From Public Debt to Government Equity: A New Perspective

Marin Muzhani*

PhD in economics from the University of Florence

***Corresponding author:** Marin Muzhani, PhD in economics from the University of Florence.

Abstract

In a new monetary reality of the 21st century dominated by an economy pricing system with stable inflation, stable interest rate (except during wars, pandemics, supply chain constraint, etc.), low growth and low unemployment but high public debt, is recommended to explore new pathways to reduce government sovereign debt. This paper suggests a new perspective on how the Government Sovereign debt could be converted to Government Shareholder's Equity. In fact, the new theory suggest that government issued-securities could help heavily indebted developing countries reduce the debt-to-GDP ratio by converting the debt-raising capacity to a hybrid debt-securities-raising capacity to translate the borrowed money into economic growth by trying to raise large funds to invest in infrastructure and elevate the level of household's standard of living.

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Introduction

There is a valuation whether a government is using its debt-raising capacity cautiously which depends on government's ability to render the borrowed money into economic growth without raising inflation. The growth in government spending and debt has been seen by some economists as welcome policy to stimulate growth and finance infrastructures thanks to the borrowing costs that were at historic lows since the global financial crisis of 2008, except for the pandemic and war in Europe during 2020-24 that pushed the borrowing cost up to fight an unreasonable and irrational high inflation.

The scope of this paper is to explore innovative paths to reduce government debt. This paper is about some new theories on how a government sovereign debt can be converted into government shareholder's equity to help reduce more efficiently government debt ratio. The paper is divided into six parts. The first part considers general theories about public debt and fiscal policy. The second part will talk about the mandatory and discretionary spending programs. The third part will discuss some known paths to reduce sovereign debt. The fourth part will take into consideration a new perspective how a sovereign debt can be converted to a government shareholder's equity or if a government can issue securities in equity. The fifth part will talk more in detail about the risk factors for government-issued securities and how to make dividend payments. The sixth part is about the cost of public debt versus cost of government equity based on different case scenarios. The last segment is the conclusion part which draws general conclusions.

Public Debt and Fiscal Policy

The growth in government spending and debt has been seen by some analysts as welcome policy to stimulate growth and finance infrastructures such as roads, bridges, hospitals, schools, vital for job growth thanks to the borrowing costs that were at historic lows since 2008 after the first global financial crisis of the 21st century. The valuation whether a government is using its debt-raising capacity cautiously depends on government's ability to translate the borrowed money into economic growth without raising inflation and keeping at a stable level the household's standard of living.

The definition of public debt is that it represents the total amount of debt, including total liabilities, borrowed by the government

of a country to meet its development budget. The term public debt can also be used to indicate the overall liabilities of the central government. The main goal of debt management consists of raising low-cost funding to meet the financial requirements of the government and facilitate the capital market conditions for government-issued securities.

The government deficit spending is the difference between how much money the government takes in through taxes and how much it spends during the year. The public debt is the accumulation of all the deficit, plus any other money the government spent that wasn't part of the budget. For example, the United States public debt in August 2021 was around $28.43 trillion USD dollars. In 2020 alone, the U.S. Government spent about 371 billion U.S. dollars of taxpayers' money on interest for debt held by the public.

Debt levels should not be an issue if interest rates on the public debt remain below rates of economic growth in the long run. The debt-growth relationship is about the existing primary budget deficit and about the rising pressures of an increasing debt ratio on long-term interest rates. If debt-to-GDP ratio goes unchecked, large increases in debt ratio could lead to much higher taxes, lower future incomes, and intergenerational inequity [1]. There exists another theory that takes into consideration the nonlinear relationship between public debt levels and economic growth. This is called the threshold or nonlinear effect theory. In fact, according to this theory studied by Reinhart and Rogoff , the increase in public debt, below the debt threshold, will have positive effects on economic growth [2]. An increase in public debt above the debt threshold will have negative effects on economic growth.

Other studies based on a nonlinear debt-growth threshold proposes that, despite the fact such thresholds might exist, there is no common threshold level, and the threshold may depend on other factors such as a country's level of development and the quality of its institutions. Some studies suggest that an increase in the debt ratio, let say by 10% points will cause the GDP growth to fall under 1% [3]. For debt-ridden countries, high debt levels have a negative impact on economic growth, as a large portion of their output goes to repay debts, which is an obstacle to investing [4]. For some countries the effects of increased public debt can exercise a substantial negative permanent effect and some positive transitory effects on economic growth [5].

There are several studies that explore the existence of a debt threshold. One of these studies takes into consideration the nonlinear threshold effects of debt on growth for government debt, nonfinancial corporate debt, and household debt. Based on this study we have found that when the ratio of public debt to GDP reaches about 85%, a further 10% increase reduces economic growth by more than 0.10% point [6]. Another study on debt threshold by Checherita-Westphal and Rother suggests a nonlinear impact of debt on growth with a turning point after which the government debt-to-GDP ratio has a negative impact on long-term growth. This threshold is at about 90-100% of GDP.

However, the negative impact on economic growth of high debt may start at a lower threshold of around 70-80% of GDP [7]. Another empirical study by Baum, Checherita-Westphal, and

Rother, explores the development of public debt for Euro Area countries from 1990 to 2010. This study finds that in the short run the impact of public debt on GDP growth is positive. However, in the long-run, when public debt-to-GDP ratio is around 67-70%, the positive transitory effect decreases and for countries with high debt ratios over 95% additional debt increases have negative impact on economic growth.

It is interesting to understand how the public debt of the biggest economy in the world, the U.S.A., works. The total public debt of the United States of America is divided into two main categories: the debt held by the public and intragovernmental holdings. It is interesting to see how the U.S. government raise money through federal government auctions of treasury securities such as U.S. Savings Bonds, Treasury Bills (T-Bills) and other security notes from domestic and foreign investors. During the auction process held by the U.S. government, investors bid for debt securities in two different options: competitive or non-competitive bids. In the first option of competitive bids, investors state the interest rate at which they're willing to buy the securities. In the second option of non-competitive bids, investors agree to purchase the securities at the average interest rate of all bids.

In addition to debt held by the public, there are also intragovernmental holdings that are treasury debt securities purchased by the U.S. government to strengthen the federal savings programs like social security and health care. Sometimes the federal savings programs are also called Unfunded Liabilities as these unfunded liabilities are larger than the conventional stock of government debt. A better indicator of a nation's indebtedness is the ratio of its public debt to its GDP, or total national income. The more debt a country holds, the less money it's able to put away in savings and reinvest in the nation's economy. The debt-to-GDP ratio is one of the main vital indicators of the sustainability of government finance. Public debt is basically calculated as the sum of the liability categories such as: debt securities, currency and deposits, loans, insurance, pensions, and other accounts payable. Changes in government debt principally show the accumulated public debt over time and reflect the impact of past government deficits.

Technically speaking, a government can sustain the same level of debt by running small deficits forever (for years and even decades) if GDP is increasing because GDP is a close substitution for the tax base. The higher the GDP the higher the tax base of the government, and the higher the level of economic growth the more additional debt the government can take on each year. There are, of course, some negative effects of government debt. Government bonds compete with corporate bonds for investors' money, which pushes up interest rates for everyone. And if the government is absorbing a larger proportion of the capital available, there is less capital left for the private sector. The positive effects of government debt are that government with the borrowed money can invest on productive investments destined to grow the tax base such as roads, bridges, schools, ports, hospitals, universities, school loans, basic research, and other expenditures like government run programs, etc.

It is a well-known fact, that government debt as a fraction of GDP has been increasing in advanced countries in the last five-six decades. The government debt theories can explain the in-

crease in the level of debt in certain periods during a response to macroeconomic shocks, however they cannot explain the trend to debt accumulation in any advanced countries. The fiscal policy tries to create a trade-off between the commitment to keep under control spending in normal periods and to have flexibility to react quickly during economic shocks and financial crisis. This trade-off is reached using different optimal fiscal rules, such as escape clause, information dependence, cross-country coordination, etc., [8].

The political economy theories have the capability to explain the long-run trend deriving from an aging population in advanced countries, political polarization, and certain electoral uncertainty. These theories highlight the time-inconsistency in government regarding political decisions, and consequently the necessity for a fiscal policy that limit policymakers. The main three problems that are caused by national debt are: first, lower national savings and eventually lower income in certain cases.

Second, large amounts of interest payments for debt could lead to large tax hikes and unreasonable government spending cuts. Third, decreased ability to respond quickly to economic shocks and greater risk of a fiscal crisis and ultimately financial crisis.

Mandatory and Discretionary Spending Programs
The primary drivers of the future public debt in the advanced countries such as the U.S.A., EU countries, U.K., Canada, Japan, Australia, etc. are the mandatory spending programs that every government needs to comply. For example, in the U.S., the main drivers of the public debt continue to be the mandatory spending programs, also called the social programs or Social Security programs such as Medicare and Medicaid. Their total cost, as predicted, in the recent years has counted for approximately half of all federal spending in the U.S. This cost is expected to increase as a percentage of GDP because of the aging population in the U.S. which require more health expenses. Figure 1.1 below illustrates the US. Federal Budget spending for 2021.

Table 1: 1 U.S. Federal Budget Spending for 2021. Source: U.S. Congressional Budget Office (2021)

Mandatory spending	Mandatory spending	Mandatory spending	Mandatory spending	Discretionary spending	Discretionary spending	Interest Payment	Total
23%	15 %	9%	15%	15%	14%	9%	100%
Social Security (retirement insurance, disability insurance, hospital insurance for the aged, drug benefits)	Medicare (hospital coverage, medical coverage, prescription drug coverage)	Medicaid (family planning care, prescription drug cost, hospital services, pediatric services, mental and dental health care)	Other (employment benefit, food and income support, federal pension, antipoverty tax credits, crop insurance)	Defense	Non-defense (transportation, infrastructure, health, housing, education, social services, veteran's benefit, etc.)	Servicing public debt	
$1 trillion	$644 billion	$409 billion	$642 billion	$676 billion	$661 billion	$375 billion	$4.407 Trillion

As illustrated in table (1.1) most of the federal budget goes toward privileged or entitlement programs called also Mandatory Spending such as Social Security, Medicare, and Medicaid, etc. which counts for more than 50-60% of the U.S. federal annual budget. Meanwhile, under Discretionary Spending there are other programs such as defense, and non-defense (transportation, infra-structure, education, housing, etc.). Differently from Discretionary Spending, which are approved by U.S. Congress each year through the appropriation process, the mandatory spending is automatic unless legislation for these underlying programs is changed.

The U.S. government is expecting that the corresponding tax revenues are projected to remain stagnant, therefore not able to cover the increasing social security program expenses. Meanwhile, the interest payment on the public debt has reached normally around 8-10% of the annual budget and eventually might rise as spending continues to have a slow but steady rise. Another option to balance the budget was to cut taxes through a new tax bill, as it happened during the Donald Trump administration (Tax Cuts and Jobs Act (TCJA)), that became law on Dec.22,

2017) to help boost economic growth and increase government revenue. The main idea of the Tax Cuts Act was to enhance growth and the annual GDP by 1 percent over the next ten years, but also to increase the annual budget shortfalls and eventually adding about $1.8 trillion to the public debt over the same 10-year period. The U.S. has the highest debt-to-GDP ratio compared to other advanced countries.

Despite this, the U.S. is the still world's largest economy with no chance of defaulting on its debt. After the WWII, the U.S. dollar has become the world's reserve-currency country and still nowadays is considered the world currency and used as a reserve currency for many central banks around the world. Therefore, there has been always high demand for US dollar, which has helped the U.S. finance its own debt with no risk of default. In fact, many investors consider putting a premium on holding low-risk dollar denominated assets such as U.S. Treasury bills, notes and bonds. The high demand for US dollars from foreign creditors has helped the Government of United States to borrow at relatively low interest rates. The U.S. Treasury securities are held by domestic and foreign investors, different national governments,

and private funds. Foreign investors and governments hold more than 40 percent of the U.S. public debt. The biggest holders of the U.S. Treasury bills are China and Japan holding each more than $1 trillion and then the U.K.

There are at least two political views regarding the debt: the first view is that the United States will become stuck in a "debt trap" like under-developed countries with high debt limiting growth, which itself leads to more debt. The second view is that the U.S. government can handle debt as far as the country can afford to print more money. The US dollar is considered a world reserve-currency as far as the U.S. economy grows every year.

There is a worry from some economists that large accumulation of government debts can drag the economy into recession. In this case, the investors could lose confidence on the U.S. Government's ability to control large amounts of debt and could be asking for higher interest rates for the U.S. Treasury securities. As a result, this could increase further the public deficit and the increased borrowing could turn into a debt spiral, which could require sudden change in fiscal policy by eventually applying government spending cuts or tax increases. Another conspiracy theory about the US dollar is that if the US dollar continues to weaken it could lead to a significant decrease in demand for the US dollar and US dollar-backed securities. This means that the United States won't be able to sell off its debts to foreign countries. However, this scenario is unlikely to happen.

Economists and policymaker experts have tried to put different strategies to balance the federal budget of the United States of America and reduce debt. Most of these strategies include a combination of deep spending cuts and tax increases for healthy and rich and other categories to bend the debt curve. The most optimist policymakers believe that the U.S. Federal Government could continue to expand public debt for many years into the future with very little consequences thanks to the trust the investors have and have had in the U.S. economy since the end of the WWII. On the other side, the less optimistic politicians and economists believe the reservoir of trust the U.S. economy has accumulated might be reduced year over year which could increase the risk of debt crisis.

Some Paths to Reduce Sovereign Debt
Governments in both developed and developing countries have at least two options to reduce the debt-to-GDP ratio: first, need to run fiscal surpluses large enough to repay the debt, and second raise nominal GDP growth. The growth of debt-to-GDP ratio is given by a simple equation which describes the relationship between a country's primary balance, the interest rate it pays on debt and the growth rate of nominal GDP. Country's primary balance or the fiscal balance normally excludes the interest payment, and the growth rate of nominal GDP depends on the inflation rate and real GDP growth rate. Therefore, the debt-to-GDP ratio is written as,

$$D_t = \left(\left[\frac{1+i_t}{1+g_t} \right] D_{t-1} \right) - Prim_t \qquad (1.1)$$

where D_t is the projected government debt-to-GDP ratio for the next period, $(1+i)t$ is the interest rate on a government bond, $(1+g)t$ is the nominal GDP growth forecast, D_{t-1} is the current government debt-to-GDP ratio, and $Prim_t$ is the primary balance

of the government. The importance of the equation above is that it highlights the role of interest rates in controlling the government debt. Fortuitously, the governments in different countries have profited from very low-interest rates since the 2008 financial crisis until the start of the pandemic waves in 2020-2023. Therefore, despite the government debt having increased relatively, interest payments have consistently decreased which has given many national governments a powerful tool to use cheap capital to finance government spending.

A simple definition of budget deficit is that budget deficit is the rate of change of the stock of debt. The rate of change in the stock of real debt is given as,

$$D'(t) = [G(t)\text{-}T(t)] + r(t)\, D(t) \qquad (1.2)$$

where D(t) is the debt outstanding at period t, G(t) denotes the government purchases and T(t) is the taxes at time t, and r(t) is the real interest rate at period t. The above equation implies that the rate of change in the stock of real debt equals the difference between the government's spending and revenues, plus the real interest on its debt. The term in square brackets on the right-side of equation (1.2) indicates the primary deficit [9]. The primary deficit is often a better way to show how fiscal policy at a given period is contributing to the government's budget constraint. The government must run primary surpluses large enough to offset the primary deficit.

Governments faces budget constraint, which means that the present value of government purchases and services must be less than or equal to the government's initial wealth. The budget constraint can be expressed as the value of a unit of output at time t discounted back to period 0. By denoting G(t) the government's real spending, T(t) the government's revenue through taxes at time t and D (0) the initial real debt outstanding we have that the government's budget constraint is given as,

$$\int_{t=0}^{\infty} a^{-R(t)}\, G(t)dt \leq -D(0) + \int_{t=0}^{\infty} a^{-R(t)} T(t)dt \quad (1.3)$$

where R(t) is the real interest rate at time t, and a^(-R(t)) is the value of a unit of output at time t discounted back to time 0, and D (0) is the debt entered as negative into the budget constraint. By introducing the primary deficit from (1.2), we can rewrite the government budget constraint above in the following form as,

$$\int_{t=0}^{\infty} a^{-R(t)} [T(t) - G(t)]dt \geq -D(0) \qquad (1.4)$$

The above equation of government budget constraint means that government must run primary surpluses in the present value to offset the initial debt at period 0. There are at least four possible paths to reduce government debt ratios: 1) make fiscal adjustments to reduce fiscal deficits, 2) increase GDP growth through productivity improvements, 3) raise inflation targets and 4) restructure sovereign debt [10].

The First path consists of making fiscal adjustments to repay debt which requires the government to maintain significant fiscal surpluses to cover debt service in the long run. This path is not easy to achieve. For example, a country moving from a fiscal deficit of 3.0 percent of GDP to a surplus of at least 2.0 percent of GDP would require a shift of 3.0+2.0=5.0 percent of GDP.

This achievement would require tough unpopular choices about increasing taxes and cutting government spending.

The Second path of reducing government debt ratio consists of increasing the real GDP growth through productivity improvements and structural reforms. Based on this path, countries are required to generate more growth than projected to see government debt ratios reduced, especially in the most indebted countries. For example, in an indebted country the GDP must grow by 2.0-2.5 percent points faster than the planned growth of 1.5 percent to reach at least a growth rate of 4.0 percent per year to start seeing a reduction on government debt ratio.

The Third path of reducing government debt ratio consists of raising inflation target to boost nominal GDP growth which is part of the denominator of equation (1.1) to reduce debt ratio. If the government debt is held in local currency, rising inflation will reduce the amount government has to pay back to investors. In recent years the inflation has remained at low levels despite interest rates being at a record low which has not helped reduce the debt ratio (exception is in years 2022-2024 with the war in Europe and inflation skyrocketing).

The Fourth path to reduce government debt ratio consists of restructuring the sovereign debt. The sovereign debt restructuring comes with a high price including austerity policies such as government spending cuts and increasing taxes. However, if nothing is done to restructure sovereign debt it may generate financial crisis and consequently deep recession, therefore a default is considered a last resort. For some countries with the increased government debt in recent years, the absence of political will to continue with austerity, and the inability to recover from crisis and pick up a growth path have left these countries with no options but trying new tools to restructure the sovereign debt.

The indebted countries should reduce the debt service charges, so they can reallocate the much-needed funds to other areas. This can be achieved by a concrete plan to reduce debt that includes careful control of direct program spending and adopting tax reform to create jobs and growth. Such a plan would put private enterprises on the front line in the battle for a more supportable and equitable budget to guarantee that taxpayer money is put in better use.

The International Monetary Fund (IMF) suggests several reforms to enable sovereign debt restructuring to progress more proficiently especially for under-developed countries (IMF staff report, 2014, 1-48). The IMF recognizes contractual reforms intended to address collective action problems through Collective Agreement Clauses (CAC) in a few countries facing a sovereign debt restructuring. Most of the contractual provisions are made by the sovereign issuer and its creditors, therefore the role of IMF is to facilitate agreements on the design and use of the provisions.

Can a Government Sovereign Debt become a Government Shareholder's Equity? Can Government Issue Securities in Equity?
After over two centuries of government debt in the early modern era, it has come time to discuss another path based on a completely different logic of reducing government debt. This logic emphasises a different way of raising money using the capital market which is normally used by public and private corporations. This is not a new concept, but rather a different perspective and a different logic to develop this concept adapted for government debt.

In public finance, the government debt also known as sovereign debt is the total amount of all debt owed at a point in time by a government to domestic lenders or to foreign lenders. How does the capital market work? There has been a large literature in finance regarding capital markets and how companies use them to raise funds. As per definition capital markets are financial markets in which securities are issued to raise medium to long-term financing, and where market participants trade those securities. Securities are financial assets that are traded and represent either an ownership position in a corporation (a share) or a creditor relationship with a government body or a corporation (a bond).

Capital markets serve two purposes. First, they work as a channel for demand and supply of debt and equity capital. This means that they channel the money provided by savers and depository institutions to borrowers and investees through the sale and purchase of securities (bonds and shares). Second, they provide a secondary market where holders of these securities can exchange them for one another at market prices. Capital markets are widely regulated. Financial regulators, such as, the U.K.'s Bank of England, the U.S. Securities and Exchange Commission (SEC), or the Ontario Securities Commission in Canada oversee the capital markets in their respective jurisdictions to among other things protect investors against fraud.

Companies use the capital markets to raise funds needed to finance activities such as buying manufacturing facilities, warehouses, equipment, and inventories, conducting research and development, and supporting essential corporate activities. Much of the money comes from major institutions such as pension funds, insurance companies, investment funds, banks, foundations, government grants, colleges, and universities. In addition, there are also individual investors wishing to earn interest or dividends on their savings and use capital markets to buy positions in securities they consider attractive. The capital market has two components: the stock market and the bond market. The stock market is where shares of publicly traded companies are issued, bought, and sold. This market allows companies to access capital in return for giving the investor proportionate ownership in the company. Investors can then buy and sell these shares. The bond market is where bonds are issued by corporations and governments. A bond is a debt instrument that has a fixed interest rate and maturity date.

Shareholder's equity per definition is how much owners of a company have invested in the business, either by investing money in shares and receive dividends or by retaining earnings over time. On the balance sheet, shareholders' equity is broken down into three categories: common shares, preferred shares and retained earnings.

Issuing Securities: from a finance point of view, we know that the sale of new securities is affected by general market conditions. Corporations in general try to sell new shares during a rising market where the demand for new shares is particular-

ly strong so they can realize the highest prices for their shares. There are few steps to issue new securities in a corporation as follows:

1. The Board of Directors must approve the issuance of securities. The next important decision is whether to sell the securities through a private placement or a public offering. To be listed on a stock exchange, the listing requirements must be met. Companies must meet a threshold of revenues or assets to qualify for listing, which can vary by stock exchange.

2. The next step is to hire an investment bank to act as the company's underwriter. An underwriter assists with the issuing process by advising on the offer price and helping to market and sell the new securities.

3. If a private placement is to be completed, the investment bank will prepare an offering memorandum and help sell the issue to interested private investors.

4. For a public offering, the company must decide on the method of public issue to be used, based on two types: a cash-offer and a-rights offer. In a cash-offer, the securities are offered to the public as part of the public offering. In the a-rights offer, the securities are offered to existing shareholders in proportion to their current holdings.

5. If a cash-offer is being made, the company must decide on the type of underwriting arrangement: a bought deal, a firm commitment, a best effort arrangement or a Dutch auction.

6. The next step is to prepare, finalize, and file the necessary documents including the prospectus. The underwriter will use this prospectus to market the shares. A prospectus is a written document prepared by the issuer outlining the amount of funds to be raised in the offering, the nature, and terms of the securities to be issued, the use of the funds, a description of the issuer's business and strategy, and historical financial statements.

7. The last step is for the underwriter to advise on the final offer price. Once this is known, the prospectus is finalized, the regulators give their final approval, and the shares can start to trade on the primary market for the first offering.

Investors buy these newly issued shares, and the issuing company receives in exchange cash on sale. Then, shares and bonds are sold subsequently in the secondary market where investors buy securities from other investors. The buying and selling of securities in the secondary market allows investors to liquidate their holdings when necessary. In the secondary market, it is the selling investor who receives the cash on sale and the buying investor who pays the cash to receive ownership of the security. Transactions in the secondary market create the ability to freely trade a security which in finance is known as liquidity. Liquidity is the ability in which assets can be converted into cash. The creation of liquidity through the existence of a secondary market increases the inclination of investors to invest in the primary market, as they rely on the secondary market to liquidate their position in case, they need cash to invest elsewhere. Prices in the secondary market are influenced by past and new information [11].

How can a Sovereign Government Issue Government-Securities in Equity like a Public Corporation?
Based on steps to issue new securities in a corporation mentioned above, we think a sovereign government can follow similar steps to issue government-securities:

1. The government does not have a board of directors like a private or public company; however, it can have an agency or finance department that decides how the securities can be issued. Government securities are different from government bonds as they do not represent debt, but rather "ownership" on the underlying government's projects, such as highways, ports, airports, power generating corporations, mining companies owned by government, etc.

2. The second step is when government/finance department (or hire an investment bank to act as an agent) creates a legal document that outlines the conditions under which the securities can be issued and underlies the projects that government needs to accomplish with the money received from securities, such as building roads, ports, hospitals, schools, airports, factories, etc. Government officials must also decide how the securities will be sold in the primary market. Like in the issuance of government bonds, the government can offer government-security auctions and invite multiple underwriters to attend and participate in the bidding process.

3. The third step is to prepare a preliminary official statement or disclosure document to deliver to potential buyers. This document is very important as it tells investors what projects the government is going to undertake with the money raised from public offering. In addition, this document should specify how the government is going to pay dividends to investors like a profitable public corporation. The government should pay dividends to the holders of government securities when the national economy is doing well and growing so the securities can be more liquid and tradeable in the secondary market. If the economy is not doing well during a fiscal year - as in a normal profitable company - the dividends are retained by the government and reinvested in different projects to help the economy grow. This document should also state how long the security is going to trade in the secondary market: 5 years, 10 years, 15 years or more. Unlike the shares of a public corporation which do not expire, government securities should have a time limit after which they should expire. At the expiration date the government should pay back the original issued amount to all investors holding them. Investors typically examine the price, risk, the trade value in the secondary market and expected dividends of each government security offering before deciding to place a bid.

4. The fourth step is the legal requirement for government-securities to hold a public meeting after a reasonable marketing period. During this marketing period, usually lasting one, two, or a few weeks, potential purchasers thoroughly review and evaluate the disclosure document. When the government holds a government-securities auction, each group of investors submits its purchase bid during the public meetings. The auction continues until all the government-securities are consequently distributed.

5. The fifth and last step is when the underwriters pay the purchase price of government-issued-securities to the paying agent (investment bank or finance department that acts as an agent), who pays the cost of issuance to the government agency in charge of issuing the securities. The role of the agent is to make sure that raised funds are accordingly distributed based on the intended purpose of the securities issue. After the closure of the distribution, a complete set of

closing documents are distributed to each investor participating in the auction. Then the government-securities can start to trade on the primary market for the first offering. Individual investors working with a financial institution, or brokers can buy and sell previously issued government securities in the secondary market [11].

Those governments deciding to get financed though government-issued-securities have a duty to investors to ensure that the issues are liquid, marketable, and of a size enough to guarantee a tradable market. These factors guarantee the marketability of government securities issues and make it more attractive to potential domestic and international investors. A few months before the end of the securities life (10 or 15 years) the government announces that the government-securities are going to retire on a certain date (retirement date) at the original issue value, or

they will be renewed for another term. If government is not able to pay the original face value of the securities to the investors, then the investors have the right to claim shares in government owned entities such as government-run-companies, ports, airports, highways, power generation facilities, government-owned lands, mining rights, etc.

Representatives of the investors or holders of the government issued-securities must participate to the government meetings opened to investors to discuss the government infrastructure spending and ongoing projects that are financed by government issued-securities. These meetings have the purpose of helping recall government responsibilities in front of investors for cost overruns and other problems associated with these projects. Table 1.2 illustrates the difference between the government-issued bonds and government-issued securities.

The difference between Government-Issued Bonds and Government-Issued Securities
Table 2: Government-issued bonds and Government-issued securities

Government Bonds	Government Securities
Issued by Government used to raise capital for various projects such as infrastructure and other spending. The bond issue is for both Mandatory Spending and Discretionary Spending.	Issued by Government for various projects such as infrastructure spending, government projects, etc. The government issued securities are only for Discretionary Spending.
Government bonds are also used by the Central Bank to control the nation's money supply.	Government issued securities are used by Government to finance specific largescale projects in infrastructure, such as roads, bridges, ports, airports, subways, hospitals, power generations companies, etc. No involvement from central bank.
Pay fixed rate interest every 3 months, 6 months, or 12 months.	Pay dividends if economy is doing well and growing. Otherwise, no dividends until economy recovers.
Not marketable in the secondary market	Marketable in the secondary market.
Face value stays the same throughout the bond duration	Fair value of the securities is based on the market. It goes up or down based on the performance of the national economy, using parameters such as employment rate, inflation, interest rate, tax revenue, government revenue collection rate, GDP growth rate, etc.
Yields changes daily	No yields
Expiration date determined since the beginning of the bond issue.	Expiration date could change based on the market value and government needs to issue new securities and retire the old ones.
Government bonds have high cost for some governments such as those in developing countries where government bonds are not so liquid, so they would pay high fixed interest rates to attract investors.	Government securities do not have high cost as they do not pay interests but rather dividends. However, the government is not required to pay dividends if economy is not performing well.
Government bonds are used for both developed and developing countries.	Government-issued-securities are used for both developed and developing countries as an easy and cheap way to raise funds mainly for infrastructure projects.
Governments that are unable to pay interests (cash payments) on bonds go into default.	Governments unable to pay the original face value of the securities will have to transfer government owned company shares to the holders of the government-securities at the retired date. Government has another option to convert them into Government-bonds.
Public debt or government sovereign debt increases year over year if not checked and may not be manageable in the long run.	Public debt remains stable or decreases as Shareholder's equity increases, however manageable in the long run.
	Holders of the government issued securities can participate to government meetings opened to investors regarding the projects financed by the sale of these securities. This holds the government accountable on ongoing public projects, so the money is spent accordingly.

The scope of government-issued-securities is to help heavily indebted developing countries to reduce the debt-to-GDP ratio by converting the debt-raising capacity to a hybrid debt-securities-raising capacity to translate the borrowed money into economic growth keeping inflation stable and trying to raise the level of the household's standard of living. The securities-raising method, regarding government spending, should be used mostly for Discretionary Spending such as transportation, infrastructure, roads, ports, airports, hospitals, generation power facilities, etc., that help grow national economy and not for Mandatory Spending such as social security, education, retirement insurance, disability insurance, hospital insurance for the aged, drug benefit, etc. which instead should be covered by a combination of government-issued bonds and tax revenue [11].

Before the end of the government-issued-securities life, the government can have a general meeting with the representatives of the holders of government-securities to decide how to proceed with security retirement and renewal. This meeting will announce the date securities will be "frozen" and pulled out of the secondary market for retirement. Here as well, the government has at least three options based on the market value of the government issued securities on the retirement date as given in table 1.3:

Table 3: The retirement of the government-issued securities

Option 1	Option 2	Option 3
Market Value < Original issued value	Market Value > Original issued value	Market Value > Original issued value
a-) Government pays the original-issued value of securities to investors as lump-sum payout or as deferred payments. This has a higher cost for the government if the economy is not performing well and the fair value of securities is lower than the book value.	a-) Government pays the original-issued value and in addition converts the portion of the difference between market value and original-issued-value to government bonds with fixed interests. b-) Government pay the whole market value as lump-sum payout or as deferred payments.	a-) If the Government is unable to pay the original-issued value, it has the option to transfer a portion (less than 50%) of the ownership of the government owned companies to government securities-holders.
b-) Or government securities are renewed for another term and kept trading in the secondary market, and government continue to pay dividends.	c-) Or government securities are renewed for another term and kept trading in the secondary market, and government continue to pay dividends.	b-) Or government securities are renewed for another term and kept trading in the secondary market, and government continue to pay dividends.

There are advantages and disadvantages for each method of raising funds for government spending as follows:

Government Debt-Raising Method:	
Advantages	**Disadvantages:**
• There is a steady interest income return • Low risk of default for the bonds issued by the government of developed countries. • There is a liquid market for reselling • The government bonds are assessable through mutual funds and Exchange Trade Funds (ETF).	• Government bonds offer low rates of return • In some countries fixed income from bonds falls behind with rising inflation • There is a carry risk when market interest rates increase • There is a default and other risks on foreign bonds issued from developing countries • In many jurisdictions interest income from Treasury securities is subject to federal/government income tax
Government-Issued-Securities-Raising Method:	
Advantages	**Disadvantages:**
• There is no risk of default • There is a liquid market for reselling them in the secondary market • Steady dividend payments when national economy performs well. • Market value increase in the secondary market when national economy performs well. • Investors could buy and resell government-securities for a capital gain or a quick rate of return. • Convertible in government owned companies' shares or government-bonds.	• When national economy goes into recession, there are no dividend payments, until economy recovers. • There is risk for government-securities to underperform if parameters such as employment rate, inflation, interest rate, tax revenue, GDP growth rate are not performing well as forecasted. • •Capital gains are taxable when government securities are sold at a profit.

The government-issued-securities strategy can be used also to save big banks and other financial intuitions in the brink of collapse as illustrated below [11].

The government-issued-securities can be used to save large public corporations and big banks in the brink of bankruptcy, which are important and too big to fail for an economy. Rather than using a bailout strategy, as it happened in 2008 when President George W. Bush and U.S. Congress decided to purchase with the taxpayer's money failing assets of big banks and other financial institutions in the U.S. ahead of the Great Recession, the government can have the option of using a different and more effective strategy to rescue big banks.

The government's first step is to nationalize the big banks by buying their shares at market value, using taxpayers' money, so they don't fail and collapse with huge repercussions in capital markets. The second step is to issue new government-securities (with security life of 5, 10 or 15 years) on the primary market for the first offering, that are correlated to the 'ownership' of underlying government projects which in this case are the big banks to save. By acting in this way, the government can cash in the money from the primary market offering and use a portion of it to recover the taxpayers' money used in the bailout and another portion to inject money into the failing banks, so they can start repairing their balance sheets. For example, if the cost of buying failing banks' shares is $5 billion (bailout), then the government will issue government-securities for a total of $10 billon to cover the cost of bailout ($5 billion) and cost of repairing balance sheet (another $5 billion).

At the end of the government-issued-securities life the government will have a general meeting with the investors and representatives of the holders of government-issued-securities used to save big banks to decide how to proceed with the retirement of these securities. Based on the market value of the government-issued-securities, government can option to legally "transfer" the ownership of the 'repaired' big banks to investors (owners of the government-issued-securities) or renew for another term and keep trading in the secondary market and continue to pay dividends. The government-issued-securities strategy is a more efficient approach to save the failing assets of big banks and other large corporations, as it quickly recovers the taxpayer's money.

The budget deficit can now be expressed in a hybrid form using both the rate of change of the stock of debt D(t) and the government issued-securities stock S(t). The rate of change of the combination of the stock of real debt D'(t) and government equity S'(T) can be rewritten from equation (1.2) into a hybrid form as,

$$D'(t) + S'(t) = [G(t)\text{-}T(t)] + r(t)D(t) + d(t)S(t) \quad (1.5)$$

where D(t) is the government debt outstanding at period t, G(t) denotes the government purchases, T(t) is the taxes at time t, and r(t) is the real interest rate at period t, S(t) is the government issued-securities outstanding, and d(t) is the dividend payable at period t. The above equation implies that the rate of change in the stock of real debt and government-equity equals the difference between the government's spending and revenues, plus the real interest on its debt and eventual dividends payable on outstanding equity. The term in square brackets on the right-side of (1.5) indicates the primary deficit. The government must run primary surpluses in the present value to offset the initial debt at period 0 and the primary deficits.

However, the budget deficit and real stock of debt can be reduced if government incurs more often spending (discretionary spending) using government issued-securities which reduces the real interest payments on debt, given that dividends payable on government-securities are not consistent and often are subject to changes. As per equation (1.5) we have that a change in the trend of the stock of real debt and government-equity is shown as,

$$D'(t1){\downarrow} + S'(t1){\uparrow} = [G(t1)\text{-}T(t1)] + r(t1)D(t1){\downarrow} + d(t1)S(t1) \quad \text{for}$$
$$d(t1){\uparrow} \text{ subject to } T(t1)>T(t0), g(t1)>g(t0), U(t1)<U(t0) \text{ or } d(t1){\downarrow}$$
$$\text{subject to } T(t1)<T(t0), g(t1)<g(t0), U(t1)>U(t0) \quad (1.6)$$

where debt outstanding D'(t)↓ is decreasing, government-equity S'(t)↑ is increasing, real interest payments on debt r(t)D(t)↓

is decreasing and dividend payments on equity d(t)S(t) stays the same or decreases during economic downturn and increases during economic growth. The dividend payable at period one d(t1) is subject to increases if the revenue taxes in period 1 is greater than in period 0, T(t1)>T(t0), growth rate in period 1 is greater than in period 0, g(t1)>g(t0), and unemployment rate in period 1 is lower than in period 0 U(t1) <U(t0). Instead, the dividend payout in period one, d(t1), will be subject to decreases where there is a recession or if the revenue taxes in period 1 is lower than in period 0, T(t1)<T(t0), growth rate in period 1 is lower than in period 0, g(t1)<g(t0), and unemployment rate in period 1 is greater than in period 0 U(t1)>U(t0). The government must increase the government-issued-securities program to reduce stock of real debt and offset the primary deficit even without running large primary surpluses.

Some Risk Factors for Government-issued-securities and Dividend Payments

As for every financial instrument, there are several general risks associated with the issuing government securities. A list of potential risks for government issued securities have been itemized below:

- **Issues Risk or Credit Risk** – is determined by the borrower's credit capacity to fulfil the obligations in a timely manner such as the dividend payments. The government will pay dividends if economy is doing well and growing. Otherwise, no dividends until economy recovers. The dividend is based on parameters such as employment rate, inflation rate, interest rate, tax revenue, government revenue collection rate and GDP growth rate. Once the tax revenue rate has increased due to GDP growth rate, then government can declare dividends in a similar way as in a profitable corporation.

- **Settlement Risk** - is determined when an investor or client pay the purchase price of the security in advance but re-

ceive it with a time delay due to unpredictable events. In the same way, an investor, or organization is obliged to deliver financial securities sold to other investors or clients and may not receive the purchase price agreed from the buyer at the same time.

- **Guarantor Risk** – like issuer risk, the guarantor risk occurs when a third-party act as the guarantor of the issuer. In this case, the guarantor becomes insolvent and makes the timely settlement impossible.

- **Inflation Risk/Monetary Value Risk** – in a volatile monetary market, the inflation risk is always a present risk. Inflation can diminish the value of an investment. In fact, the purchasing power of the invested capital decreases when inflation rate rises and is higher than the return rate generated by securities.

- **Market Risk/ Price Fluctuations** – is a potential risk that occurs when the fluctuation in the value of the financial instrument is much higher than a normal fluctuation due to external shocks. If the market value of the financial instrument drops quickly, then there is an asset shrink. If it rises quickly then there is an asset revaluation.

- **Country Risk/Transfer Risk** – investments in securities in other countries are subject to country risk. Some of the factors that contribute to country risk are political instability, regional wars, insecure economic and social circumstances, etc. Country risk is often considered as a transfer risk due to exchange rate risks which may hinder the international movement of payments or capital. Due to country risk foreign exchange measures may prevent the payment of interest and dividends. In fact, to avoid transfer risk many developing countries issue securities in USD currency.

- **Liquidity Risk** – this risk occurs when securities become illiquid. Illiquid securities arise when the supply and demand is insufficient, so the purchase or sale of securities may not be possible at the desired time and desired price.

- **Tax revenue Risk** – is a risk faced by governments that have a complicated tax revenue system. For government issued securities, tax revenue collection is important process that help guarantee government the flow of cash to pay dividends. Developing countries face hard challenges when they try to create an efficient tax system comparable to developed countries. The main challenge is that most of the workers in these countries are employed in agriculture and in small informal companies. Most of their earnings are paid cash "off the books" and therefore the base for an income tax is hard to estimate. In addition, the workers of these countries spend their earnings in small stores using cash with no receipts, which is impossible to have accurate records of sales and inventory. Therefore, modern tools of raising revenue, such as income taxes and consumer taxes, play a small role in under-developed economies.

- **Underpricing Risk**- One of the most difficult acts by the agent (finance department or investment bank acting as an agent on behalf of government) is to determine the "right" price at which to offer the shares of government for the first time to the market. To get some input into this decision, the agent presents the legal document outlining the projects that government needs to accomplish with the money received from securities, such as building roads, ports, hospitals, schools, airports, factories, etc., to institutional investors who provide feedback on the price they would be willing to pay for the shares. With this information, the agent acting on behalf of the government decides on the initial offer price for the issue. If the price is too high, then all the shares that the government wanted to sell may not be sold and less cash would be received. If the share price is set too low, then the government would lose additional cash it could have received with the higher price. Underpricing occurs often when the share price increases on its first day of trading. For example, take a share/security that had an initial offer price of $50, but by the end of the first day it is trading at $85. Could the government have issued it at a price of 85 instead? If so, the government had an opportunity cost of the additional $35 per share/security. Underpricing is an opportunity cost for the issuer. If it occurs, then the government may have been able to raise more capital for the same number of securities issued or, alternatively, have issued fewer securities to raise the same amount of capital.

How to Pay Dividends to Government-issued Securities?
Per definition, a dividend is a distribution of retained earnings by a company to its shareholders in the form of cash or stock reinvestment. Dividends are paid on an annual basis or more frequently on a quarterly basis. Dividend payments, whether cash or stock, reduce retained earnings of a corporation by the total amount of the dividend. In the case of a cash dividend the money is transferred to a liability account called dividends payable. In the case of a stock dividend, however, the amount deducted from retained earnings is added to the equity account at par value and new shares are issued to the shareholders. The value of each share's par value does not change.

Government does not have a profit or retained earnings to distribute to its shareholders, but rather annual surplus or deficits (government spending – government expenses=surplus/deficit). So, The First option is to distribute the government surplus to security shareholders. Unfortunately, most of the government runs on annual deficits, which has nothing left to distribute to shareholders.

The Second option seems to be the annual/quarterly GDP growth. Once the government declares that in a given year the GDP annual/quarterly growth rate has been for example 0.9% of GDP, it implies that the government was able to collect 0.9% more on tax revenue for that year compared to last year. This 0.9% GDP growth is a potential surplus that can distributed to government-issued security shareholders based on the number of government-issued securities outstanding. The Third option is to use a dividend yield based on a dividend index, for example the S&P 500 index, which is the dividend index of the largest stocks in the United States.

Let's Look at a Practical Simple Example
GDP growth for a developed country like Canada on annual basis in 2023 was 1.1%. Canada's GDP at the end of 2023 was estimated to be $2.226 trillion in purchasing power parity terms. It

[1]As per Department of Finance Canada calculations office, the aggregate principal amount of money to be borrowed by the government of Canada in 2024-25 is projected to be $508 billion, 83 per cent of which will be used to refinance maturing debt. The size of the 2024-25 gross issuance of domestic bonds and treasury bills (i.e., domestic borrowing program) totals $500 billion and reflects the need to refinance $414 billion of maturing debt, in addition to projected financial requirements of $102 billion, which includes $30 billion to fund purchases of Canada Mortgage Bonds and a reduction of cash balances of $16 billion. Source: Department of Finance Canada calculations- Budget Canada 2024. See table 1.3a in appendix for Planned and Actual Sources and Uses of Borrowings for 2024-25 breakdown.

means that about 1.1% of Canada's GDP growth which is roughly $22.26 billion are available for dividend distribution. This is much lower than $34.7 billion that the government of Canada spent on debt servicing charges in 2023. If Canada has a total of $508 billion on government-issued securities outstanding at the end of 2023-2024, it can pay around 0.043 cent for each dollar on government-issued securities which is about 4.3% per share/security.

Third option is to use the dividend yield of S&P 500 index, which some of the largest stocks in the United States, many of which pay out a regular dividend. The index's dividend yield is the total dividends earned in a year divided by the index's price. For example, as of December 31, 2023, the average yield of the S&P 500 was 1.5%. If Canada has a total of $508 billion on government-issued securities outstanding at the end of 2023-2024 as per table 1.3A in Appendix, it can pay around 0.015 cent for each dollar on government-issued security using the S&P index, which is about $7.6 billion on annual basis. This amount is much lower than any amount that the government of Canada could spend on debt servicing in any given year in the last 20 years.

The Cost of Public Debt Versus Government Equity
The rise of government debt in the past decades has been a main concern for many countries around the world. The industrialized economies have been dealing with high debt accumulation due to stimulus expenditures and high cost of stabilizing the financial system after the 2008 global financial crisis and during the 2020 global pandemic. In the last two-three decades the financial crises have led to an unparalleled increase in public debt creating some worries about the impact on economic growth. It has been a considerable cost increase to serve the government debt in many advanced countries. It is clear that interest payments on rising public debt consume a significant portion of government revenue. Hence, it limits the government's capability to lower taxes and fund different programs. Climbing debt and interest payments have also made the government's fiscal position more susceptible to interest rate movements.

Developing countries instead, in the last two decades, have seen a sharp increase of public debt compared to industrialized countries mainly due to growing development financing needs, COVID-19 pandemic, cost-of-living crisis, climate change, and by limited alternative sources of financing. There is a concerning trend that dominates the public debt picture of low-income developing countries. Debt rising has become more expensive and the number of low-income countries that are susceptible to damaging debt crisis has been rising in the last decade.

The number of countries facing high levels of debt has increased abruptly from only 22 countries in 2011 to 59 countries in 2022. Less developed countries borrow money by paying much higher interest rates compared to developed countries. Countries in Africa, South Asia and Latin America borrow at rates that are 3-4

times higher than those of the United States and even 6-8 times higher than those of Germany. In fact, during 2023 the 10-year bond yields in Germany and the U.S.A were at 1.5 and 3.1 respectively. The 10-year bond yields in Asia, Latin America and Africa for the same year were at 6.5, 7.7 and 11.6 respectively which means 3-8 times higher compared to the U.S.A. and Germany [12].

In the last few years, developed countries have seen debt service charges and quick growth of interest payments consuming more and more government resources, especially during the COVID-19 pandemic and the war in Europe (2020-2024). Debt service charges or interest payments on public debt consume a substantial portion of the government revenue. This limits the government's capability to fund the existing program or new programs such as home care, mental health and homelessness prevention, etc. High debt and rising interest payments had made the government fiscal situation more exposed to interest rate movements.

For example, in Canada, interest payments or public debt charges were projected to reach $22.1 billion in 2022, using up to 6% of the total Canadian federal revenue. This ratio is expected to rise to 9% in 2025-20226. This means that for every tax dollar collected by the government, almost 10 cents will be used to pay interest on the public debt [13]. In the third quarter of 2023, the Canadian federal government spent over $24.7 billion on interest payments, which is 20.7% up compared to same quarter in 2022 [14].

In the U.S. interest payments or public debt charges have been increasing from $221 billion in 2013 to $340 billion in 2020 and to a record high of $659 billion in 2023. Basically, the net interest costs have risen from 1.6% of the GDP in 2020 to 2.5% in 2023. As of November 2023, the public debt of the U.S. was around $34 trillion USD dollars. This enormous increase is due in part to much higher interest rates and due to a $9.5 trillion increase in the U.S. debt between 2020 and end of 2023 because of pandemic emergency measures. The ten-year U.S. Treasury Notes paid 2.4% in 2019, 1.1% in 2020 and 3.8% in 2023. In the same way, the newly issued 3-month U.S. Treasury notes paid on average 2.3% in 2019, 0.7% in 2020 and 5.0% in 2023 [15].

The World Bank Group (WBG) loans have normally lower interest rates than the rates on loans from commercial loans for the upper-middle-income countries (defined as those with per capita incomes of between $4,046 and $12,535). The Bank, as well, lends money at no interest in projects that benefit the poorest countries, if they don't have other sources of loans and must have a per capita income of less than $1,085 and cannot already be in arrears already to the IMF or World Bank. Table 1.4 below indicates the range of interest rates on World Bank loans as of January 1, 2024, for less developed and under-developed countries.

Table 4: Interest Rates on World Bank Loans. IDA terms (effective as of January 1, 2024).

Category	Maturity	Grace Period	Principal Payment (1)	Principal Payment (2)	Acceleration Clause
Grants	N/A	N/A	N/A	N/A	N/A
Small Economy	40	10	2% for yrs.11-20	4% for yrs.21-40	Yes
Regular	38	6	3.125% for yrs. 7-38		Yes
Blend	30	5	3.3% for yrs.6-25	6.8% for yrs.26-30	Yes
SML	12	6	16.67% for yrs.7-12		Yes
50-Year Credit	50	10	2.5% for yrs.11-50		Yes
Guarantees	N/A	N/A	N/A	N/A	N/A
Non-concessional Financing	Up to 35 yrs. Max. maturity		Flexible	Flexible	N/A

Source: IDA: International Development Association, Dec.19.2023. World Bank Group.

Regarding the dividend policies, the average dividend yield on S&P 500 index companies that pay a dividend historically fluctuates somewhere between 2%-5% depending on the market conditions. The S&P 500 companies paid out a record $565 billion in dividends in 2022, up 10% from 2021. The S&P dividend yield has been at 1.78% at the end of 2022 and throughout 2023, while the 10-year Treasury yield has been around 3-4%. On average, the S&P 500 dividend yield for a 10-year period, 2019-2019 has been around 1.97% [16]. In public corporations, dividends are periodic payments, due to excess funds, made to shareholders of the company. There is no obligation for a corporation to pay dividends.

Dividend payments fluctuate in response to changes in the company's profits, market conditions and the company's specific sector. A company can choose to pay dividends for several reasons: first, paying dividends is a way to attract more investors and keep investors interested in investing in the company. Second, dividends are a sign of financial health. It means that the company has enough funds to pay dividends which could tell investors that the company is doing well.

Some companies choose not to pay dividends and reinvest the funds in the company. It is also standard for some public companies to suspend dividends if they are facing financial stress. They can start paying dividends when the company's health is established. If we express the budget deficit in a hybrid form using both the rate of change of the stock of debt D(t) and the government issued-securities stock S(t) as per expression (1.5) - where the rate of change in the stock of real debt and government-equity equals the difference between the government's spending and revenues, plus the real interest on its debt and eventual dividends payable on outstanding equity - we can simulate 3 cases of hybrid public debt and government equity with different cash flows. We assume that a central government is looking to finance a $9 billion public deficit for 3 years using both traditional and hybrid models.

Case-1. Conventional Model to Finance Public Deficit – 38 Year-Period on $9 Billion Loan

It is assume that a government will take a regular loan with interest at 3.125% for a period of 38 years, with no initial grace period, based on the Interest Rates schedule on World Bank Loans using IDA terms (effective as of January 1, 2024) as per

amortization schedule 1 in table 1.1A (in appendix) with a 38-year amortization period on a loan of $9 billion to finance budget deficit for 3 years ($3 billion each year). As per equation (1.5) we have that:

$$D'(t) + S'(t) = [\ G(t)-T(t)] +r\ (t)\ D(t)+d(t)S(t) \qquad (1.5b\text{-}1)$$

where public deficit D'(t)=$9 billion, government issued-securities S'(t) = 0, government spending G(t) =$58 billion, government tax collection-revenue T(t) = $55 billion, interest rate r(t) =3.125% and dividend payable d(t) = 1.78%. Therefore, by plugging the numbers on (1.5b-1) we get the following expression for year 1:

=> [$9 000 000 000 (D) + $0 (S) =[($58 000 000 000(G) − $55 000 000 000(T)] + [3.125% ($9 000 000 000 (D(t)] + [1.78% ($0(S(t))]
=>[$9 000 000 000 (D) + $0 (S) =[(3 000 000 000 (Deficit financed)] + [$279 462 919.13 (D(t))] + [$0(S(t)]
=> [$9 000 000 000 (D) + $0 (S)] = 0 + [$279 462 919.13 (D(t))] + [$0(S(t)]
[$9 000 000 000 -98 000 000 (D)] = $279 462 919.13 (D(t))
=> [$8 9 020 000 (D)] debt left = $279 462 919.13 (D(t)) Interest charges paid and $125 477 796.31 paid on principal

Based on the amortized loan calculator on table 1.1A (appendix) the public debt available at the end of year one is about $8.874 billion, and interest paid is around $279.4 million on interest charges and $125.5 million on principal charges ($404.9 million total charges) paid on a loan of $9 billion dollars. Next two years cash-flow follow a similar pattern as year one and won't be shown here.

Case 2- Cash flow- -Hybrid Model to Finance Public Deficit -38 Year-Period Loan + Government-Issued-Securities

It is assumed that a government will take a loan with interest rate at 3.125% for a period of 38 years based on the Interest Rates schedule on World Bank Loans as per IDA terms (effective as of January 1, 2024) as per amortization schedule 2 in table 1.2A (in appendix) with a 38-year amortization period on a loan of $5 billion to finance budget deficit for 3 years ($1.66 billion each year). In addition, the government will issue securities for $4 billion using a dividend yield of about 1.78% as per S&P500 Index average dividend calculation. As per equation (1.5) we have that:

$D'(t)+ S'(t) = [G(t)-T(t)] +r (t) D(t)+d(t)S(t)$ (1.5b-2)

where public deficit D'(t)=\$5 billion, government issued-securities S'(t) = \$4 billion, government spending G(t) =\$58 billion, government tax collection-revenue T(t) = \$55 billion, interest rate r(t) =3.125% and dividend payable d(t) = 1.78%. Therefore, by plugging the numbers on (1.5b-2) we get the following expression for year 1:

=> [\$5 000 000 000 (D) + \$4 000 000 000 (S)]= [(\$58 000 000 000 (G)– \$55 000 000 000 (T)] +[3.125% (\$5 000 000 000 D(t))] – [1.78% (\$4 000 000 000 S(t))]

=> [\$5 000 000 000 (D) + \$4 000 000 000 (S)] =[(\$3 000 000 000 (Deficit financed)] + [\$155 257 177.29 (D(t))] + [\$71 000 000 (S(t)]

=> [\$5 000 000 000 (D) + \$4 000 000 000 (S)] =0+ [\$155 257 177.29 (D(t)) +[\$68 000 000(S(t)]

=> [\$4 930 290 113.16 (D)] debt left + 4 000 000 000 (S) security left] = \$155 257 177.29 (D(t)) Interest charges paid +\$ 69,709,886.84 Principal paid + 71 200 000 S(T) dividend payout

Based on the amortized loan calculator in table 1.2A (appendix) the public debit available at the end of year one is about \$ 4.930 Billion at 3.125% interest rate, which paid around \$155 million on interest charges and \$69.7 million on principal (total of \$224 million) and \$72 million on dividend payouts on government securities available (\$4 billion) on the first year. Next two years cash-flow follow a similar pattern as year one and won't be shown here.

Case 3- Cash Flow- -New Model without Public Deficit – Based on Government-Issued-Securities

Assumed that a government prefers to take no loan to finance public deficit but rather issue government-securities for a total of \$9 billion. At the end of year one it will use a dividend yield of about 1.78% as per S&P500 average dividend calculation. As per equation (1.5) we have that:

$D'(t)+ S'(t) = [G(t)-T(t)] +r (t) D(t)+d(t)S(t)$ (1.5b-3)

where public deficit D'(t)=\$0 billion, government issued-securities S'(t) = \$9 billion, government spending G(t) =\$58 billion, government tax collection-revenue T(t) = \$55 billion, interest rate r(t) =3.125% and dividend payable d(t) = 1.78%. Therefore, by plugging the numbers on (1.5b-3) we get the following expression for year 1:

=> [\$0 (D) + \$9 000 000 000 (S)]= [(\$58 000 000 000 (G)– \$55 000 000 000 (T)] +[3.125% (\$0 D(t))] – [1.78% (\$9 000 000 000 S(t))]

=> [\$0 (D) + \$9 000 000 000 (S)] =[(\$3 000 000 000 (Deficit financed)] + [\$ 0 (D(t))] + [\$160 200 000 (S(t)]

=> [\$0 (D) + \$9 000 000 000 (S)] =0+ [\$0 (D(t))] +\$[160 200 000 (S(t)]

[\$0 (D)] debt left + 9 000 000 000 (S) security left] = \$0 (D(t)) Interest charges paid + 160 200 000 S(T) dividend payout

Based on the amortized loan calculator in table 1.1A the public debit available at the end of year one is \$0 at 3.125% interest rate. However, the government issued government-securities and paid \$160.2 million on dividend payouts on government-issued-securities available (\$9 billion) on the first year.

Table 1.5 summarizes the 3 cases and shows the difference between interest charges on 38 years loan (\$9 billion and \$5 billion) at 3.125% versus dividend yields on government-issued-securities for the same amount renewed after 10 years, assumed that dividend is paid every single year. If we compare interest charges and dividends to finance the \$9 billion public deficit for 3 years, based on a \$9 billion loan or a \$9 billion government-issued-securities, the accumulated dividend payout (dividend yield at 1.78%) after 38 years is lower than accumulated interest charges (without principal) by about \$300 millions. Instead, on a \$5 billion loan or \$5 billion government-issued-securities the dividend payout after 38 years is lower than interest charges (without principal) by about \$166 million.

On a \$9 billion loan or a \$9 billion government-issued-securities accumulated interest charges for 10 years are higher than dividends by about \$997 million, and for 20 years by about \$1.46 billion and for 30 years by about \$1.20 billion. However, if we take into consideration the average S&P 500 dividend yield for a 10-year period, 2009-2019 of around 1.97% and compare the accumulated interest on a \$9 billion loan and accumulated dividend issued on a \$9 billion government-issued-securities we have that accumulated interest for a 38-year period are lower by \$349 million than accumulated dividends.

Different from interest charges, dividend yields can change from year to year. They may go up or down or may not be issued at all if the economy is going into recession.

Table 5: Accumulated interest charges on loans versus dividend yield on government-issued-securities. Case scenarios.

Amount paid in years	Interest at 3.125% = loan \$9 billion = 38 years	Interest at 3.125% = loan \$5 billion = 38 years	Dividend yield at 1.78% on securities = \$4 billion	Dividend yield at 1.78% on securities = \$5 billion	Dividend yield at 1.78% on securities = \$9 billion	Dividend yield at 1.97% on securities = \$9 billion
10 years- accumulative	\$2 599 621 946.46	\$1 444 234 414.70	\$712 000 000.0	\$890 000 000.0	\$1 602 000 000.0	\$1 773 000 000.0
Difference. dividend 1.78% vs. interest charges = 10 years accum.	\$ (997 621 946.46)		If government-securities are renewed for 10 more years	\$(554 234 414.70)	If government-securities are renewed for 10 more years	

20 years – accumulative	$4 668 212 435.38	$2 593 451 352.95	$1 424 000 000.0	$1 780 000 000.0	$3 204 000 000.0	$3 546 000 000.0
Difference. dividend 1.78% vs. interest charges = 20 years accum.	$(1 464 212 435.38)		If government-securities renewed are for 10 more years	$(813 451 352.95)	If government-securities renewed are for 10 more years	
30 years – accumulative	$6 011 263 750.95	$3 339 590 972.70	$2 136 000 000.0	$2 670 000 000.0	$4 806 000 000.0	$5 319 000 000.0
Difference. Dividend 1.78% vs. interest charges = 30 years accum.	$(1 205 263 750.95)		If government-securities are renewed for 8 more years	$(669 590 972.70)	If government-securities are renewed for 8 more years	
38 years - accumulative	$6 387 747 187.01	$3 548 748 437.17	$2 705 600 000.0	$3 382 000 000	$6 087 600 000.0	$6 767 400 000.0
	Difference dividend yield at 1.78% vs. interest charges at $9 billion loan or securities =38 years accumulative			Difference dividend yield at 1.78% vs. interest charges at $5 billion loan or securities		Difference dividend yield at 1.97% vs. interest charges at $9 billion loan or securities
	$(300 147 187.01)			$(166 748 437.17)		$349 652 812.99

There is much more flexibility on paying annual dividends on government-issued-securities, based on different factors such as stock market conditions and trends, interest rates, economy's growth rate, unemployment rate, government revenue and tax collection rate, government spending, etc. In the years when an economy is healthy, with high growth rate, low unemployment rate and high government revenue and tax collection, the government will increase the cash flow available to declare higher annual dividend yield. On the other hand, in the years when an economy is weak with low growth rate, high unemployment rate and low government revenue and tax collection, the government will decrease the cash flow available to declare annual dividend yield. As in the private sector, when an economy is weak and recovering from a recession the government may not declare or declare a low dividend yield on government-issued- securities.

The simulated case scenario above on financing public deficit is not that different from real case scenarios, except for the government-issued-securities which are currently based on theorical assumptions. In fact, the largest province in Canada, Ontario with a population of 15.6 million, is expecting a much larger public deficit in 2024 than in previous years and delays a return to a balanced budget until 2026-27. Table 1.6 shows Ontario's province budget breakdown by category-revenue and category-spending for 2024.

Table 6: Canada largest province, Ontario's Budget 2024- breakdown. Source: Ontario Provincial Budget-2024-2024. Toronto Star, March 27. 2024

Canada - Ontario Province - Budget 2024-2025			
Category -Revenue	Revenue-Taxes in CAD $ billions	Category- Spending	Spending in CAD $ billions
Personal Income Tax	$51.9 billion	Health sector	$85.0 billion
Sales Tax	$38.8 billion	Education sector	$37.6 billion
Education Property Tax	$5.8 billion	Post-secondary education sector	$12.2 billion
Corporate Tax	$24.9 billion	Justice sector	$5.9 billion
Gas and Fuel taxes	$2.6 billion	Children community and social services sector	$19.9 billion

Employer Health Tax	$8.7 billion	Other programs	$40.0 billion
Other taxes	$6.9 billion		
Ontario Health premium	$5.0 billion	Sub-total without debt	$200.6 billion
Other non-tax revenue	$18.0 billion		
Income from Government business	$6.8 billion	Interest on provincial debt	$13.9 billion
Federal Transfers	$36.3 billion		
Total	$205.7 billion	Total spending	$214.5 billion
		Contingency funds	$1.0 billion
		Total spending with contingency funds	$215.5 billion
Deficit without Interest on debt	$5.1 billion		
Overall Deficit (including interest on Provincial debt)	$9.88 billion		

As per table above the largest revenue items on Ontario-2024 budget are personal income tax ($51.9 billion), corporate tax ($24.9 billion) and federal transfers ($36.3 billion). On the opposite side, the largest spending items are health sector ($85.0 billion), education sector ($37.6 billion), post-secondary system ($12.2 billion) and other programs ($40.0 billion) such as infrastructure work on roads, highways, transportation, energy sector, subsides to corporations, etc. Interest on provincial debt alone is $13.9 billion which represents 6.8% of the budget revenue. However, putting Ontario's Province debt burden in perspective, the $13.9 billion the province will pay to service its debt in 2024 is more than it spends on postsecondary education. The combined yearly deficit with capital spending plans sees the Province of Ontario moving from a 38.0% debt-to-GDP ratio in 2022-2023 to 39.5% in 2025-2026 and 39.1% by fiscal year 2026-2027. This is just below the 40% prescribed debt-to-GDP ceiling regarding the province's debt as we can see in tab.1.7 [17].

Table 7: Government of Ontario Fiscal Plan. Ontario Province, Canada.

(In $ Billions)		Province of Ontario-Canada			
Category			**Medium-Term Outlook**	**Medium-Term Outlook**	**Medium-Term Outlook**
Revenue	Actual 2022-23	Interim 2023-24	2024-25	2025-26	2026-27
Personal Income Tax	$44.20	$50.6	$51.9	$55.1	$58.3
Sales Tax	$36.1	$39.8	$38.8	$40.6	$42.7
Corporate Tax	$27.8	$24.2	$24.9	$26.3	$28.0
Ontario Health Premium	$4.4	$4.9	$5.0	$5.2	$5.4
Education Property Tax	$6.0	$5.8	$5.8	$5.9	$5.9
All Other taxes	$18.0	$17.2	$18.20	$20.4	$21.0
Total Tax Revenue	$136.5	$142.5	$144.7	$153.5	$161.3
Government of Canada Transfers	$31.3	$34.8	$36.3	$37.5	$38.7
Income from Gov. Business Enterprises	$6.1	$7.3	$6.8	$8.0	$7.8
Other Non-Tax Revenue	$19.0	$19.8	$18.0	$18.50	$18.8
Total Revenue	$192.9	$204.3	$205.7	$217.4	$226.6
Spending Programs					
Health Sector	$75.1	$84.5	$85.0	$88.0	$89.90
Education Sector	$33.6	$36.60	$37.60	$38.80	$39.40
Postsecondary Education sector	$11.7	$12.6	$12.2	$12.5	$13.0
Children, Community, Social Services Sector	$18.0	$19.4	$19.9	$20.1	$20.1
Justice Sector	$5.3	$6.1	$5.9	$5.6	$5.6

Other Programs	$30.1	$35.3	$40.0	$40.9	$40.9
Total Base Programs	$173.8	$194.5	$200.6	$205.8	$208.9
Covid-19 Time-Limited Funding	$6.3	0	0	0	0
Other One-Time Expenses	$6.3	0	0	0	0
Total Programs	$186.4	$$194.5	$200.6	$205.8	$208.9
Interest on Debt	$12.4	$12.8	$13.9	$14.7	$15.20
Total Expense	$198.8	$207.3	$214.5	$220.6	$224.1
Surplus (Deficit) Before reserve	($5.9)	($3.0)	($8.8)	($3.1)	$2.5
Reserve	0	0	$1.0	$1.5	$2.0
Surplus (Deficit)	($5.9)	($3.0)	($9.8)	($4.6)	$0.5
Net Debt as a Per Cent of GDP	38.2%	38.0%	39.2%	39.5%	39.1%
Net Debt as a Per Cent of Revenue	207.6%	203.0%	213.5%	211.4%	209.4%
Interest on Debt as a Per Cent of Revenue	6.4%	6.3%	6.8%	6.8%	6.7%
Net Debt	$400.5	$414.8	$439.1	$459.8	$474.5

Source: Ontario Treasury Board Secretariat and Ontario Ministry of Finance 2024

Ontario's government net debt is supposed to increase from $400.5 billons in 2022-2023 to $474.5 in 2026-2027 over a 5-year period, an 18.5% increase. The government of Ontario has completed a $41.8 billion in long-term borrowing in 2023-2024, which is $14.3 billion higher than anticipated in the 2023 budget. In the medium-term outlook, the long-term borrowing forecasts in 2024-25, 2025-26 and 2026-27 will be respectively $38.2 billion, $37.7 billion and $32.8 billion. Ontario's borrowing costs for 2023-24 were 4.2% and the estimated borrowing costs for 2024-25, 2025-26 and 2026-27 are forecasted respectively to be around 4.0% for all 3 years.

Regarding the terms of debt, the province of Ontario has continued to extend the terms of public debt to reduce refinancing risk on maturing debt [17]. In fact, the Province of Ontario has issued over $137.0 billion of bonds, which is about one-third of total debt outstanding with maturities over 30 years since 2010-11, including the $12.8 billion debt issued in 2023-24 alone. By using the "Case 3- Cash flow" scenario, in our assumption to re-

duce public, without public deficit by converting net debt of the Province of Ontario into government-issued-securities we have created a simplified case scenario on table 1.8.

First column shows the Provincial fiscal year, second column shows the Effective Interest Rate on Total Debt in the Province of Ontario for a 34-year period (Ontario Minister of Finance, Cost of Debt-2024), the third column shows the S&P 500 Dividend Yield for each year as December 31 (12-month dividend per share/price) as per (S&P 500 dividend yield by Year, 2024 tables), the forth column shows the Net Debt in Ontario Province by year from 2013 to 2024 (Ontario Financing Authority, fifth column indicates the Ontario's Interest-on-Debt (IOD) from 2013 to 2024, sixth column shows the dividend payments based on Dividend yield S&P 500 if Net Debt is converted to Government Issued-securities (government equity) and last column shows dividend payments as a percentage of Interest-on-Debt (IOD) [18].

Table 8: Interest-on-Debt (IOD) versus Dividend payouts if Net Debt is converted to Government-issued-securities. Province of Ontario- Canada.

			Ontario Province -Canada	IOD vs. Dividend		
Year	Effective Interest Rate on Total Debt in Ontario Province					
(a)	Dividend Yield S&P 500- Dec.31. each year					
(b)	Net Debt (in $ millions)- Ontario Province					
(c)	Ontario Interest-On-Debt (IOD) (in $ millions)					
(d)	Dividend payments based on Dividend yield S&P 500 (in $ millions) if Net Debt converted to Gov. Equity					
e=(b x d)	Dividend as % of Interest-on-Debt (IOD)					
(e/d)						
1990	10.9%	3.68%				

Year						
1991	10.7%	3.14%				
1992	10.1%	2.84%				
1993	9.5%	2.70%				
1994	9.8%	2.89%				
1995	9.4%	2.24%				
1996	9.0%	2.0%				
1997	9.0%	1.61%				
1998	8.6%	1.36%				
1999	8.4%	1.17%				
2000	8.2%	1.22%				
2001	7.6%	1.37%				
2002	7.2%	1.79%				
2003	6.7%	1.61%				
2004	6.4%	1.62%				
2005	6.1%	1.76%				
2006	6.0%	1.76%				
2007	5.8%	1.87%				
2008	5.2%	3.23%				
2009	4.6%	2.02%				
2010	4.5%	1.83%				
2011	4.4%	2.13%				
2012	4.1%	2.20%				
2013	3.9%	1.94%	$276 169.00	$11 155.00	$5 357.68	48.0%
2014	3.7%	1.92%	$294 557.00	$ 11 221.00	$5 655.49	50.4%
2015	3.6%	2.11%	$306 657.00	$11 589.00	$6 464.13	55.8%
2016	3.5%	2.03%	$314 077.00	$11 727.00	$5 944.45	54.4%
2017	3.6%	1.84%	$323 068.00	$11 912.00	$7 056.32	49.9%
2018	3.6%	2.09%	$337 623.00	$12 385.00	$7 056.32	57.0%
2019	3.4%	1.83%	$352 382.00	$12 497.00	$6 448.59	51.6%
2020	3.0%	1.58%	$372 501.00	$12 296.00	$5 885.52	47.9%
2021	3.0%	1.29%	$382 842.00	$12 583.00	$4 938.66	39.2%
2022	3.2%	1.71%	$400 484.00	$12 389.00	$6 848.28	55.3%
2023	3.4%	1.50%	$414 814.00	$12 843.00	$6 222.21	48.4%
2024	3.4%	1 . 3 9 % (April)	$439 056.00	$12 843.00	$6 102.88	43.9%
Average years: 1990-2024	6.1 %	2.0%	Total years: 2013-2024	$132 597.00	$73 299.97	

As per table 1.8, based in our assumption if Net Debt is converted to Government Issued-securities (government equity) the dividend payments (based on dividend yield S&P 500) as a percentage of Interest-on-Debt (IOD) are in the range of 50% in the period 2013-2024 (from 1996 to 2012 Net Debt is not available). For each year, the dividend payout is almost half of the cost of interest-on-debt, which is a huge saving in billions of dollars for the Province of Ontario. For a 13-year period, from 2013 to 2024, the Government of Ontario could have paid dividend of only $79 billion, which converts to saving of more than $59 billion in taxpayers money if Net Debt was converted to Government Issued-securities ($132 billion interest on debt - $79 billion dividends Gov-issued securities = $59 billion savings) .

Conclusions

We have perceived how public debt and fiscal policy affects the real economy. A government can sustain the same level of debt by running small deficits forever for years and even decades, if

[2]The Government of the Province of Ontario could use the second option of paying dividends, based on the GDP annual/quarterly growth rate. We have that in 2023 the Province of Ontario growth rate was 1.2% and the total GDP for the same year was $852.7 billion. Therefore, if the Net Debt (in $ millions) of the Ontario Province was $414 814 in 2023 as per Table 1.8, and using a base dividend of 1.2% based on the annual GDP growth rate, then the dividend distribution to government-issued security shareholders should be $4 977.01 (in $ millions) which is even lower then $6 222.21 (in $ millions) dividend based on the S&P 500- for 2023 at 1.5%.

GDP is increasing, because GDP is a close substitution for the tax base. There is a positive impact on public debt when GDP is growing. The higher the GDP the higher the tax base of the government and the higher the level of economic growth which can result in more additional debt government can take on each period. However, there is also the risk that large accumulation of government debts can drag the economy into recession. If this happens the investors could lose confidence in the Government's ability to control large amounts of debt and could ask for higher interest rates for government bonds.

As a result, this could increase further the public deficit and increased borrowing turning into a debt spiral, which could require sudden change in fiscal policy such as government spending cuts or tax increases which could hurt a large portion of the population. The fiscal policy has tried to create a trade-off between the commitment to keep under control spending in prosperous periods and to have flexibility to react quickly during economic shocks and financial crisis using some optimal fiscal rules, such as escape clauses, etc.

In this paper we introduced a new theory on how the Government Sovereign debt could be converted to Government Shareholder's Equity. The scope of government-issued securities was to help heavily indebted developing countries to reduce the debt-to-GDP ratio by converting the debt-raising capacity to a hybrid debt-securities-raising capacity to translate the borrowed money into economic growth keeping inflation stable and at the same time trying to raise large funds to invest in infrastructure and elevate the level of the household's standard of living. The government-issued-securities raising method, regarding government spending is advised to be used for Discretionary Spending such as transportation and infrastructure and not much for Mandatory Spending such as social security programs and education which should be covered by a combination of government debt and tax revenue.

In the last segment, we have seen that based on the different case scenarios the cost of government issued securities is always lower than the cost of public debt. This is a new path to explore on public debt which suggest that government issued-securities could help indebted developing countries reduce the debt-to-GDP ratio by converting the debt-raising capacity to a hybrid debt-securities-raising capacity which could be translated into economic growth by raising large funds to invest in infrastructure at less cost [19-25].

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Appendix

Table 1: Amortization schedule 1 Loan terms: Loan amount =$9 billion loan; loan term =38 years, Interest rate = 3.125%, compound – annually (APY), Pay back = every year.

Year	Beginning Balance	Interest	Principal	Ending Balance
1	9 000 000 000.00	279 462 919.13	125 477 796.31	8 874 522 203.69
2	8 874 522 203.69	275 485 084.85	129 455 630.59	8 745 066 573.09
3	8 745 066 573.09	271 381 147.26	133 559 568.18	8 611 507 004.91
4	8 611 507 004.91	267 147 108.70	137 793 606.74	8 473 713 398.17
5	8 473 713 398.17	262 778 844.77	142 161 870.68	8 331 551 527.49
6	8 331 551 527.49	258 272 100.32	146 668 615.13	8 184 882 912.36
7	8 184 882 912.36	253 622 485.31	151 318 230.14	8 033 564 682.22
8	8 033 564 682.22	248 825 470.54	156 115 244.91	7 877 449 437.31
9	7 877 449 437.31	243 876 383.20	161 064 332.24	7 716 385 105.07
10	7 716 385 105.07	238 770 402.38	166 170 313.07	7 550 214 792.00
11	7 550 214 792.00	233 502 554.31	171 438 161.14	7 378 776 630.86
12	7 378 776 630.86	228 067 707.55	176 873 007.89	7 201 903 622.97
13	7 201 903 622.97	222 460 568.10	182 480 147.44	7 019 423 475.53
14	7 019 423 475.53	216 675 673.73	188 265 041.71	6 831 158 433.82
15	6 831 158 433.82	210 707 389.64	194 233 325.81	6 636 925 108.01
16	6 636 925 108.01	204 549 901.99	200 390 813.46	6 436 534 294.56
17	6 436 534 294.56	198 197 212.74	206 743 502.70	6 229 790 791.85
18	6 229 790 791.85	191 643 133.73	213 297 581.72	6 016 493 210.14
19	6 016 493 210.14	184 881 280.58	220 059 434.86	5 796 433 775.27
20	5 796 433 775.27	177 905 066.55	227 035 648.89	5 569 398 126.38
21	5 569 398 126.38	170 707 696.08	234 233 019.37	5 335 165 107.01
22	5 335 165 107.01	163 282 158.17	241 658 557.28	5 093 506 549.73
23	5 093 506 549.73	155 621 219.57	249 319 495.88	4 844 187 053.86
24	4 844 187 053.86	147 717 417.73	257 223 297.71	4 586 963 756.14
25	4 586 963 756.14	139 563 053.53	265 377 661.92	4 321 586 094.23
26	4 321 586 094.23	131 150 183.75	273 790 531.69	4 047 795 562.54
27	4 047 795 562.54	122 470 613.39	282 470 102.05	3 473 900 632.68
28	3 473 900 632.68	113 515 887.64	291 424 824.81	3 473 900 632.68
29	3 473 900 632.68	104 277 283.65	300 663 431.80	3 173 237 200.88
30	3 173 237 200.88	94 745 802.06	310 194 913.38	2 863 042 287.50
31	2 863 042 287.50	84 912 158.22	320 028 557.23	2 543 013 730.27
32	2 543 013 730.27	74 766 773.12	330 173 942.32	2 212 839 787.95
33	2 212 839 787.95	64 299 764.10	340 640 951.34	1 872 198 836.60
34	1 872 198 836.60	53 500 935.21	351 439 780.24	1 520 759 056.37
35	1 520 759 056.37	42 359 767.24	362 580 948.20	1 158 178 108.16
36	1 158 178 108.16	30 865 407.55	374 075 307.89	784 102 800.27
37	784 102 800.27	19 006 659.42	385 934 056.02	398 168 744.25
38	398 168 744.25	6 771 971.20	398 168 744.25	0.0

Table 2: Amortization schedule 2 Loan terms: Loan amount =$5 billion loan; loan term =38 years, Interest rate = 3.125%, compound – annually (APY), Pay back = every year.

Year	Beginning Balance	Interest	Principal	Ending Balance
1	5 000 000 000.00	155 257 177.29	69 709 886.84	4 930 290 113.16
2	4 930 290 113.16	153 047 269.36	71 919 794.77	4 858 370 318.38
3	4 858 370 318.38	150 767 304.04	74 199 760.10	4 784 170 558.28
4	4 784 170 558.28	148 415 060.39	76 552 003.75	4 707 618 554.54

5	4 707 618 554.54	145 988 247.09	78 978 817.04	4 628 639 737.49
6	4 628 639 737.49	143 484 500.18	81 482 563.96	4 547 157 173.53
7	4 547 157 173.53	140 901 380.73	84 065 683.41	4 463 091 490.12
8	4 463 091 490.12	138 236 372.52	86 730 691.62	4 376 360 798.51
9	4 376 360 798.51	135 486 879.56	89 480 184.58	4 286 880 613.93
10	4 286 880 613.93	132 650 223.54	92 316 840.59	4 194 563 773.33
11	4 194 563 773.33	129 723 641 28	95 243 422.85	4 099 320 350.48
12	4 099 320 350.48	126 704 281.97	98 262 782.16	4 001 057 568.32
13	4 001 057 568.32	123 589 204.45	101 377 859 .69	3 899 679 708.63
14	3 899 679 708.63	120 375 374.30	104 591 689.84	3 795 088 018.79
15	3 795 088 018.79	117 059 660.91	107 907 403.23	3 687 180 615.56
16	3 687 180 615.56	113 638 834.44	111 328 229.70	3 575 852 385.86
17	3 575 852 385.86	110 109 562.64	114 857 501.50	3 460 994 884.36
18	3 460 994 884.36	106 468 407.63	118 498 656.51	3 342 496 227.85
19	3 342 496 227.85	102 711 822.55	122 255 241.59	3 220 240 986.26
20	3 220 240 986.26	98 836 148.08	126 130 916.05	3 094 110 070.21
21	3 094 110 070.21	94 837 608 .93	130 129 455.21	2 963 980 615.01
22	2 963 980 615.01	90 712 310.09	134 254 754.04	2 829 725 860.96
23	2 829 725 860.96	86 456 233.09	138 510 831.04	2 691 215 029.92
24	2 691 215 029.92	82 065 232.07	142 901 832.06	2 548 313 197.86
25	2 548 313 197.86	77 535 029.74	147 432 034.40	2 400 881 163.46
26	2 400 881 163.46	72 861 213.20	152 105 850.94	2 248 775 312.52
27	2 248 775 312.52	68 039 229.66	156 927 834.47	2 091 847 478.05
28	2 091 847 478.05	63 064 382.02	161 902 682.12	1 929 944 795.93
29	1 929 944 795.93	57 931 824.25	167 035 239.89	1 762 909 556.04
30	1 762 909 556.04	52 636 556.70	172 330 507.44	1 590 579 048.61
31	1 590 579 048.61	47 173 421.23	177 793 642.90	1 412 785 405.71
32	1 412 785 405.71	41 537 096.18	183 429 967.96	1 229 355 437.75
33	1 229 355 437.75	35 722 091.17	189 244 972.97	1 040 110 464.78
34	1 040 110 464.78	29 722 741.78	195 244 322.35	844 866 142.43
35	844 866 142.43	23 533 204.02	201 433 860.11	643 432 282.31
36	643 432 282.31	17 147 448.64	207 819 615.50	435 612 666.82
37	435 612 666.82	10 559 255.23	214 407 808.90	221 204 857.92
38	221 204 857.92	3 762 206.22	221 204 857.92	0.0

Table 3: Government of Canada. Planned/Actual Sources and Uses of Borrowings for 2024-25 (billions of dollars)

Sources of borrowings	
Payable in Canadian Currency	
Treasury bills	$ 272.0
Bonds	$ 228.0
Total payable in Canadian currency	$ 500.0
Payable in foreign currencies	$ 8.0
Total sources of borrowings	$ 508.0
Uses of borrowings	
Payable in Canadian Currency	
Treasury bills	$ 267.0
Bonds	$ 147.0
Retail debt	0

Total refinancing needs	$ 421.0
Financial requirement	
Budgetary balance	$ 40.0
Non-budgetary transactions	
Pension and other accounts	(-$ 6.0)
Non-financial assets	$ 5.0
Loans, investments, and advances	
Loans to enterprise Crown corporations	$ 42.0
Other	$ 6.0
Othe Transactions	$ 16.0
Total financial requirement	$ 102.0
Total uses of borrowings	$ 523.0
Net increase or decrease (-) in cash	(-$ 16.0)
Change in other unmatured debt transaction	0

Source: Department of Finance Canada calculations - https://budget.canada.ca/2024/report-rapport/anx2-en.html