalized to the NAICS 2007 classification which forms the basis of the IOIC system in the CSNA.

71. The all-item CPI (1992 = 100) is used to adjust for inflation.

72. This was done at the most detailed level of the input-output tables industry classification which comprises 235 industries.

73. 2009 Input-Output tables were used because it is the first year for which the new CSNA commodity, industry and final demand classification was introduced. These tables were published in November 2012. More information is available at www.statcan.gc.ca.

- f) transport services industries: 25%;
- g) most professional services: 5%;
- h) repairs services and services to private household: 30%;
- i) most of the remaining services: 25%.

The rates above apply to small unincorporated businesses. The rates assumed for small incorporated businesses were half these amounts.

In the past few years, tax reassessment data has become available for use at Statistics Canada. These data were used to confront and validate the industry distribution of skimming resulting from the use of the T1 and T2 data and ratios described above.

The tax data file used contained various types of reassessments.⁷⁴ For this study, only the reassessments from audits and investigations were used. Moreover, only records that had the expected outcome for the underground economy were kept, meaning only those cases where income was adjusted up or where expenses were adjusted down as a result of the audit, were retained. In cases where income was reduced or expenses were adjusted up, that is, where the audit was to the advantage of the taxpayer, it was assumed that these were not instances of underground activity but rather errors on the part of the tax filer. Records where no changes occurred were kept in order to calculate the percent change in revenues and expenses after the reassessment of the tax return.

The reassessment data that were available to Statistics Canada for the T2 portion (incorporated businesses) of the tax data covered only the years 2005 to 2011. The data for 2005 differed considerably from other years and therefore were not used in this study. Data for 2006 to 2009 were the most complete since most of the reassessments for those years have been completed. Data for the years 2010 and 2011 had fewer numbers of completed reassessments (particularly 2011) and therefore the total sample of data was smaller and incomplete.

The reassessment data by industry are in some cases highly variable from year to year since a large reassessment case in a given industry can change the industry totals considerably. Extreme cases were thus limited to a maximum understatement or overstatement of 5% since the aim was to estimate skimming.⁷⁵

Also, to compensate for the limited number of observations, a four-year moving average reassessment rate was calculated for each industry.

As throughout the study, the rate for unincorporated businesses was assumed to be double that of incorporated businesses. These rates were applied to GDP estimates by industry⁷⁶ split out, for the purposes of this study, into parts attributable to incorporated and unincorporated businesses and to small and large businesses. This was done using the operating revenues from the T1 and T2 tax files. The result of these calculations was an alternative industry distribution of skimming based on the tax audit files.

It should be noted that the calculated reassessment rates are probably on the high side because the population of filers audited by CRA is not selected in a random manner. In fact, certain industries and other outliers are targeted for re-assessment.⁷⁷ On the other hand, some underground operators may have not filed any tax records and therefore would be completely excluded from this sample. This population would likely be small and their economic activity insignificant, otherwise they would be detected.

74. For instance, special investigations, audit, appeals, conversion, system process, post assessment adjustment, client requested rollup, etc.

75. Skimming here must be understood as recurrent and systematic understatement of income or overstatement of expenses. Exceptional case are not considered as they would not go "under the radar" of the tax authorities. The assumption made here is that at the upper bound limit, a business could skim to a maximum of 10% before being detected by the tax authorities.

76. At the time of the study, GDP by industry was not available for the full time period, owing to the implementation schedule of the CSNA historical revision. Consequently, a special calculation was done for the purposes of this study, using working level information from the Canadian productivity accounts (1997 to 2008) to estimate GDP by industry for 1997 to 2008, and backcasting to 1992 using the previously published growth rate of GDP by industry. Nominal estimates of GDP by industry for 2010 to 2011 were projected using growth of operating revenues from tax files, and benchmarked to the published CSNA total.

77. The smoothing of the reassessment data helps to attenuate this potential selection bias.

The two estimates were reconciled as follows:

- a) the reassessment estimates were taken “as is”;
- b) the total of skimming by industry minus reassessment estimate is calculated;
- c) the total in (b) is allocated using the skimming by industry distribution.⁷⁸

The effect of that reconciliation process on the industry distribution is illustrated in Table C.10. First, the audited file revealed that skimming is more widespread than assumed in the skimming by industry estimates. Second, industries that are usually considered more exposed to UE activities like retail, accommodation and food services and other services excluding public administration are less important from the audited file perspective. Thirdly, the audited file indicates that there is significantly more skimming occurring in the crop and animal production industry, wholesale, transportation, professional, scientific and technical services and in health care and social assistance.

Table C.10 Change in industry distribution from the reconciliation process, 2009

	Industry distribution from:			Effect of using audited information on distribution
	Skimming estimation	Audited tax files	Reconciled estimates	
	percentage			change
Industries				
Crop and animal production	3.2	8.5	5.3	increase
Forestry and logging	0.1	0.4	0.2	increase
Fishing, hunting and trapping	0.2	0.4	0.3	increase
Support activities for agriculture and forestry	0.0	0.0	0.0	increase
Mining, quarrying, and oil and gas extraction	0.0	0.7	0.3	increase
Utilities	0.0	0.0	0.0	increase
Construction	0.0	0.0	0.0	no change
Manufacturing	0.2	2.1	0.9	increase
Wholesale trade	0.0	2.0	0.8	increase
Retail trade	22.9	6.7	16.4	decrease
Transportation and warehousing	1.9	4.9	3.1	increase
Information and cultural industries	0.3	1.1	0.6	increase
Finance, insurance, real estate, rental and leasing and holding companies	25.3	26.3	25.7	increase
Owner occupied dwellings	0.0	0.0	0.0	no change
Professional, scientific and technical services	1.0	16.5	7.2	increase
Administrative and support, waste management and remediation services	1.3	4.7	2.7	increase
Educational services	1.3	0.8	1.1	decrease
Health care and social assistance	4.8	11.0	7.3	increase
Arts, entertainment and recreation	4.9	1.5	3.6	decrease
Accommodation and food services	18.9	6.7	14.0	decrease
Other services (except public administration)	13.6	5.6	10.4	decrease
Government and non-profit institutions serving households	0.0	0.2	0.1	increase
Total	100.0	100.0	100.0	...

... not applicable

Source:

Statistics Canada, National Economic Accounts Division, 2013, special tabulation.

78. This difference amounted to 60% of the skimming estimates by industry in 2009; estimates derived from audited tax files being the lower of the two.

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