MODELING THE UNDISCOVERED GROSS DOMESTIC PRODUCT

2010/2018

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Gross domestic product is the total value of goods produced and services provided within a country during one year. The problem is there are neither fiscal policy instruments nor records of GDP during Pagume in Ethiopia. Thus, the hypothesis is there is no relationship between the UGDP and Pagume over the long run. The general objective of the study is to model the Undiscovered GDP in Ethiopia. The specific objectives of the study are to analyze the difference between Ethiopian budget year and Gregorian budget year (modeling three categories of four years in the medium term), estimate the model of undiscovered GDP over the study period (1989-2004), determine the amount of undiscovered GDP at the base year (1988) and its growth rate and forecast the Undiscovered GDP (2005-2017). The undiscovered gross domestic product (UGDP) was generated as the product of average daily gross domestic product (actual GDP divided by 360 days) and 5 days (if the year was an ordinary) and 6 days (if the year was leap year). Next, the undiscovered gross domestic product is regressed against time over years. The findings are we reject the null hypothesis and accept the alternative that there is strong relationship between UGDP and time, as time increases by a unit UGDP increases by 402.50 millions Birr; 432.51 million Birr is the adjusted level of UGDP for the base year (1988) and the undiscovered gross domestic product increased at a 18.02 % annual rate from 1988 to 2004. Therefore, if the government amends and applies universal business income tax schedules the undiscovered Gross Domestic Product will be discovered.

Undiscovered Gross Domestic Product (UGDP), Broadening income tax bases, Additional income tax revenue and Additional disposable income, Linear Trend Analysis of the UGDP model, Growth Trend Analysis of Undiscovered Gross Domestic Product, Forecasting the UGDP with Linear and Growth Trend Comparison.

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1. Introduction

1.1. Statement of the Problem

Gross Domestic Product is the total value of final goods and services produced in a country during a calendar year. GDP per person is the simplest overall measure of income in a country. Economic growth is measured by change in GDP from year to year [Streak, 2003:129]. But, GDP's definition of calendar year is too general. Because, we discovered there are two new theories of time. New theories of time are the Tropics rotate and revolve faster than the Temperates. Consistently; there are also two technologies of time[1]. The first technology of time that records faster day, week, month and year of Amete Mehert is called Ethiopian calendar. Whereas the second technology that records slower day, week, month and year of Anno Domini is called Gregorian calendar.

Besides recording, each calendar uses to make fiscal instruments that link factors of production, organization and productive labour force. For example, financial regulation of the country declared the Ethiopia's budget year runs from 1st Hamle of this year to 30th Sene of next year. This budget year or fiscal year months' use to make fiscal policy instruments such as income tax schedules. Income tax schedules in turn use to estimate, legislate and execute activities of budget during a year, medium period (4 years) and long year period (28 years). Consistently, Ethiopia's income tax law verbally obliges every employer how to apply the individual income tax base of 12 months such as 11 of 30 days (Meskerem to Hamle) and one special month of 35 and 36 days (Nehase and Pagume).

> *"Employers have an obligation to withhold the tax from each payment to an employee, and to pay the withheld amounts to the Tax Authority the amount withheld during each calendar month, in applying preceding income attributable to the months* ***of Nehase*** *and* ***Pagume*** *shall be aggregated and treated as the income of one month."* Income tax law (series of income tax laws: 1953, 1994 and 2008).

Nonetheless, there are several economic, natural and social problems. The first problem is that neither salary income and rental income nor income tax revenue is operational for 5 and 6 marginal days in the short run. The second problem is moderate seasons and shorter variations of day and night of the year in which we are naturally observing, but not recognized and institutionalized. The third problem is the current growth and transformation plan (GTP) projected revenue, expenditure and deficit neither from domestic nor external sources for a period of 26 days. The fourth problem is the available long run/historical data of GDP represent only information of 360 days in each fiscal year.

[1]According to Hackett (1983:217), using science knowledge to develop better products is called technology.

Why all of the above economic, natural and social problems do exist? Because, there are several organizations do use the Gregorian calendar. Thus, what are the adverse impacts of using the Gregorian calendar in the GTP? The opportunity cost of using the Gregorian calendar in Ethiopia is foregoing/scarifying the use of Ethiopian calendar in the Tropics that naturally shows more than 84% of the Earth. As a result, Pagume is known neither by English-English dictionaries nor by any Encyclopedias.

Therefore, bilingual modern dictionaries, for example, English Amharic Dictionary, excluded Pagume by adopting April is Miyazia, August is Nehase, etc. and September is Meskerem. Thus the expected value of Ethiopian calendar months both in an ordinary and leap year is 30 days, whereas, the expected value of Gregorian calendar months in an ordinary year is 30.42 and in a leap year is 30.5 days. The comparison shows the statistics of Pagume does exist neither in an ordinary year nor in a leap year (look at Table 1.1 in the Appendices).

As result two traditional complementary policies such as fiscal policy involves government's powers to design tax, collect tax, spend, and borrow, and the effects of these activities on the economy, and monetary policy that concerned with the volume, availability, cost and types of money, credit, foreign reserve and interest rate are neither designed nor operational during Pagume. Consequently, there are no financial records both by private sector and public sector (national income accounting). Besides, agricultural activity in Ethiopia is naturally depends on events of four moderate seasons: Kermpt, Metsew, Bega and Tseday. But the impact of using the Gregorian calendar is hiding moderate seasons that reveal agricultural activities and its linkage with industry and service sectors.

Series of the above problems do exist because there are no concept of Pagume, policy instruments, records of economics and moderate seasons. What is the primary solution? The primary solution is discovering the statistics of Pagumeby comparing the Ethiopian calendar and Gregorian calendar using programs (complex mathematical formula of Excel).As a result an expected value of Ethiopian calendar months increased from 30 days to 30.42 in an ordinary year and 30.5 days in a leap year (look at Table 1.2 in the Appendices).

Discovering the statistics of Pagume helps to conceptualize Pagume in terms of its nature such as days, moderate seasons, month and three categories of four years. Thus, first, Pagume is five and six faster rotations of the Tropics, where 6 to 10 and 11 of September is slower rotations of the Temperates. Second, Pagume recur after 30th Nehase and before 1st Meskerem. Thus we are observing that it is part of Kermpt in the east-west north and Bega in the east-west south Tropics simultaneously. Third, Pagume is 5 and 6 marginal days of the year that cause it is a subset of 12th month, i.e., Nehase & Pagume has 35 days and 36 days in an ordinary and leap years.

We have been engaged in searching the economic problem of Pagume since 1992 A.M. Thus discovering and conceptualizing the statistics of Pagume are a means to

innovate new theories and fiscal technologies. For example, we innovated new economics (new theories of income taxation):

> *Broadening income tax bases yield additional tax revenue and additional disposable income.*

To translate new theories into practices, new fiscal policy instruments have been innovated from the current. Two complementary employment income tax schedules for income tax period of 35 and 36 days (2002) and Two Universal Business Income tax Schedules for income tax period of 365 and 366 days (2005). But the further problem is these new fiscal policy instruments have not been yet amended for application. As a result economic variables remain undiscovered. Thus, there are several short, medium and long period specific questions.

- What is the undiscovered GDP over the study period (1989-2004)?
- What is the amount of GDP at the base year and its growth rate over the study period? , and
- What is the forecasted undiscovered GDP for (2005-2015 A.M)?

1.2. Objectives of the study

The objectives of the study are to

- ✓ Estimate the model of undiscovered GDP,
- ✓ Determine the amount of undiscovered GDP at the base year and its growth rate.
- ✓ Forecast the Undiscovered GDP (2005-2017)

1.3. Significance of the study

Its significance is that modeling the Undiscovered GDP in Ethiopia is new methods that use to discover new economics. It benefits not only the government but also business men. Stakeholders such as policy makers, academicians and practitioners will be involved in the process of transforming the models into reality. It gives new knowledge and skills about two theories of time and application of Ethiopian calendar in the Tropics and Gregorian calendar in the Temperates. It equips and expands new knowledge and skills of economics exponentially.

1.4. Concepts of the Undiscovered Economics

Additional Disposable Income is disposable income of 365/366 days minus disposable income of 360 days.
Additional income tax revenue is income tax revenue of 365/366 days minus income tax revenue of 360 days.
Amete Mehert

Broad income tax schedule is series of seven income tax brackets and marginal taxes that use to determine income tax bases and income tax revenue per period of 360 days.
Broader income tax schedule is series of seven income tax brackets and marginal taxes that use to detrmine income tax bases and income tax revenue per period of 365 days.
Brodest income tax schedule is series of seven income tax brackets and marginal taxes that use to detrmine income tax bases and income tax revenue per period of 366 days.
Category one is the first year in which New Year begins on Meskerem 1 and ends on Pagume 5 in the Tropics, when September 12 to September 10 recurs in the Temperates.
Category two is there are two years (the 2nd and 3rd),each year begins on Meskerem 1 and ends on Pagume 5 in the Tropics, when September 11 to September 10 recurs in the Temperates.
Category three is the leap year that begins on Meskerem 1 and ends on Pagume 6, when September 11 to September 11recurs in the Temperates.
Econometrics is mathematics in economics that deals with the application of mathematical and statistical techniques to the undiscovered economic data and problems of Pagume.
Economics studies the allocation and distribution of scarce resources (land, labor, capital and entrepreneurs) so as to meet aggregate human wants per period of time.
Ethiopian calendar is technology records faster units of time such as week, month and Amete Mehret.
Gregorian calendar is technology records slower units of time such as week, month and Anno Domini.
Microeconomics is branch of economics that studies how an individual units make decision at a point of time.
Macroeconomics is branch of economics that studies the performance of the economy in view of economic growth, distribution of income, stabilization of price, employment generation and favorable balance of payment over a period of calendar year.
Public Finance/Public Economics is applied economics that studies how optimal income tax schedules are designed and applied to meet growth, efficiency and equity targets of the country per period of time.
Pagume is five and six faster rotation of tropical earth, when September 6 to10/11 is slower rotation of the Temperates.
Undiscovered broader business income tax revenue is theoretical income tax revenue of 365 days minus income tax revenue of 360 days. **Undiscovered broadest income tax revenue** is broadest income tax revenue minus current income tax revenue.

2. Literature Review

It is hardly easy to get literature that deals with the theory of the undiscovered gross domestic product. Reviewing scientific methods of time is novelty to understand how the knowledge of time evolved from the known sources. Besides, reviewing recent literature that speaks about uses of calendars is useful. Finally theory of national income and gross domestic product would be reviewed.

2.1. Critical review of theory of time

Waugh (1937:1) asserted a large portion of all human knowledge has come down to us from unknown sources. The method by which it was originally discovered is not known. Contrary to Waugh argument, literatures show a large portion of all human knowledge has come down to us from known sources. In the following sections we will discuss the extraordinary source of knowledge in chronologicalorder.

2.1.1. Ancient Babylon

Babylonians was the first known source of knowledge. According to Merton (1943:172) the ancient Babylonians gave the measure for the circle. They thought the time take the earth to make one revolution around the sun was 360 days; and hence, the distance traveled in one day would be 1/360 of a circle. They invented a calendar of 12 months of 30 days each. Besides, 360 degrees that measures the circumference of sphere was invented by them. Moreover, as one of the earliest known civilizations, the 6,000-year-old society of Lagash, Sumer, in present-day Iraq, taxation supported massive warfare.

Moreover, the Babylonians used arithmetic and simple algebra to exchange money and merchandise, compute simple and compound interest, calculate taxes, and allocate shares of a harvest to the state, temple, and farmer. The building of canals, granaries, and other public works also required using arithmetic and geometry. Calendar reckoning, used to determine the times for planting and for religious events, was another important application of mathematics. Finally, the division of the circle into 360 parts and the division of the degree and the minute each into 60 parts originated in Babylonian astronomy. The Babylonians also divided the day into 24 hours, the hour into 60 minutes, and the minute into 60 seconds. The Babylonians devised tables of *reciprocals* (numbers that yield 1 when multiplied, such as 3 and 1/3), tables of squares and square roots, tables of cubes and cube roots, and tables of compound interest.

2.1.2. Ancient Greek

Ancient Greek was the second known source of knowledge. Parmenides (Greek philosopher) divided the world into five zones, by lines of latitude (using 360 ° of ancient Babylon) in the 5th century BC. Those five zones were a torrid zone between the Tropic of Cancer (about 23 .5° N) and the Tropic of Capricorn (about 23 .5° S); the north and south Temperate zones between the Tropics and the polar circles (66 .5° N and S); and the north and south frigid zones, which lie between the polar circles and the poles. Although, Parmenides was the first man who brought down 360 degrees of Babylon, classifying north and south Tropics as one zone was capital mistake.

Moreover, it is the greatest substance that the ancient Greeks added 5.25 days to the Babylonians' 360 days. Thus, they discovered an average solar year - time taken for the Earth to move around the Sun, is equal to 365.25 days in 519 Amete Feda. Barnett (1980:129) explains in 240 A.F Eratosthenes measured the circumference of Earth at the equator is 40,046.6 km on Sene 14 when the sun is overhead at the Tropic of Cancer.

Archimedes, the greatest mathematician of antiquity, produced theorems on complicated areas and volumes and proved them rigorously. Archimedes measured surface area of earth from the equator that amounts 511,248,288.6 square km [$SA_{Equator} = 4\pi(r)^2$; where π pie or constant number of 22/7 and r is radius of earth at the equator].

Hipparchus (190-120 A.F) discovered the precession of the equinoxes. The concept equinox is time of equal day and night, either of the two annual crossings of the equator by the Sun, once in each direction, when the lengths of day and night are approximately equal everywhere on Earth on Meskerem 13 and Megabit 12. His calculation of the tropical year, the length of the year measured by the sun, was within 6.5 minutes of modern measurements. He devised a method of locating geographic positions by means of latitudes and longitudes.

2.1.3. Ancient Ethiopia

Consistent to the series of the above source of knowledge, the Ethiopian calendar that consists 12 months of 30 days in which 11 of 30 days (Meskerem to Hamle) and 1 special month of 35 and 36 days (Nehase and Pagume) and 7 days of week was made in 519 A.M. It has been called three categories of four years calendar since 519 A.F. (Fassil Tassew, 2005:67-113,160).

2.1.4. Ancient Rome

Brandwein (1970:457) explained the Julian calendar was made in 46 B.C. based on an average solar year of 365.25 days. The arrangement of 12 months of the Julian calendar was not scientific in such a way that Julius Caesar's successor, Augustus Caesar, retained the Julian calendar but changed the names of 7th and 8th months to July and August. He also gave 31 days to each of them by taking two days from February. The names of the days are based on the seven heavenly bodies used in traditional astrology (the sun, the moon, Mars, Mercury, Jupiter, Venus, and Saturn). The seven-day week became part of the Roman calendar in 321A.D.

2.2. Birth of Christos

One of the most recognized source of modern knowledge which we use universally is the point of the birth of Christos. Waugh (1937:281) writes that time is reckoned from the birth of Christ.

2.2.1. Amete Mehret and Anno Domini

Getachew Haile (2006:23) explained the time period since the birth of Christos is called Amte Mehert (A.M) in the Ethiopian calendar and where it is called Anno Domini (A.D) in the Julian and currently in the Gregorian calendar. Thus Christos was born Maksegnoelt, Meskerem 1,0 A.M. but according to the Julian calendar, it was Tuesday, September 12, 7 A.D.

2.2.2. Map of the first globe

Rogers (1979:49) explains the first people who really made a science of map making were the ancient Greeks. During the 100s Amete Mehret, Ptolemy compiled most Greek geographic knowledge up to his time. He divided the equatorial circle into 360

degrees and constructed an imaginary north-south, east-west network over the surface of the earth to serve as a reference grid for locating the relative positions of known landmasses, such as islands and continents. Therefore, it is worth noting that Ptolemy contributed useful descriptions and maps of the known world that includes Ethiopia interior in south Tropic (look at Figure 2.1 below).

Figure 2.1: Ptolemy's map of the world and Ethiopia Interior.

Besides, scientific literature of Doresse (1967:28) shows the king of Aksum who had an extensive area under his direct control, were in trading relations with Egypt by way of the Nile about the middle of the first century.

2.3. The European Renaissance

Additional knowledge was made during the European Renaissance.Renaissance was the period of time in Europe between the 14th and 17th centuries, when the art, literature, and ideas of ancient Greece were discovered again and widely studies, causing a rebirth of activity in all these things.

2.3.1. Copernicus' theory was not as accurate as Ptolemy's

Kuhn (1962:154) explained Copernicus' theory was not more accurate than Ptolemy's and did not lead directly to any improvement in the calendar. Therefore, according to Kuhn, two problems can be detected from the second map of earth and calendar of the Gregorian that were made during the European Renaissance.

The first problem is detected from the second world map which was made in 1540 A.D. Second world map referred to the map that were made next to Ptolemy's. Nevertheless, Figure 2.2 reveal the Western Half of the World does exclude the entire Tropics by measurement of degrees. Because, for example, as you see from the globe below 75°W and 135° W which are written in the western north Caribbean Sea and Pacific Ocean(west north Tropic) exist neither by nature nor by default.

Figure 2.2: The Western Half of the World excludes the Tropics by degrees

Source: Rogers (1979:50).

Therefore, it is natural the imaginary daylight line that connects 23.5°EN and 156.5° WS is traditionally called Tropic of Cancer, and now it is called Sene 14. Besides, the imaginary daylight line that connects 0° East and 180° west traditionally is called an Equator, now it is called Meskerem 13. Thus the drawer of the second world map should have known surface area of west north Tropic is in the range of degrees between 156.5°EN and 180° W.

The second problem which were made during the European Renaissance is that the Gregorian calendar has been deformed from the Julian since October 5, 1582 A.D. Nowadays we are observing several scandals in the Gregorian calendar. Firstly, an average solar year cannot be less than 365.25 days; secondly, they did not cancel 11 days; thirdly, they violated the rule of three categories of four years, because they made leap year day in category one and also at the end of their second month's(February 28 changed to February 29), fourthly, they did and do not make clock and watch that use to record slower motion of seconds, minutes and hours that recur in the Temperates and fifthly their prescription of canceling a day in every four hundred years from their calendar is neither natural nor scientific.

Despite the above scandals, the Gregorian calendar benefited us two fundamental elements of time. First, the Gregorian calendar rediscovered five optimum days of the Temperates such as end of June 21, September 23, December 21, March 21 and June 21 that reveal the cycle of extreme seasons in a year. Second, the Gregorian calendar has invented name of English week from the Julian week since 1752 A.D.

Although the units of time recorded on the calendar are week, day of month and Amete Mehert, the source of week was unknown. For example, week (from Latin *vicis,*"change") is period of seven days now in universal use as a division of time. According to the western literature, the source of week is Hebrew. It is Hebrew or Chaldean origin and is mentioned as a unit of time in the Bible (Genesis 29:27). On

the contrary, it has been known that a Biblical 'time' or year =12*30 days=360 (Rev.11.2, 3:6, 14).
Those contradictions guided us to discover the source of week. According to the precision of three categories of four years (Ethiopian calendar), the source of week is an average solar year of 365.25 days. Number of days of Pagume 6 is equal to 0.25 times number of years. Thus 7 days emanate from Pagume 6, because 6 hours of Pagume 6 multiplied by 28 years. Therefore, week has been known since 519 A.F. but, the Problem is week of Geze such as Segno through Ehud does show neither etymological meaning of 24 hours nor 12 hours of night and 12 hours of daylight. The second problem is the symbol of Geze number is not scientific. Besides it excluded the beginning year of category one or number 0. Effects of the first problem is that interpreter of English dictionary interprets Segno through Ehud as Monday through Sunday.

It is necessary to learn and know that English people innovated English week by suffixing the word day upon the Julian week. English week are Sunday (Sol), Monday (Moon), Tuesday (Tui, the Saxon Mars), Wednesday (Woden, or Mercury), Thursday (Thor, or Jupiter), Friday (Frygga, or Venus), and Saturday (Saturn)—come from Roman or Norse names for the planets. English week which has been innovated and used since 1752 A.D. reveal etymological meaning of each week day that one rotation of earth that has 12 hours daylight and 12 hours night.

Barnett (1980:232) describes that the development of the Cartesian coordinate system represented a very important advance in mathematics, it was through the use of this system that Rene Descartes (1596-1650), a French philosopher-mathematician transformed geometric problems requiring long tedious reasoning into algebraic problems that could be solved almost mathematically. This joining of algebra and geometry has now become known as **analytic geometry.**

Lewis (1999:120) explains that astronomer is built on Greek astron, star, and nomos, arrangement, law or order. The astronomer is interested in the arrangement of stars and other celestial bodies. The science is astronomy and the adjective is astronomical. A word often used in non-heavenly sense, as in "the astronomical size of the national debt". Astronomy deals in such enormous distances (the sun, for example, is 148,800,000 kilometers from the equator, and light from the stars travels 297,600 km per second) that the adjective astronomical is applied to any tremendously large figure.

Daniel (1956:144) describes how the measurement of weight depends on earth. Thus he defined the weight of a body is the force (or pull) with which the body and the Earth attract each other. To understand what this means we have to know something about this force of attraction which exists between Earth and bodies on or above the Earth's surface, called the force of gravity. Isaac Newton (1642-1727), explains how objects move on Earth as well as through the heavens (Mechanics). His mathematical insights led him to invent the area of mathematics called calculus (which German mathematician Gottfried Wilhelm Leibniz also developed independently). Invention of calculus gave science one of its most versatile and powerful tools.

Roazzi (2005:169) explained Einstein's theory of relativity as follows.

> "In Einstein's theory of relativity, he discusses time and space to be so closely associated that they are inseparable. It's like having a dog that is half collie and St. Bernard, but you cannot separate the collie half from the St. Bernard half. That is how closely space and time are associated. They call it a space-time continuum. In fact, no physicist today uses the word 'space' or 'time' independent of each other anymore. The space-time continuum adds the fourth dimension to what we know as a three-dimensional world. This is where it gets sticky, because our minds cannot comprehend a four-dimensional world. In fact, we cannot even explain it using the language of English, but it is easily explained with the language of mathematics".

Brandwein (1960:154) explained that west northern people unified 24 hours of the Greek and 360 degrees of the Babylon at the equator in 1884 A.D.

> *"In 1884, at the Washington Meridian Conference, the nations of the world agreed to divide the earth into time zones based on lines of longitude 15 degrees apart. Since 360 divided by 15 equals 24, you could see that each time zone marks one hour of a day's time. As the earth rotates, one hour passes for every 15 degrees of earth's surface that goes by a given point".*

The critic here is that the above agreement holds true only on the longest circumference which is called an equator. We know in 24 hours the earth makes one rotation. Thus, if they have known one hour passes for every 13.76 degrees of earth's surface at the Tropic of Cancer or Capricorn and 5.98 degrees of earth's surface at the Arctic or Antarctic Circle, they would have prescribed use of the Gregorian calendar in the Tropics.

2.4. Empirical evidence

2.4.1. Moderate and extreme seasons

Moderate and extreme seasons are annual cycles caused by Earth's faster and slower rotations and revolution to its longer and long orbits around the Sun. Earth makes one complete orbit in one year of 365.25 days, the Tropics rotate and revolve faster than the Temperates. Thus, events of moderate and extreme seasons in the Tropics and Temperates are naturally observed.

But traditional divisions of seasonal year by the west-north people were concerned only extreme seasons of the Temperates. For example, summer, autumn, winter and springs are extreme seasons in north Temperate. Thus moderate seasons of the Tropics remain undiscovered. Because Grisdale (1965:33) erratically concluded that there are only two seasons, a dry season and a rainy season. He partially and extraordinarily discovered how Ethiopians are to be regarded with suspicion about moderate seasons as follows.

> "In Ethiopia there is a misleading tendency to call the 'Rainy Season'-the Northern Summer-'Kermpt' meaning winter, because the climate is more unpleasant in this season. This tendency should be checked; instead of using the terms winter and summer it is better to

> use more meaningful expressions 'Rainy Season' and 'Dry Season', remembering whilst so-doing what we truly mean by the seasons".

He observed that Kermpt cannot be called summer. His partial discovery is worth noticing. Because moderate season is a period for particular activity or a period of the year during which a particular activity usually takes place in the tropical human world or among plants and animals of equatorial rain forest regions.

2.4.2. Recording technology

Brandwein (1970:463) asserts a calendar records the number of times Earth rotates on its axis during one revolution around the sun-about 365.25 times. Grisdale (1965:37) compared the Ethiopian calendar and the Gregorian calendar with reference to leap year, the fourth year, which February has 29 days instead of the usual 28, and the month of Pagume has 6 days instead of 5.

Musgrave (1959:504) explains the information in the schedule is of some interest, but has no operational meaning unless they could translate into calendar terms the concept of a period. This statement shows the information written in the income tax schedule cannot be described unless one does know the period of time in the calendar.

2.4.3. Economics as Science

Hanson (1967:5) writes that economists, like other scientists, observe facts, select and classify them, and make them the basis for generalizations. Economic laws are based on the deductions of pure theory, and so state only what will happen if certain assumed conditions are fulfilled. As in other sciences, certain assumptions are made, though some of the assumptions of economics are not realistic, as. For example, the assumption that people in their economic activity are always perfectly rational in their behavior. Whereas, too, the practical scientist can conduct his experiments in his laboratory, the economist, like other social scientists, has to study his special aspect of human behavior in the world at large. In principle, however, what is true of all scientific laws is also true of economic laws. Thus there is no fundamental difference between economics and other sciences.

Robert (1968:2-3) defined Economics is the study of a process we find in all human societies- the process of providing for material well-being of society. In the simplest terms, economics is the study of how man earns his daily bread. Yet, if man does not live by bread alone, it is obvious that he cannot live without bread. Like every other living thing, the human being must eat- the imperious first rule of continued existence. And this first prerequisite is less to be taken for granted than it first appears, for human organism is not, in itself, a highly efficient mechanism for survival. From each hundred calories of food it consumes, it can deliver only about twenty calories of mechanical energy. On a decent diet, man can produce just about one horsepower-hour of work daily, and with this he must replenish his exhausted body. With what is left over, he is free to build a civilization.

OrioGiarini (2011:30) confirmed economics has been developed for over two centuries on the basis of the cultural background of a “static” Newtonian notion of

time/space, which goes hand in hand with the assumption of certainty (as an acceptable, achievable goal) that still dominates today's thinking.

Microeconomics is a branch of economics that studies how an individual make decision at a point of time. Where macroeconomics studies the performance of the economy, price stability, full employment and favorable balance of payment over a period of time. Tian (2006:14) asserted that modern economics developed in last fifty years. It systematically studies individuals' economic behavior and economic phenomena by the scientific studying method observation-theory –observation- and through the use of various analytical approaches. An *economic theory*, which can be considered an axiomatic approach, consists of a set of assumptions and conditions, an analytical framework, and conclusions (explanations and/or predications) that are derived from the assumptions and the analytical framework. Like any science, economics is concerned with the explanation of observed phenomena and also makes economic predictions and assessments based on economic theories. Economic theories are developed to explain the observed phenomena in terms of a set of basic assumptions and rules. Microeconomic theory aims to model economic activities as the interaction of individual economic agents pursuing their private interests (ibid: 15).

Macroeconomics studies about the performance of the general economy in such a way that how economic growth (GDP changes), employment generation, equitable distribution of income, price stabilization and favorable balance of payment of the country are targeted and achieved over a period of time. Gross Domestic Product (GDP), the total value of goods and services produced in a country over a period of time. GDP may be calculated in three ways: (1) by adding up the value of all goods and services produced, (2) by adding up the expenditure on goods and services at the time of sale, or (3) by adding up producers' incomes from the sale of goods or services. Total income of nation is the total money earned or gained by all residents of a country over a period of time, including income from rent, profits, interest, government benefits, salaries, and wages. National Income is, in the theory of economics, the total net income earned by the people of a country in producing the national output of goods and services over a period of time, usually a calendar year. However, it is difficult to measure GDP precisely, partly because every country has an unofficial economy, often called a black economy that consists of transactions not reported to government.

Mankiw (2004:21) stated economists involve in rigorous science and policy advisor. When economists attempt to explain the world as it is, they act as scientists. When economists attempt to improve the world, they act as policy advisors. Thus policy advisor makes one of the most known policy instrument of the government is called fiscal policy.

The purpose of fiscal policy is not only to manage government revenue and expenditure but also to make equal distribution of resources among the society. The

most traditionally applied fiscal policy tool is called progressive income tax schedules. The first income tax bracket is the principal element of progressive income tax schedule; it determines income necessary for subsistence existence is free from taxation. Income level free from tax is alike to the consumer budget line. Besides the first income tax brackets, there are series of income tax brackets and marginal taxes that use to address distribution of income among the society. Therefore, progressive income tax schedule links microeconomics and macroeconomics in Ethiopia (Getnet, 2008:27).

2.5. Benefits of the previous literatures

Evidences of the above literatures show us there are two recording technology of time. Ethiopian calendar is the image of Tropics and sun (the first solar calendar year that consists of three categories of four years: three ordinary years, each has 365 days and a leap year with 366 days or Pagume 6, 12 months such as 11 of 30 days - Meskerem to Hamle and 1 of 35 and 36 days-Nehase and Pagume and 7 days of week has been invented since 519 Amete Feda), where the Gregorian calendar which has been deformed from the Julian calendar (was made in 46 B.C.) since 1582 A.D. is the image of Temperates and sun.

We could be able to understand that two solstices such as Sene 14 and Tahisas 12 and two equinoxes such as Meskerem 13 and Megabit 12 of the Tropics were discovered by Parmenides and Hipparchus respectively. Thus, according to the precision of Ethiopian calendar forecasting power, Jesus Christos was born at the end of Segnoelt, Pagume 6,6019 A.F. and beginning of Maksegnoelt, Meskerem 1, 0 A.M. But according to the Julian calendar he was born on Tuesday, September 12, 7 A.D. Therefore, it is an automatic to discover that the Julian calendar excluded seven years such as the first three categories of four years (0,1, 2 and 3) and three years (4,5 and 6 years) from the second category.

We can imagine that Newton's outstanding contribution enabled the English people to invent English week. Thus innovating Amharic week from Geze is necessary and very simple. Elt is the concept of time in Amharic language that shows one faster rotation of earth in which 12 hours of qune, i.e. daylight and 12 hours of lelit, i.e. night. Suffixing elt on the Geze week yield Amharic week such as Segnoelt through Ehudelt (look at Table 2.1 in the appendices).

The second uses of calendars are recording moderate and extreme seasons during one faster and slower revolution. Therefore, five optimum days in the Tropics are called end of Sene 14, Meskerem 13, Tahisas 12, Megabit 12 and Sene 14. Whereas five optimum days in the Temperates are called the end of June 21, September 23, December 21, March 21 and June 21.

The third uses of calendars are to make other technologies such as machines and fiscal policy instruments. Gregorian calendar is an example for making machineries and Ethiopian calendar is an example for making fiscal policy instruments. The forth uses of calendars are to plan, legislate, execute and monitor activities.

3. Methodology

3.1. Descriptive and Inferential methods

Information used for problem solving is called data. Descriptive statistics involve gathering, categorizing, analyzing and presenting data. Thus we use descriptive statistics to discover moderate seasons and extreme seasons, to derive 48 months of the medium term period and to calculate seven steps additional income tax revenue and disposable income for an ordinary year and leap year respectively.

Inferential statistics deals with analysis of a sample data in order to infer about the population. We use inferential analysis to estimate the undiscovered gross domestic product, test the hypothesis (slope of UGDP is zero), estimate the UGDP in the base year, discover its growth rate and forecast the undiscovered gross domestic product.

3.2. Study periods and source of data

There are three study periods. The first is the short run or one year, 1st Hamle to 30th Sene.It is called 6 hours of Pagume 6.Thus, in the short run, there are two-two four moderate symmetrical seasons recur in the Tropics from end of Sene 14 to Sene 14, where two-two four extreme symmetrical seasons recur in the Temperates from end of June 21 to June 21. The second period is medium term period or three categories of four years or it is called a day of Pagume 6. The third period is the long run period that cover 16 years (1989 to 2004), and when the long run period is extended to 28 years, it is called week of Pagume 6.

The source short run and medium term data are the current theoretical income tax schedule C, calendar of Ethiopia and calendar of Gregorian and date website. The source of long term time series data are national income accounts of different fiscal years from Central Statistical Office and series of Ethiopian calendar.

3.3. **Producers or Research Design**

The multipliers of UGDP are 5 and 6, when the reference years an ordinary and leap year respectively. Leap year is unique year that has 366 days. Here linear equation of leap year is used to determine the multiplier.

$$y = 0.25x + 0.25$$

Where y is dependent variable that represents the number of series of year and x is an independent variable that represents the number of leap year. We substitute the number of any year in the variable x and solve for the variable y, if the result is an integer, that year is leap year, otherwise it is an ordinary year.

Therefore, four steps are involved to generate the UGDP data. Collect the actual data, calculate the average daily actual gross domestic product as the ratio of actual gross domestic product data to 360 days; determine the multiplier whether it is 5 or 6 days, and multiply the result of the second step by the multiplier so as to generate the Undiscovered Gross Domestic Product [please refer TABLE 3.1].

TABLE 3.1: Generating the Undiscovered Gross Domestic Product data in millions of Birr						
Year (1)	Actual GDP (2)	Number of days (3)	Average daily GDP (4)=(2)/(3)	Multiplier (,4)	Undiscovered GDP (6)=(4)*(5)	Period (,7)
1989	37,965	360	105.46	5	527.3	1
1990	44,600	360	123.9	5	619.5	2
1991	58,789	360	163.3	6	979.8	3
1992	48,411	360	134.5	5	672.5	4
1993	52,700	360	146.4	5	732	5
1994	66,557	360	184.9	5	924.5	6
1995	73,432	360	203.9	6	1223.4	7
1996	86,661	360	240.7	5	1203.5	8
1997	106,473	360	295.76	5	1478.8	9
1998	131,641	360	365.67	5	1828.35	10
1999	171,384	360	476.1	6	2856.6	11
2000	245,585	360	682.2	5	3411	12
2001	328,809	360	913.6	5	4568	13
2002	335,380	360	931.6	5	4658	14
2003	382,939	360	1063.7	6	6382.2	15
2004	511,157	360	1419.9	5	7099.5	16
Source: Actual GDP of column 2 was obtained from Central Statistics Authority and the rest data was generated using mathematical operation of Microsoft Excel.						

3.4. Model Specification

Data in column 6 of Table 3.1 is the dependent variable or UGDP and column 7 is an independent variable is time in years. Model of UGDP is specified to regress data of column 6 against time (column 7) by adopting measurement of economic relationships of the identified variables (Johanston, 1960:3). We would estimate regression line of UGDP, test hypothesis and forecast the UGDP.

The simplest relationship between UGDP and X is a linear one or constant change model,

$$\text{UGDP} = \alpha + \beta X$$

Other relationships, exponential or continuous growth model,

$$\text{UGDP} = \alpha e^{\beta X}$$

This can be reduced to a linear form in transformed variables by taking logs of both sides to give

$$\ln \text{UGDP} = ln\alpha + \beta X$$

Where α and β are unknown parameters indicating the intercept and slope of the function. The introduction of a stochastic term into the economic model of UGDP is necessary.

$$\text{UGDP} = \alpha + \beta X + \in$$

Where $\in$ denotes a variable which may take on positive or negative values at each point of time. We inserted the term $\in$, the multipliers that used to generate UGDP are not constant besides there are several issues may not be captured by time.
Considering OLS assumptions we set the hypotheses

$$\text{UGDP}_i = \alpha + \beta X_i + \in_i \qquad i=1,2,\ldots,n$$

to test there is no relationship between UGDP and time at the base year ($\alpha = 0$)? is the slope coefficient, $\beta = 0$? Or is there no relationship between UGDP and time (X) over the study period?

Least Squares Estimators of UGDP

$$\overline{UGDP} = \hat{\alpha} + \hat{\beta}\overline{X}$$

the least –squares estimators , the estimated line passes through the point of means($\overline{X}$, $\overline{UGDP}$). Thus, the slope of the estimated line

$$\hat{\beta} = \frac{\sum X_i UGDP_i}{\sum X_i^2}$$

$$\hat{\alpha} = \overline{UGDP} - \hat{\beta}\overline{X}$$

Where $\hat{\beta}$ is estimate of $UGDP$ in millions of Birr per year and $\hat{\alpha}$ is estimate of $UGDP$ in millions of Birr at the base year.

Forecasting Model

To predict the value of $UGDP$ that corresponds to a value of any time in the future, say $X = X_0$, the unbiased linear regression of prediction equation

$$\widehat{UGDP_0} = \hat{\alpha} + \hat{\beta}X_0$$

To predict the $UGDP$ in any future period, we simply subtract the base year (1988) from the year in question to determine a relevant value for X_0.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

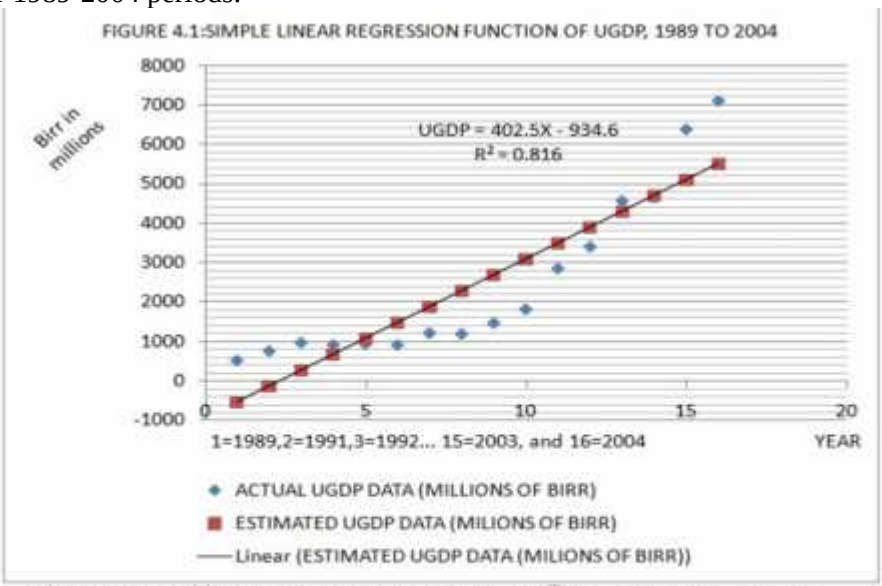
4.1. Model of the Undiscovered Gross Domestic Product

Results and analysis of the estimated model of UGDP are addressed in this section. First the estimated linear trend analysis assumes constant period-by-period unit changes of UGDP over time are reported and illustrated in Figure 4.1. Then results are analyzed in section 4.2. Finally forecasting is made in section 4.3

4.1.1. Results of the Undiscovered Gross Domestic Product

Figure 4.1 displays the 16 years actual Undiscovered Gross Domestic Product in Ethiopia. Along with a curve representing a linear relation between UGDP and time over 1989-2004 periods.

FIGURE 4.1:SIMPLE LINEAR REGRESSION FUNCTION OF UGDP, 1989 TO 2004



The estimated linear regression equation, $\widehat{UGDP} = 402.5X - 934.6$

Predictor	Cofficient	St.Dev.	t-ratio	F Value
Constant	-934.6	16.6316	-56.2	3157.7918
Ttime (X)	402.5	51	7.8916	62.2779

4.1.2. Linear Trend Analysis of the UGDP model

We construct the simple linear model of undiscovered domestic product by replacing the time variable in the explanatory and undiscovered gross domestic product variable in the explained section of the classical general linear equation in order to make the line that fit to the undiscovered gross domestic product data'. In fact, our general model becomes equation (4.1) below in which $\widehat{UGDP}_t$ is the outcome that we want to predict and *Xi* is the *i*th year on the predictor variable.

A linear relation between UGDP and time, such as illustrated in Figure 4.1 can be written as

$$\widehat{UGDP}_t = \hat{\alpha} + \hat{\beta} x_t + \hat{e}_i \quad ----------(4.1)$$

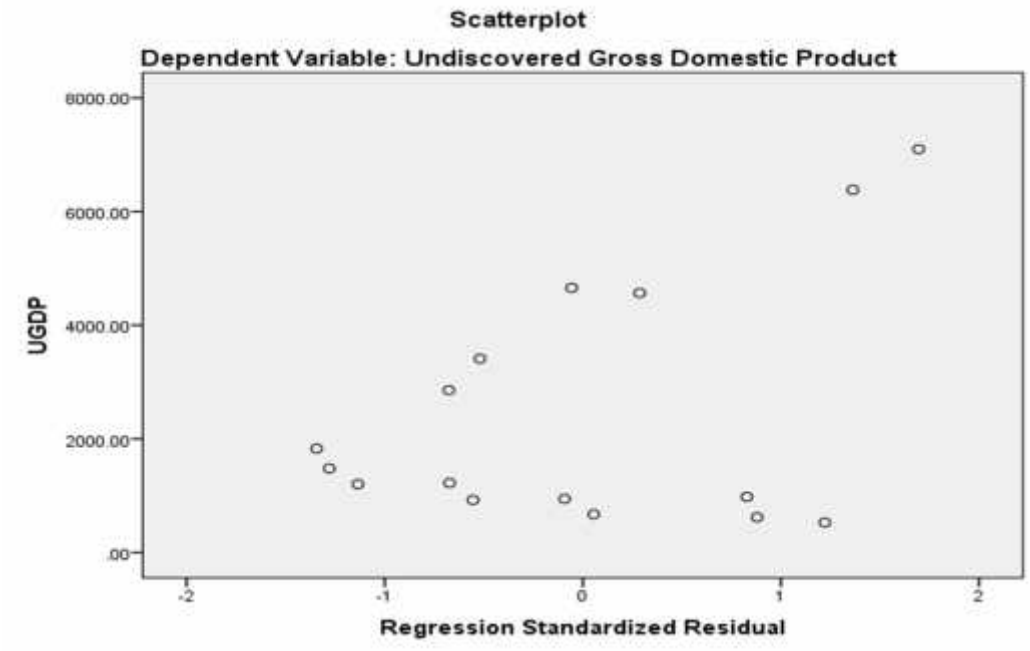
The coefficient of this equation can be estimated by using UGDP data for the 1989-2004 periods and the least squares regression methods as follows (t statistics in parentheses):

$$\widehat{UGDP_t} = -934.60 + 402.50x_t \quad ----------(4.2)$$

$$(7.8916) \; ;R^2 = 0.82$$

This regression line estimated two things: the slope of the line denoted by $\hat{\beta} = 402.5$and the point at which the line crosses the vertical axis of the graph (known as intercept of the line) denoted by $\hat{\alpha} = -934.6$.

Residual plot a graphical test of the adequacy of regression assumptions shows that a scatter plot of standardized residuals versus fitted values should exhibit no apparent pattern, moreover, a successful fitting of a regression model should produce standardized residuals within (-2.25,2.5), roughly speaking, and a regression analysis cannot be complete without an examination of residuals (Chatterjee, Hnandcock and Simonnoff, 1995:150). Therefore, our regression is assumed to be satisfactory that residual plot of the UGDP shows there is no apparent pattern between standardized UGDP residual and fitted value of UGDP. Its standardized residual is within (-1.344, 1.695) in which it is within the interval of a successful fitting of a regression line.



Before we use the linear trend prediction of UGDP, it is useful to test our null hypothesis that there is no relationship between UGDP and time over the 1989-2004 periods. Both the standard error test and the Student's test of the null hypothesis show our estimate was significant that there is a strong relationship between UGDP and time. We accept that our parameter estimate is statistically significant at the 5 per cent level of significance for a two-tail test, because standard error of the coefficient (51) is less than half of the estimated slope coefficient (201.25=402.50/2),

and the observed or sample value of the t ratio is 7.8916 (estimated slope coefficient divided by the standard error of the coefficient) is greater than 2.145 (the theoretical value of t obtained from the t-table with 14 degrees of freedom (n-k=16-2)[2].

Thus, we reject the null hypothesis, we accept the alternative one: $\hat{\beta} = 402.50$ is statistically significant, this means that there is strong relationship between UGDP and time, as time increases by a unit UGDP increases by 402.50 million Birr[3].

Moreover, the 95 per cent confidence interval for slope coefficient is estimated from 293.31 up to 512.1 million of Birr[4]. To interpret, let's round the values. If the government amends and applies these two universal business income tax schedules, it definitely expects that the undiscovered Gross Domestic Product that will be discovered increases by 402.5 million of Birr, as year increases by a unit. It is likely the slope of the undiscovered GDP will range from 293.31 to 512.1 million of Birr. Thus $\hat{\beta} = 402.50\ million\ of\ Birr$ is taken as reliable estimate that lies in the ranges.

Thus, using the linear trend equation estimated over the 1989-2004 periods, we can forecast the UGDP for the future periods. To forecast UGDP in any future period subtract 1988 from the year in question to determine a relevant value for time(x). The other important methods we learn are from the confidence and prediction intervals for UGDP data reported in Fig.4.2.

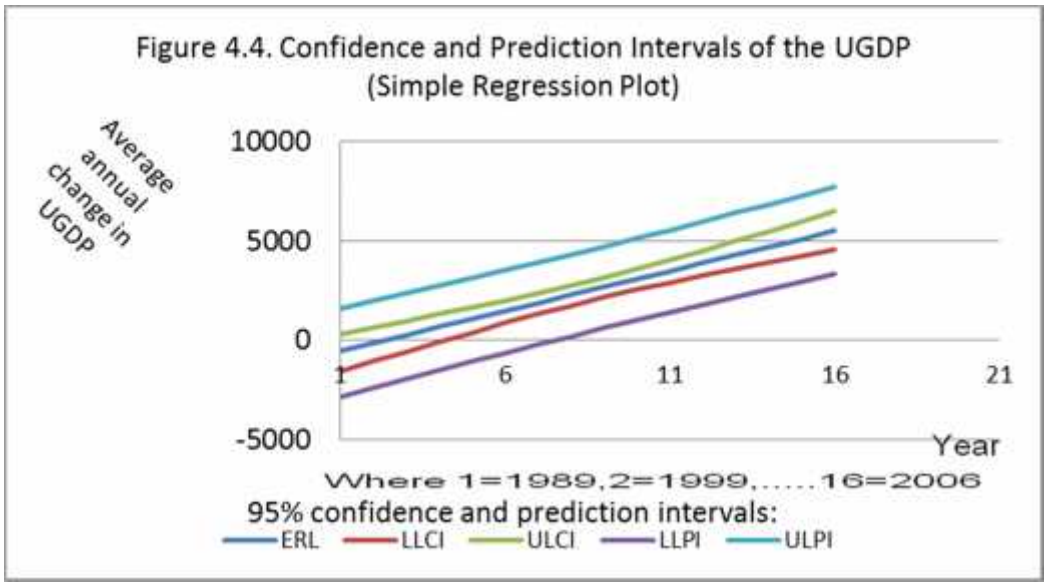
The following Figure 4.2 shows simple regression plot that illustrates the use of Confidence intervals and prediction intervals of UGDP. Considering the estimated regression line of $\widehat{UGDP_t} = -934.60 + 402.50x_t$. Two possible use of the line are: what is our best estimate for the true average annual UGDP over the study period? What is the best estimate for the value of UGDP for one particular year in the population that has change in time is equal to some value? Each of these questions is answered by substituting that value of number of year difference into the regression equation, but estimates have different levels of variability associated with them. The confidence interval (sometimes called interval for the fitted value) provides a representation of accuracy of an estimate of the average target value for all periods

[2] Theoretical value of t table is referred from Koutsoyiannis (2010:660).

[3] Moreover the observed F* ratio (=62.3) is also compared with the theoretical F value with v_1=K-1=1 and v_2=N-K=15 degrees of freedom (at the 95 per cent level of significance). From the F table we find $F_{0.05}$=7.26. Given that $F^* > F_{0.05}$ we reject the null hypothesis and we accept that the regression is significant, that time (X_i) is a significant explanatory factor for the variation in UGDP(Y).

[4] The 95 per cent confidence interval estimate of the slope of regression line of UGDP is from 293.31 up to 512.1 was determined by substituting the estimated values of $\hat{\beta} = 402.7$ and $se(\hat{\beta}) = 51$ in the formula $\beta = \hat{\beta} \pm 2.145 * se(\hat{\beta}).P(293.31 < \beta < 512.1) = 0.95$.

with a given predicted value, while the prediction interval (sometimes called the confidence interval for a predicted value) provides a representation of accuracy of a prediction of the target value for a particular observation or year with a given predicting value.



This plot of CI and PI of UGDP illustrates a few interesting points. First, the point wise confidence interval (represented by inner LLCI line and ULCI lines) is much narrower than the point wise prediction interval (represented by the outer pair of LLPI and ULPI lines), since the former interval is based on the variability of $\hat{\alpha} + \hat{\beta} x\ time$ as an estimator of $\alpha + \beta x\ time$, the latter interval also reflects the inherent variability of time about the regression line in the population itself. Second, it should be noted that the interval is narrowest in the center of the plot, and gets wider at the extremes; this shows that the predictions become progressively les accurate as the predicting value gets more extreme compared with the bulk of the points (this is more apparent in the confidence interval than it is in the prediction interval). Thus in the following sections we will see how prediction interval is calculated.

Thus, using the linear trend equation estimated over the 1989-2004 periods, we can forecast the UGDP for the future periods. To forecast UGDP in any future period subtract 1988 from the year in question to determine a relevant value for time(x). The other important methods we learn from the confidence and prediction intervals for UGDP data reported in Fig.4.4.

Figure 4.4 state that a confidence and prediction intervals take the form of two bands (groups) around the least squares line. The relationship between point estimate and interval predictions for different values of X_0 shown by the graph. A point prediction is always shown by the fitted least squares line.

The point prediction of UGDP for the year 2013 is

$$\widehat{UGDP}_{2013} = -934.6 + 402.5(X_0), where X_0 = 25 = 2008 - 1988$$

$$\widehat{UBITR}_{2013} = -934.60 + 402.50(25)$$

$$\widehat{UGDP}_{2013} = -934.60 + 10062.5 = 9127.9\ millionsofBirr$$

Similarly the point prediction of UGDP for the year 2015 is

$$\widehat{UGDP}_{2015} = -934.6 + 402.5(X_0), where X_0 = 27 = 2015 - 1988$$

$$\widehat{UGDP}_{2013} = -934.60 + 402.50(27)$$

$$\widehat{UGDP}_{2016} = -934.60 + 10{,}867.5 = 9{,}932.9\ millionsofBirr$$

Suppose the standard error of the forecast is about 5.5439, and If we select $1-\propto=0.95$, then $t_c = 2.145$ and the 95% prediction interval for $UGDP_0(UGDP_{2013})$ *is*

$$\widehat{UGDP}_{2013} \pm t_c se(f) = 9127.9 \pm 2.145(5.5439)$$

Thus, the 95 per cent prediction interval for these who plan, legislate and execute budget, the UGDP lies between 9116.01 and 9139.79 millions of Birr. The interpretation is that if the government amends and applies policies, rules and regulation that use to plan, legislate and execute resources during Pagume, it can expect to mobilize the undiscovered gross domestic product of 9127.9 million of Birr in the year 2013. It is likely these undiscovered gross domestic product will range from 9116 to 9139.79 million of Birr. [5]

Note that the undiscovered GDP projections are based on a linear trend line, which implies that UGDP increase by a constant Birr amount each year; in this example, it is projected to grow by 402.5 million Birr per year.

It is known that the least squared regression line minimizes the sum of squared residuals between the actual and fitted values over the sample data. Therefore, Figure 4.1 shows differences between actual and fitted values of UGDP are generally positive in both early (1989-1994) and latter (2002) periods, where as they are generally negative and constant in the intervening 1995-2001 period. These differences suggest that the shape of the undiscovered gross domestic product /time relation may not be constant but rather may be generally increasing over the 1989-2004 periods. Under these circumstances, it may be more convenient to assume that undiscovered gross domestic product is changing at a constant annual rate than a constant annual amount.

4.2. Growth Trend Analysis of Undiscovered Gross Domestic Product

Two fundamental questions of the study are what were the amount the UGDP in the base year (1988) and the annual growth rate? These questions can be answered by using the traditional growth trend analysis that assumes a constant period-by-period percentage change in an important economic variable over time. Table 4.4.1 reveals the actual UGDP in millions of Birr (column B) and transformed into logarithmic of base 10 (column C) and natural log (column D) for the periods 1989 to 2004 (column A).

[5]Such moderate interval means that our point forecast of 9127.9 million Birr is somehow reliable.

Table 4.4.1: UNDISCOVERED GROSS DOMESTIC PRODUCT ,1989-2004 Ec

Year	UGDP (MILLIONS OF BIRR)	COMMON LOGARITHMS OF UGDP (BASE 10)	NATURAL LOGARITHMS OF UGDP (BASE e)	TIME PERIOD
(A)	(B)	(C)	(D)	(E)
1989	527.3	2.722057771	6.267769647	1
1990	619.5	2.792041311	6.428912701	2
1991	979.8	2.991137435	6.887348469	3
1992	672.5	2.827692289	6.511002111	4
1993	944.82	2.975349078	6.850994433	5
1994	924.4	2.965859937	6.829144878	6
1995	1223.87	3.087735289	7.109773248	7
1996	1203.63	3.080493004	7.09309727	8
1997	1478.79	3.169906505	7.298979465	9
1998	1828.35	3.262059336	7.5111692	10
1999	2856.42	3.455822065	7.957324371	11
2000	3410.9	3.532868987	8.134731465	12
2001	4566.79	3.659611041	8.42656583	13
2002	4658.06	3.668205078	8.446354331	14
2003	6382.31	3.804977895	8.76128538	15
2004	7099.4	3.851221646	8.867765552	16

Source: The value of undiscovered GDP was from Table 3.1 & computed.

A good feature of regression that use logarithmic transformation is that the coefficient estimate can be interpreted as the percent changes, applying the technique to the actual UGDP data for 1989-2004 period results in the linear constant annual rate of growth regression model (regress the common logarithmic of UGDP (column C) against time (column E) and (t statistics in parentheses):

$$\log UGDP = 2.636 + 0.072x \qquad (4.3.)$$

(59.652) (17.030), R^2 =0.94

Undiscovered GDP forecasts (in millions of Birr) can be estimated by transforming the estimated equation (4.3) back to their original form:

$$antilgUGDP = antilog(2.636 + 0.72x)$$

$$UGDP_x = (antilog2.636)(antilog0.072)^x \qquad (4.4)$$

$$= 432.51(1.1803)^x$$

In this model, 432.51 million Birr is the adjusted level of UGDP for x=0, or 1988, because the first year of data used in regression estimation=1, was 1989. The number 1.1803 equals 1 plus the average rate of growth using annual compounding, is meaning that the undiscovered gross domestic product increased at a 18.02 % annual rate from 1988 to 2004.

To forecast Undiscovered GDP in any future year by using this model, subtract 1988 from the year being forecast to determine x. therefore, a constant annual rate of growth model forecast for UGDP in 2013 is

$$X=2013-1988=25$$

$$UGDP_{2013}=\text{Birr } 432.51(1.1803)^{25}$$

$$= 27{,}277.61 \text{ million Birr,}$$

Similarly, a constant annual rate of growth model forecast for UGDP in 2015 is

$$X=2015-1988=27$$

$$UGDP_{2015}=\text{Birr } 432.51(1.1803)^{27}$$

$$= 38{,}000.66 \text{ million Birr.}$$

Another frequently used form of the constant growth model is based on an underlying assumption of continuous, as opposed to annual, compounding. The continuous growth model is expressed by the exponential equation:

$$UGDP_t = UGDP_o e^{gt}$$

Taking the natural logarithm (to the base e) of both sides of the above equation gives

$$lnUGDP_t = lnUGDP_o + gt$$

Under an exponential rate of growth assumption, the regression model estimate of the slope coefficient, g, is a direct estimate of the continuous rate of growth. For example, a continuous growth model estimate for UGDP is (t statistics in parentheses):

$$lnUGDP_t = 6.071 + 0.167t \quad ----------(4.5)$$

$$(59.652) \quad (17.030), \quad R^2 = 0.97$$

In this equation, the coefficient 0.167 (=16.7%) is a direct estimate of the continuous compounding growth rate for UGDP. Notice that t statistics for the slope coefficient are identical for the constant annual rate of growth regression model (Eq.4.3).

Again, UGDP forecasts (in millions of Birr) can be derived by transforming this estimated equation 4.5 back to its original form:

$$UGDP_t = (Expontiate\ 6.071)(Expontiate\ 0.167)^t$$

$$UGDP_t = 433.11\ millionBirr(1.1817)^t \qquad (4.6)$$

The very small difference between the estimate of Eq.4.4 and 4.6 can be attributed to rounding error; otherwise they are similar.

4.3. Forecasting the UGDP with Linear and Growth Trend Comparison

The importance of selecting the correct structural form for a trending model can be demonstrated by comparing the Undiscovered Gross Domestic Product projection that results from the two basic approaches that have been considered. Remember with the

constant change model, UGDP were projected to be 9127.9 million Birr in 2013 and 9932.9 million Birr in 2015. Compare these UGDP forecasts with the projection of 27,277.61 million Birr in 2013 and 38,000.66 millions of Birr in 2015 for the constant growth rate model.

The forecast model states that as time increases the undiscovered gross domestic product also increases. The direct forecasts for the UGDP rises steadily using the log linear growth compared to a less gradual increase predicted using simple linear trend. If the government amends and uses new two universal business income tax schedules and complementary employment income tax schedules the forecast result shown in column D and E of table 4.5.1 describes that UGDP will definitely be discovered.

Table 4.5.1: FORECASING THE UNDISCOVERD GROSS DOMESTIC PRODUCT, 2005 TO 2017 (IN MILLIONS OF BIRR).

YEAR (A)	BASE YEAR	TIME BERIOD (C)= (A)- (B)	$UGDB = 402.5x - 934.6$ (D)	$UGDP = 432.51(1.1803)^x$ (E)
2017	1988	29	10737.9	52939.03
2016	1988	28	10335.4	44852.18
2015	1988	27	9932.9	38000.66
2014	1988	26	9530.4	32195.76
2013	1988	25	9127.9	27277.61
2012	1988	24	8725.4	23110.74
2011	1988	23	8322.9	19580.4
2010	1988	22	7920.4	16589.34
2009	1988	21	7517.9	14055.19
2008	1988	20	7115.4	11908.15
2007	1988	19	6712.9	10089.09
2006	1988	18	6310.4	8547.9
2005	1988	17	5907.9	7242.14

Source: Author calculation using the generated UGDP of Ethiopia, 1989 to 2004

Therefore, the UGDP forecast growth model asserts that broadening the income tax bases that yield more tax revenue to the government and disposable income to the tax payers in the short run, definitely leads to reduction of debt finance in the long run. Reduction of debt finance will largely be substituted by domestic income tax revenue.

5. Conclusion and Policy Implications

5.1. Conclusion

The observed problem was the first and second GTP plan did project revenue, expenditure and deficit finance neither from domestic nor external sources for a period of 26 days, because of the fact that the Ministry of Finance and Economic Development used the Gregorian calendar. The opportunity cost of using the Gregorian calendar in Ethiopia in general and in the GTP in particular is scarifying the use of Ethiopian calendar in the entire Tropics.

Thus, the total projected revenue, expenditure and deficit finance were 615,592; 690,959 and 75,367 billion Birr respectively were only for a period of 1800 days (360 days * 5 years). The average daily projected revenue, expenditure and deficit finance were proportionally calculated as 342,384 and 42 billion Birr respectively. Therefore, the average daily projected revenue, expenditure and deficit finance multiplied by 26 days is equal to the value of resources 8,892; 9,984 and 1,092 billion Birr that were neither projected nor included in the first GTP. There are neither factors income such as salary income for labor, rental income for building, interest income for capital and profit for an entrepreneurs or income tax revenues from these source sides during 26 days. These imply that neither private accounting of the firm nor the national income accounting of Ethiopia provides economic data. Therefore, the final impact of using the Gregorian calendar in the GTP is the available historical data of Ethiopia's GDP excluded the period of 5 and 6 days (undiscovered period). That is why we choose the undiscovered gross domestic product as the dependent variable.

Thus modeling the undiscovered gross domestic product is the time series analysis for 16 years period (1989 to 2004). Therefore, the hypothesis of the study is there is no relationship between the undiscovered GDP and number of years in Ethiopia. The specific research questions are: What are the universal standards of Ethiopia's budgetary months over the medium term public expenditure plan? , what are seven steps additional undiscovered business income tax revenue and disposable income in three categories of four years? What is the undiscovered GDP over the study period? What is the relationship between the undiscovered GDP and time?, and What is the undiscovered GDP in the base year and its growth rate?

The Undiscovered Gross Domestic Product (UGDP) Data, which was generated from the various years' national accounts of Ethiopia, is the big picture in estimating the economic model of UGDP. The data of actual national income accounts were obtained from the Central Statistics Authority of Ethiopia. Actual GDP data at market price for the years 1989 to 1993 and 1994 to 2004 were taken from national income accounts of 1995 and 2005 respectively. There are four steps this study uses to generate the undiscovered gross domestic product data: first, collect the actual GDP data from the Central Statistical Office, second, calculate the average daily actual gross domestic product as the ratio of actual gross domestic product data to 360 days; third, determine the multiplier whether it is 5 or 6 days, and fourth multiply the result of the second step by the multiplier so as to generate a proxy for the universal gross domestic product data of each year over the study period (look at Table 3.1).

Undiscovered gross domestic product model was made by replacing the time variable in the explanatory and undiscovered gross domestic product variable in the explained section of the classical general linear equation in order to make the line that fit to the

undiscovered gross domestic product data'. The estimated undiscovered gross domestic product regression line reported in Figure 4.1. The estimated undiscovered gross domestic product model has two things: the slope the line denoted by $\hat{\beta} = 402.5$ and the point at which the line crosses the vertical axis of the graph (known as intercept of the line) denoted by $\hat{\alpha} = -934.6$.

Before we used the linear trend prediction of UGDP, we tested the null hypothesis that there is no relationship between UGDP and time over the 1989-2004 periods. Both the standard error test and the Student's test of the null hypothesis show our estimate was significant that there is a strong relationship between UGDP and time. We accept that our parameter estimate is statistically significant at the 5 per cent level of significance for a two-tail test, because standard error of the coefficient (51) is less than half of the estimated slope coefficient (201.25=402.50/2), and the observed or sample value of the t ratio is 7.8916 (estimated slope coefficient divided by the standard error of the coefficient) is greater than 2.145 (the theoretical value of t obtained from the t-table with 14 degrees of freedom (n-k=16-2). Thus, we reject the null hypothesis, we accept the alternative one: $\hat{\beta} = 402.50$ is statistically significant, this means that there is strong relationship between UGDP and time, as time increases by a unit UGDP increases by 402.50millions Birr.

Moreover, the 95 per cent confidence interval for slope coefficient is estimated from 293.31 up to 512.1 million of Birr. The interpretation was it is likely the slope of the undiscovered gross domestic product will range from 293.31 to 512.1 million of Birr. Thus $\hat{\beta} = 402.50\ millionofBirr$ is taken as reliable estimate that lies in the ranges.

Thus, using the linear trend equation estimated over the 1989-2004 periods, the UGDP for the future periods forecasted (2005-2013). To forecast UGDP in any future period subtract 1988 from the year in question to determine a relevant value for time(x). The other important methods we learn are from the confidence and prediction intervals for UGDP data reported in Fig.4.4.

Transforming the actual UGDP in millions of Birr into logarithmic of base and regressing the result against time for the periods 1989 to 2004 used to answer two fundamental questions of the study, what were the amounts the UGDP in the base year (1988) and the annual growth rate?'.

The finding shows 432.51 million Birr is the adjusted level of UGDP for x=0, or 1988, because the first year of data used in regression estimation=1, was 1989. Besides, the number 1.1803 equals 1 plus the average rate of growth using annual compounding, is meaning that the undiscovered gross domestic product increased at a 18.02 % annual rate from 1988 to 2004.

Finally, the Undiscovered Gross Domestic Product projection made with the constant change model of 9127.9 million Birr in 2013 and 9932.9 million Birr in 2015. Compare these UGDP forecasts with the projection of 27,277.61 million Birr in 2013 and 38,000.66 millions of Birr in 2015 for the constant growth rate model.

5.2. Policy Implications

When we added seven steps additional undiscovered business income tax revenue (column F of Table 4.7), we obtained 1613 Birr and more. Likewise, when we aggregated seven steps undiscovered disposable income (column F of Table 4.8), we obtained 7556.51 Birr. The theories broadening income tax bases yield additional tax revenue and disposable income is true. Therefore, if the government of Ethiopia amends and applies these new seven steps business income tax schedules, additional income tax revenue of 1613 and disposable income of 7556.51 Birr will be discovered per business man.

Therefore, if the government amends and applies universal business income tax schedules and GTP uses 48 months of three categories, the undiscovered Gross Domestic Product that will be discovered and increases by 402.5 million of Birr, as year increases by a unit.

The UGDP forecast growth model asserts use of 48 months of three categories in the medium term GTP and broadening the income tax bases that yield more tax revenue to the government and disposable income to the tax payers in the medium term, definitely will get out the use of Gregorian calendar. So that both private accounting of the firm and national income accounting will use the Ethiopian fiscal year in accordance with the country's legal framework. Thus, the following recommendations are forwarded.

- The Federal Government of Ethiopia must amend and use new fiscal policy instruments such as two universal business income tax schedules (Annexes B and C).
- All budgetary institutes of the government, public enterprises, private sector and international organizations must use the Ethiopian calendar or budget year of Ethiopia when they plan, legislate, implement and monitor budget.
- All employers whether private or public must pay salary during Pagume by aggregating with the month of Nehase. The government must amend and apply two complementary income tax schedules for the income tax periods of 35 and 36 days respectively.

6. References

Abraham, I. W (1969): National Income and Economic Accounting. Prentice Hall, Inc., Englewood Cliffs, New Jersey.

Barnett, R. A (1980): INTERMEDIATE ALGEBRA. Structure and use, McGraw. Hill, Inc. printed in the United States of America.

Borkowski K.M (1991:121-130): THE TROPICAL YEAR AND SOLAR CALENDAR. The Journal of the Royal Astronomical Society of Canada; Vol.85, No.3 June 1991 whole No.630.

Chatterjee, S.; Handcock, S. and Simonoff, J.S (1995). A Casebook for A First Course in Statistics and Data Analysis. John Wiley &Sond, Inc. United States of America.

Daniel F. (1956): GENERAL SCIENCE FOR TROPICAL SCHOOLS, Cambridge.

Eshetu Chole (1980). "Income Taxation in Pre-and Post-Revolution Ethiopia Comparative Review": Ethiopian Journal of Development Research, Vol. 9, No. 1.Institute of development Research, Addis Ababa.

Fantahun Belew (1992)." Government's Employees Income Tax Computation", Addis Ababa, Ethiopia: Economic Focus, EEA. Vol.3.No.5.

Fassil Tassew (2005). Ethiopian Calendar Belongs to Whom? Pagume 6. Banawi Printing Press. Addis Ababa, Ethiopia.

_____. (2002)."Analysis of Personal Income Tax and Revenue Forecasting (PITRF)"PROCEEDINGS OF THE THIRD NATIONAL CONFERENCE ON ASSESSMENT OF THE PRACTICES OF CIVIL SERVICE REFORM PROGRAM IN ETHIOPIA. Ethiopian Civil Service College and Ethiopian Management Institute, Addis Ababa.

_____. (1993 EC.). "Response to Comments on an Employment Income Tax Computations' and Computing Half Employment Income Tax", Addis Ababa, Ethiopia: Economic Focus, EEA. Vol.4. No.1.

Federal Democratic Republic of Ethiopia [FDRE]. (1996). Federal Government of Ethiopia Financial Administration Proclamation. Proclamation N0.57. Addis Ababa, Ethiopia: BerhanennaSelam Printing Press.

(1995). Democratic Republic of Ethiopia's ConstitutionNo.1, Addis Ababa, Ethiopia: BerhanennaSelam Printing Press.

_____. (2008). Income Tax Law. Proclamation No. 286. Addis Ababa, Ethiopia: BerhanennaSelam Printing Press.

GetenetDemissie (2008). Exploring and Modeling the Undiscovered Business Income Tax Revenue: Specific to Ethiopia's Tax System. Unpublished master thesis, Unity University.

Grant F.L and Hill A.M (1965): Commercial Arithmetic. Longmans, Green and Co Ltd,Great Britain.

Grisdale W. (1965 GC): A General Geography. For secondary schools in Ethiopia printed by the Institute for the publication of Textbook of the Republic of Serbia, ObilicevVenac, Begrade, and Yugoslaua.

Hanson, J,L.(1967). Economics for Students. Great Britain; by Richard Clay,Ltd.

Hirschery, M. (1996). Managerial Economics. U.S.A: The Dryden Press Harcourt, Inc.

IMF (2013). Web: International Monetary Fund Washington, D.C. http://www.imf.org

Koutsayiannis A. (2010). Theory of Econometrics, 2nd Edition, New york,Palgrave Publishers Ltd.

Imprial Ethiopian Government (1954 EC): Second Five Year Development Plan 1955-1959E.C/1963-1967 G.C. Addis Ababa: BerhanennaSelam Printing Press.

Kearsey.C.W.(1964).GENERAL PHYSICS.LONGMAN,GREEN AND CO LTD,London.

Last G.C. (1968 GC). Geography. Ministry of Education and Fine Arts. Addis Ababa: BerhanennaSelam Printing Press.

Leslau.W (1971 GC). English-Amharic Context Dictionary. Printed in Belgium by ImprimrieOrentaliste. Louvain.

Lewis. N (1999). Word Power Made Easy. Bloomsbury Publishing Plc, U.K.

Mankiw. N. G (2005). MACROECONOMICS, Harvard University, Printed in the United States of America First Printing 2009 Worth Publishers 41 Madison Avenue New York, NY 10010

McConnell, C.R and Brue,S.L.(1993). MacroEconomics, 12th edition, McGraw-Hill,Inc. New York.

MicrosofEncartEnyclopida Standard Edition 2008, software

Musgrave, R.A. (1959 GC). The Theory of Public Finance, New York: McGraw-Hill.

Myles, Gareth D.(2001). Public Economics, Printed in the United States of America.

Peters, M and Schaaf, W.L (1965) MATHEMATICS a modern approach D. Van NostrandCampany, Inc.

Robert L.H. (1968). The Making of Economic Society, 2nd Ed. USA: PRETICE-HALL,INC, ENGEEWOOD CLIFFS, NEWJERSY.

Schwab, P. (1970 GC). “Tax System of Ethiopia”; The American Journal of Economics and Sociology, Nairobi, Kenya: East African Publishing House.

Smith, Adam (1904) *An Enquiry into the Nature and Causes of The Wealth of Nations*, Volume II, London (Grant Richards) [original edition 1776]

TegegnworkGebre. (1991EC.). "Comments on Employment Income Tax Computations": Economic Focus, EEA. Vol.2. No.5. Addis Ababa, Ethiopia.

Shrivastava, O.S (1996). Economics of Growth Development and Planning, Vikas Publishing House Pvt Ltd, New Delhi.

Yamane, T(1973).STATISTICS, An Introductory Analysis, 3rd edition. Harper &Row, Publishers, New York, Evanston, San Francisco, London.

Waugh. (1943). Elements of Statistical Method; Connecticut state College, Storrs, Corn.

7. Appendices

Appendices

Annex A

Table 1.1: English-Amharic Dictionaries Excluded Pagume

	Months of Calendars'		Interpreters' and Number of Pages		
No	Gregorian	Ethiopian	Leslau.W	Ephraim Assefa	Daniel Worku
1	April	Miyazia (ሚያዚያ)	60	39	24
2	August	Nehase (ነሐሴ)	79	48	31
3	December	Tahisas (ታህሳስ)	292	199	160
4	February	Tir (የካቲት)[1]	447	294	247
5	January	Yekatit (ጥር)	672	452	381
6	July	Hamle (ሐምሌ)	677	456	385
7	June	Sene (ሰኔ)	678	457	385
8	March	Megabit (መጋቢት)	767	505	424
9	May	Ginbot (ግንቦት)	777	511	429
10	November	Hidar (ህዳር)	846	553	468
11	October	Tikimit (ጥቅምት)	857	559	472
12	September	Meskeram (መስከረም)	1142	700	579

ምንጭ፡ የዎ ልፍ፣ የኤፍሬም አሰፋ እና የዳነኤል ወርቁ እንግሊዘኛ-አማርኛ መዛግበተ ቃላት ::

[1] ዳንኤል ወርቁ (1998፡247) የካቲት በፊረንጀኞች 2ኛ በኢትዮጵያ 6ኛ ወር ነው በማለት አብራርተውታል::

Annex B

TABLE 1.2: Statistics of Pagume does exist neither in an ordinary year nor leap year

	Ethiopian Calendar			Gregorian calendar			Difference Days	
		Number of Days			Number of Days			
No	Months'	OY	LY	Months'	OY	LY	DDOY	DDLY
1	Ham	30	30	Jul	31	31	-1	-1
2	Neh	30	30	Aug	31	31	-1	-1
3	Mes	30	30	Sep	30	30	0	0
4	Tik	30	30	Oct	31	31	-1	-1
5	Hid	30	30	Nov	30	30	0	0
6	Tah	30	30	Dec	31	31	-1	-1
7	Tir	30	30	Jan	31	31	-1	-1
8	Yek	30	30	Feb	28	29	2	1
9	Meg	30	30	Mar	30	30	0	0
10	Miy	30	30	Apr	31	31	-1	-1
11	Gin	30	30	May	30	30	0	0
12	Sen	30	30	June	31	31	-1	-1
	Total	360	360		365	366	-5	-6
	Average	30	30		30.42	30.5	-0.4	-0.5

Source: Author computation using Excel.

Annex C

TABLE 1.3: Discovering the Statistics of Pagume in an ordinary and leap years

No	Ethiopian Calendar			Gregorian calendar			Difference Days	
	Months' Name	Number of Days		Months' Name	Number of Days			
		OY	LY		OY	LY	DDOY	DDLY
1	Ham	30	30	Jul	31	31	-1	-1
2	N&P	35	36	Aug	31	31	4	5
3	Mes	30	30	Sep	30	30	0	0
4	Tik	30	30	Oct	31	31	-1	-1
5	Hid	30	30	Nov	30	30	0	0
6	Tah	30	30	Dec	31	31	-1	-1
7	Tir	30	30	Jan	31	31	-1	-1
8	Yek	30	30	Feb	28	29	2	1
9	Meg	30	30	Mar	30	30	0	0
10	Miy	30	30	Apr	31	31	-1	-1
11	Gin	30	30	May	30	30	0	0
12	Sen	30	30	June	31	31	-1	-1
	Total	**365**	**366**		**365**	**366**	**0**	**0**
	Average	**30.42**	**30.5**		**30.42**	**30.5**	0	0

Source: Authors' calculation using Excel

Table 2.1 Innovating and re-discovering weeks for calendar functions

Number of weeks	Week of Ethiopian calendar	Week of Gregorian Calendar
1	Segnoelt	Monday
2	Maksegnoelt	Tuesday
3	Robelt	Wednesday
4	Hamuselt	Thursday
5	Arbelt	Friday
6	Kidamelt	Saturday
7	Ehudelt	Sunday

Source: Author innovation