

WORLD BALANCE SHEET

GLOBAL ASSETS AT A GLANCE



HARALD DEUTSCH

WorldBalanceSheet.org

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Office of the Publisher, WorldBalanceSheet.org,
Am Wasserbett 12, 68526 Ladenburg, Germany
Email: pubrights@worldbalancesheet.org

ISBN: 978-3-9821906-0-0

eISBN: 978-3-9821906-1-7

1st edition 2020

The German National Library catalogs this publication in the German National Bibliography. Detailed bibliographic information can be found on <http://dnb.ddb.de>.

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In 2019, he founded WorldBalanceSheet.org, where he currently serves as president.

WorldBalanceSheet.org is a non-profit think tank that focuses on scientific works on general global economic issues that are insufficiently covered by other sources. Real economy matters are particularly studied, which are independent of political-economic systems. WorldBalanceSheet.org is uncompromisingly focused on pure professional and academic standards; it is independent and unpolitical. Its members are comprised of economists and academics of various disciplines. This book is the first publication supported by WorldBalanceSheet.org.

Acknowledgments

I would like to thank the members of WorldBalanceSheet.org who played central roles in ensuring the quality and impartiality of this work. Their support was crucial for the success.

I would like to thank Clemens Deutsch for his dedication in providing his analysis of the world's pension systems that formed the cornerstone of Chapter 8.2 Pensions. Furthermore, he has spent many hours discussing intricate analytical and numerical issues with me. Peter Heupel gave important insights into Chapter 5 Property, specifically for subsoil assets and urban land. Laurenz Rath contributed his expertise in fixed assets to improve Chapter 6 Plant, Equipment, Inventories. Furthermore, Vincent Druffel-Spinola supported general quality improvements. I thank the whole team for their contributions, discussions, and recommendations.

Furthermore, I would like to thank some deep thinkers who influenced and motivated me for this work. Professor in Economics of Innovation and Public Value at University College London, Mariana Mazzucato focused her unrivaled work on central issues about the value, challenging the scientific community. WorldBalanceSheet.org was founded to deal with some of these challenges. Professor in Money and Macroeconomics at the University of Frankfurt, Michael P. Evers was patient in our discussions. He helped me to understand important economic concepts in this work and their limits. Deputy Director General International and European Relations of the European Central Bank, Livio Stracca helped me integrate monetary theory and central bank policies.

Finally, I would like to thank my family for their patience and support. My son, Lars, leveraged his technical experience to improve our web presence. Most importantly, my biggest thanks go to my wife, Yvonne, for her unwavering support and encouragement, not to mention the regular supply of delicious food. I could not have done this work without you.

Abbreviations

BIS	Bank for International Settlement
CAGR	Compound annual growth rate
CFA	Commodity flow analysis
DB	Defined benefit plan
DC	Defined contribution plan
EC	European Commission
FAO	Food and Agriculture Organization of the United Nations
FED	Federal Reserve System
FTE	Full-time equivalent
GDP	Gross domestic product
GIFT	Global Intangible Finance Tracker
GNI	Gross national income
ICT	Information, communication, and telecommunications
IP	Intellectual property
IT	Information technology
IFPRI	International Food Policy Research Institute
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
IMPACT	International Model for Policy Analysis of Agricultural Commodities and Trade
NGO	Non-governmental organization
NPV	Net present value
NWFP	Non-wood forest products
OECD	Organisation for Economic Co-operation and Development

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P+L	Profit and loss statement
PIM	Perpetual inventory method
PMI	Post-merger integration
PPP	Purchasing Power Parity
PWT	Penn World Table
SALM	Sovereign asset and liability management
SEEA	System of Environmental-Economic Accounting
SEEA-CF	System of Environmental-Economic Accounting– Central Framework
SIPRI	Stockholm International Peace Research Institute
SME	Small and medium-sized enterprise
SNA	System of National Accounts
SOE	State-owned enterprise
SPDR	Standard and Poor's Depositary Receipt
tn	trillion
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
US GAAP	Generally Accepted Accounting Principles in the US

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1

Executive Summary

Why do we need a World Balance Sheet?

The composition and distribution of global wealth are among the most frequently discussed topics today. But what do we really know about the world's capital? To the best of our knowledge, this book is the first to produce a financial balance sheet of the world. We address the following core questions at the heart of the global economy. What is the value of global capital? How is it composed? Does it sustainably support humankind's standard of living?

Why is this work new? Traditionally, the world economy is not measured. National economies are measured; global values are created as summations of all country values. And the economic strength is primarily measured by production. Gross domestic product (GDP) is the key metric; balance sheets are not a typical tool for managing economies. This history has led to the surprising finding that, in 2020, an integrated balance sheet of the world has not been established in the universe of economic data surrounding us.

Thus, why is a World Balance Sheet important? Firstly, in a real economy, global assets are the world's production factors that

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generate all economic outputs. What is the importance of these production factors and their relative contribution? Do we see changes, potentially declines? What does it take to promote them? Do we see structural changes that we need to address with structural answers?

Secondly, from a political-economic perspective, the world's assets encompass everything around us - our house and the streets surrounding it, our car, the company we are working for, our children's school, and the work of our hands. Are all of these in good order? Are there issues to be politically addressed?

We cannot manage what we do not measure. Therefore, we need to measure the world's capital.

World Balance Sheet: Numerical outcome

In chapters 3–10, we develop a structure and construct numbers for the World Balance Sheet, as shown in Fig. 1. As of December 31, 2018, the world's total capital is 1,497.46 trillion USD (2014), of which 45.9% (687.52 tn USD) are commercial assets and 54.1% (809.94 tn USD) are human capital. This total capital supports the world's current consumption with future annual growth of 1.13%. We are cautiously confident that despite certain inaccuracies, the total results are reliable within a confidence interval. No major capital gaps remain since consumption and total assets are balanced.

The key learnings of our study are the following:

- Land value is strongly concentrated. That is, urban land represents 65% of the land's value but less than 1% of the area. Furthermore, 32.2% of the value is attributed to agricultural land. The huge price differences drive conversion into urban land (urban sprawl) and transformation of forests and protected areas into agricultural land. This value concentration has increased in the past years.

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World Balance Sheet December 31, 2018 (in tn USD)	
Assets	1,497.46
Fixed assets	638.99
Property	184.01
Land	132.09
Cropland	26.45
Pasture land	16.06
Forest	2.69
Barren land	1.00
Urban land	85.89
Subsoil assets	51.91
Oil	30.79
Gas	3.73
Coal	6.85
Minerals (10)	10.54
Plant	260.27
Dwellings	119.84
Other buildings	140.43
Equipment	50.73
Commercial equipment	41.98
Military equipment	8.74
Intangible assets	143.99
Goodwill	117.63
Listed companies, disclosed	8.00
Listed companies, acquired	35.92
SMEs, acquired	72.73
SOEs, acquired	0.99
Intellectual property	20.76
Brand value, licenses	5.60
(Global governance)	(4.88)
Current assets	48.54
Inventories	46.90
Commercial inventories	17.54
Consumer durables	29.36
Cash and cash equivalents	1.64
Monetary gold reserves	1.41
Gold SPDR holdings	0.10
Crypto currencies	0.13
Human capital	809.94
Liabilities and Equity	1,497.46
Consumption (@1,13% CAGR)	1,497.46

Figure 1: World Balance Sheet

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- Subsoil assets are still relatively low-value; only oil represents a major value. Mining is more attractive than recycling given the low relative value of minerals. The growth of this asset class is similar to that of the world economic growth (except coal, which slightly declines).
- Tangible assets, such as buildings, equipment, and inventories, represent approximately half of the commercial assets. However, they are highly concentrated in cities in advanced economies.
- Intangible assets amount to 143.99 tn USD. This significant position stems from the evaluation of the world's intangible assets in more than 200 million companies.
- Human capital forms the largest part of the world's total capital. However, its relative share is diminishing. The share of commercial capital grows, which is driven by volume increases as well as by price increases (asset inflation).
- The world's total assets support the consumption level of humankind with a growth rate of 1.13%. This rate is less than the average growth of the past years (2.74%) due to two factors. Firstly, natural resources (e.g., forest and seas) are overexploited, resulting in declining values. Secondly, the gradual growth in human capital is mainly due to the ageing population in industrial countries. Both have a diminishing effect on consumption growth.

Key points in economic theory and statistics

Methodologically, we develop the World Balance Sheet using two balance sheets. We first introduce the thought experiment of World Inc., where they acquire all global organizations, assets, and everything of commercial value. Then, they consolidate all these acquisitions in their balance sheet, in which International Financial Reporting Standards (IFRS) rules are applied.

However, World Inc.'s balance sheet cannot comprehensively account for the world's capital. We need to consider the balance sheet of World Inc.'s shareholders who comprise all private households

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constituting the humankind. This balance sheet is complementary to that of World Inc. with regard to asset classes and value drivers. The humankind owns its human capital, and the entire equity of World Inc. It needs, however, to fund its future consumption. Therefore, the rules of household balance sheets are applied. We apply one homogeneous methodology, outlined in chapters 3 and 4.

The core theoretical learnings are the following:

- The global economy is a closed economy. Only one globe exists, which has no external trade. Our primary global view allows the application of global accounting identities, which is not possible in national accounting. This leads to important structural insights.
- A list of natural assets emerges, which constitutes the World Balance Sheet's structure. This finding is important considering that previous studies about the world's capital used various scopes and methodologies, leading to different and arbitrary asset structures. However, the World Balance Sheet's asset list is not our arbitrary design. This asset list forms a natural subset of all IFRS asset classes.
- Large intangible assets are a challenge to economic theory. Although these assets are intangible in nature, they form a part of real economy. The market value of more than 200 million companies exceeds their book value by more than 100 tn USD, mainly accounted for as goodwill. However, what capital does this goodwill represent on a collective level? Statistical data quality and scientific activity are not in accordance with the significance of this asset class.
- Financial assets are not involved in the World Balance Sheet due to accounting identities. All economic activity happens and is funded in the present. Debt is irrelevant in the real economy. A burden for future generations is not created; this situation is only a popular illusion.
- Only a few money types remain in the World Balance Sheet, namely, gold and truly produced cyber currencies, such as Bitcoin, whose role is limited quantitatively. All national

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currencies, as fiat currencies, vanish due to accounting identities.

There are also insights into data sources and their quality.

We utilized more than 100 sources, which are aligned with our selected approach. Data gaps and accuracy risks are discussed in detail in Chapter 4. Based on this assessment, we have set up a three-tier architecture of the sources used that is headed by the World Bank, United Nations (UN), and International Monetary Fund (IMF).

In general terms, we find accuracy risks higher than typically discussed in economic literature based on the following concepts:

- Many economic statistics are fraught with spurious accuracy. Contrary to science, economic data are not provided with error bars and confidence intervals as they focus more on precision than on accuracy.
- The system of national accounts (SNA) is Janus-faced. It is the dominant accounting framework of international economic statistics and therefore the most important data source for this study. However, we find it only partially usable for our work.
- Firstly, it focuses on production, not on assets, and assets are indirectly modeled, not directly measured. Furthermore, the applied modeling methods are partly obsolete and overly simple. The use of these methods, along with slow and incoherent reporting, leads to considerable accuracy risks.
- Secondly, SNA's concept of asset is not identical to that of IFRS. This difference is particularly significant for government- and consumer-owned assets and also for specific asset classes (e.g., intangible assets).
- With regard to public capital, the differences between SNA and IFRS's treatment on public assets cannot be easily bridged. A valid consistent theory frankly is not existing. In Chapter 4.4. possible levers for improvement are discussed.

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- Major positions in the World Balance Sheet have limited data sources and are not appropriately covered by literature, for example, urban land, military equipment, intangible assets, and consumer durables.

Takeaways for political economy and beyond

Although we focus on the real economy and its accounting, not on the political economy, some interesting findings are relevant for political decision-makers.

Firstly, ecological challenges are emerging in the world's capital structure. In a commercially conservative manner, we have consciously refrained from accounting for ecological services (see Chapter 5). Still, the value of forests is falling. The seas' value is neglectable because fishing revenues are outweighed by ecological issues and the lack of global governance. An economically reasoned concept for defending the value of those assets is missing, yet. Here, the output-oriented SNA results in disadvantages for political decision-making.

Human capital seems to diminish compared with commercial capital. Total capital's quota of 54.1% has fallen in the last years and is expected to decline further due to several factors. Human capital is mainly contributed by high-income countries, where labor force ages and real wage growth tends to be flat. Recently, several authors reported that the share of labor income compared with capital income is falling which is supported by our results.

Inequality may progress more than publicly perceived. As the most evenly distributed asset, human capital is in relative decline, whereas commercial assets, particularly property and intangible assets, have a higher growth rate than the overall economy. A post-industrial knowledge economy arises: Software substitute tangible products. Intellectual property (IP) substitutes plants. Tangible assets are substituted by intangible assets. However, these asset types are most concentrated, that is, only a few own these assets. Therefore, the secular growth of these asset classes drives inequality. However, this concern cannot be handled by conventional

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social contracts any more. The tools of the industrial society do not suffice to manage the post-modern labor-capital relationship. These tools were developed during the 19th and 20th centuries, e.g., workers' councils and labor unions. Social engineering tools for the new rising asset classes are waiting for their development.

Intangible assets pose a theoretical challenge in this context. At present, they account for 9.6% of the total capital and 20.9% of commercial assets. However, intangible assets are poorly understood and patchily reported. What capital do intangible assets, particularly goodwill, reflect?

To address these questions, additional improved data are required. The earth's surface (511 million km²) has been known with great accuracy for centuries. However, we cannot determine the world's total capital (i.e., 1,497.46 tn USD) earlier than now. We cannot expect the numerical results of this first World Balance Sheet to be completely accurate in every detail. Rather, the overall accuracy is probably not much better than a few percentage points that need to be refined.

Government balance sheets need to be created; physical inventories need to be conducted. Unmonitored sizeable assets require considerable attention, for example, urban land, non-listed companies, public assets, military equipment, and consumer durables.

Although expensive global science projects such as Human Genome and Human Brain are conducted, no such projects for human wealth have been created. This is not appropriate as we cannot manage what we do not measure. Therefore, a global data capturing project for human wealth should be set up.



2

Introduction

“If we cannot define what we mean by value, we cannot be sure to produce it, nor to share it fairly, nor to sustain economic growth.”

(MARIANA MAZZUCATO 2018, XIX).

2.1 MEASURING THE VALUE OF THE GLOBAL ECONOMY

We live in a world shaped by global capitalism. The importance of the economy to the people is evidenced by the abundance of financial and economic data. The news reports daily about capital markets and financial transactions. People deal with thousands of financial figures everywhere, and every day. Every economic item seems to be measured, reported, and managed.

However, this is not true. A closer examination shows that economic data are amassed based on two principles.

The first principle is fragmentariness. The scope of each economic statistic is limited a priori because it contains information about a country, a company or a political institution. Only in favorable cases, global data are available. These data are then integrated

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ex-post from hundreds of country data. The economy does not have a primary global view.

At the end of the 15th century, globes were invented, which have allowed immediate intellectual access to a primary global view of the world. Although unknown areas can be seen on the globe as white spots, it was clear from the beginning that the Earth is round, what size the white spots were, and where they were located. Global perspective has been encouraged from scratch.

Economically, we still live in the cartographic world of the 14th century. Our world map of economic data is flat and glued together from regionally drawn partial maps. It is rarely clear, if you see the entire world or only a part of it. Do you need 41, 141, or all 194 countries to sum up a worldwide statistic? Where are the economic white spots? Are they sizeable? If you closely examine our economic world map, you can see all the junctures, slightly different scales, and styles of various economic cartographers.

And secondly, economic data are centered about value flows. Economic output is in the focus. That is, how much revenues and profit a company generates? What is the GDP of a country? What tax revenues does this GDP generate? Statistics and data about the foundations of the economic machine, their capital structure and assets, are limited.

However, a true global view of the world's capital structure is indispensable due to certain reasons.

Firstly, the real economic perspective exists. The world's assets are the production factors of global businesses. Judgment of every business requires two views, namely, the profit and loss statement (P+L) and the balance sheet. P+L gives evidence about the output, whereas the balance sheet shows the basis of this output. What are the production factors for the world's economy? What is their relative importance? How do they develop over time? What can we do to influence their development? Is it sufficient to address single developments, or do structural changes in the world economy require structural answers?

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Secondly, in a political–economic perspective, global assets encompass everything of value surrounding us. Thus, are these values in good shape? The collapse of the Soviet Union and the communist economic system was initially noticeable in the erosion of infrastructure, the overexploitation of natural resources and the growing innovation gap. All of this means a huge decline in the capital base. This situation went unnoticed because this capital base was not adequately measured. Almost all observers from the west and east in 1989-1990 were not only surprised by the political developments, but also by the massive erosion of the economic structures, which led to an immediate and unexpected economic collapse. No valid capital figures had alerted these observers beforehand.

How is the situation today in our capitalistic world? Do we have well-maintained infrastructure, buildings, and equipment? Do our natural resources have high economic value? Therefore, what ecological measures are economically appropriate for the world community? What is the role of human capital? Does humankind have capable labor power, or does it need measures to nurture the resources through educational and healthcare efforts? Output centrality holds that melting the family's silver and selling it could be a sustainable source of income. Obviously, this is a misperception. Is there any recent rational evidence that we may melt some silver of the humankind? If so, we should take actions to measure it.

Ignorance of global capital structure entails not only risks but opportunity costs. What are the quantitative roles of new forms of economy derived from the Internet, software, and the knowledge society? What is the contribution of intangible assets? How can these better be exploited?

Therefore, we ask: What is the world's capital?

Surprisingly, no answer has yet been given. Instead, several partial responses were given from two perspectives.

Since Adam Smith wrote his famous *Wealth of Nations*, a governmental, a national view on the world's assets has been established.

(Finally, the title of the book was neither *Wealth of the World* nor *Wealth of the Humankind*.)

Which wealth do the nations control? Recently, scholars of the World Bank have given their answer in their latest report on *The Changing Wealth of Nations 2018* (Lange, Wodon, and Carey 2018). According to the World Bank, nations control natural resources and fixed assets. In this perspective, the world's commercial capital amounts to 411 tn USD (2014). Shares or bonds are not within the scope of nations; these are managed by wealthy individuals.

Consequently, the perspective of wealthy individuals is represented in studies, such as the wealth reports published annually by Cap Gemini, Allianz, BCG, and other consultancies and financial institutions (Brandmeir et al. 2018; CapGemini 2018; Shorrocks 2018; Zakrzewski et al. 2018). Which wealth do the wealthy own? The wealthy possess shares, bonds, and real estate. Depending on the source and detailed scope, these accounts range from 160 tn USD to 210 tn USD (2018) globally. The wealthy do not own natural resources or human capital; these accounts are managed by the World Bank.

Global wealth perspectives differ in scope, methodology, and data sources. Asset categories and their definition vary among studies, already on their highest levels. That is, the fundamental question of what is capital and how it is composed has no agreement. Resulting figures diverge substantially, and cannot be easily compared.

This situation is not irresolvable. The value of the global economy can be measured using three methodological levers. Firstly, a helicopter view is applied as it covers all global assets, ideally without exception. Secondly, a simple, homogeneous, and standardized methodology beyond scientific disputation is required. Lastly, sufficient and reliable data sources are needed for quantitative computation.

Using the helicopter view, we observe the world and its various assets accounted by the World Bank and wealth reports as having no value. These assets are the white spots in the world's global

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wealth maps. What is the value of more than 30 million km² barren land? What is the value of unexplored subsoil assets? What is the value of the world's cultural heritage, such as the Acropolis and the Colosseum? What is the value of the world's military equipment, such as warships and tanks? What is the value of more than 1 bn used cars owned by private households? What is the value of more than 200 million private businesses beyond book value?

Thus far, the mainstream answer of global data aggregators in these and other instances has been zero. This finding is not satisfactory. Of course, the neglect of many assets is not compulsory.

The widely spread neglect is partly driven by the applied methodology. The dominant methodology in global accounting is the system of national accounts (SNA). However, this accounting model is only partially useful for any capital measurements. Assets belong to individuals, not to nations.

Therefore, commercial accounting dominates theory and practice of real existing capitalism, not national accounting. When the Italian mathematician Luca Pacioli described double-entry accounting in his best-selling book in 1494, it had been in use already for at least 200 years. Since then, commercial accounting has spread throughout the world and has proven beneficial and reliable for commercial activities, irrespective of the political-economic system. This method includes the evaluation of a multitude of assets. Therefore, we use commercial accounting as defined by the IFRS as the basis for evaluating the world's assets. We apply this methodology by acquiring all assets like a merchant would do.

Finally, sufficient data provision has been established only recently. Most studies used as data sources have been created in the last four years. Only five years ago, this work would have been impossible due to insufficient data.

2.2 OBJECTIVE OF THIS WORK

To **create** a financial balance sheet of the world economy **covering** all assets **using** a homogeneous, simple, and well-defined methodology.

2.3 STRUCTURE OF THIS BOOK

Chapter 3 introduces the thought experiment of World Inc., acquiring all global organizations, buying all global assets, and consolidating all economic values in its balance sheet. We find that in a fiat money system, this process can be financed by a central bank. Thus, the thought experiment can be conducted in principle. We set up the principles of the acquisition: We buy at market prices; and we do not alter the world economy as it is. Furthermore, we define the principles of the consolidation process, and we consolidate according to the IFRS framework, without loss of generality.

We find that IFRS categorizes two asset classes, namely, monovalent and bivalent assets. Monovalent assets are reported in only one balance sheet, for example, as inventories. They are acquired once by World Inc. and are reported in the final balance sheet at market prices. In contrast, bivalent assets are reported in two balance sheets (as asset and liability, respectively). They should theoretically offset due to accounting identities and are subject to the balance sheet consolidation process.

Chapter 4 gives an overview of the most important data sources and literature. It further briefly describes the SNA and its partial usefulness for this work. However, SNA has certain limitations by design, which include focus on production (not assets), built-in issues in the treatment of governmental and household assets, limited international homogeneity, and inconsistent and delayed reporting. Therefore, SNA data do not cover all asset classes, and data accuracy shows caveats. Furthermore, data sources are introduced and qualified. Weaknesses of data provision are highlighted. We find, that weaknesses of data availability are accompanied by weaknesses of theoretical foundations, for example, in the areas of

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unexplored natural resources, public assets, intangible assets, and consumer durables.

Chapter 5 examines monovalent assets, particularly land and subsoil assets. We will develop methodology and data, which rely partly on significant and detailed work of the World Bank. Some accounting issues are also highlighted. For instance, unexplored subsoil assets and land (e.g., sea grounds and polar regions) are not well-reflected in mainstream data sources. In general, the value of property can be evaluated comparably well, except for urban and barren land.

Chapter 6 is dedicated to the monovalent asset classes categorized as plant, equipment, and inventories. Data are collected from SNA and refined by the UN, World Bank, IMF, Organisation for Economic Co-operation and Development (OECD), and other organizations and authors. SNA names these asset classes as produced assets. This basis needs to be complemented with specific analyses of military equipment and consumer durables, which are underreported in SNA.

Chapter 7 discusses intangible assets and focuses on companies acquired by World Inc. These include listed companies, but as well all private businesses and state-owned enterprises (SOEs). Intangible assets, which are openly defined, include monovalent assets such as brand value, IP, and licenses. These assets are held in company balance sheets. However, intangible assets also include goodwill, which results from the consolidation of the bivalent asset class equity. The discrepancy between market value and book value of equity remains in World Inc.'s balance sheet as goodwill. Due to the large number of acquired companies, goodwill accounts to approximately one-sixth of World Inc.'s assets.

Chapter 8 discusses consolidation of bivalent assets. These accounts are acquired by World Inc. as assets and liabilities. The consolidation process does not always lead to offsetting (as one would expect from accounting identities). Instead, consolidation

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of debt, and consolidation of pensions lead to remaining balance sheet entries.

Chapter 9 treats the asset class cash and cash equivalent - money, in economic terminology. Also, the world's central banks, with their large balance sheets, are acquired by World Inc. However, this asset class has low value, because all national currencies of the world are fiat currencies. This phenomenon makes them bivalent assets that offset during the consolidation process. Only cyber currencies, such as Bitcoin, remain, which are monovalent (truly produced) assets. Furthermore, monetary gold is also accounted for as cash equivalent.

Chapter 10 - Synthesis - consolidates the results of the previous chapters as World Inc.'s balance sheet is complete. Shareholders' perspective is added by introducing the Balance Sheet of Humankind. The humankind finally possesses their human capital, pension claims, and all World Inc.'s equity. In theory, their assets should equal the net present value (NPV) of their consumption. Empirically, this can be confirmed. Based on previous work of the World Bank our computation shows that the world's total assets support the foreseeable consumption, even with a compound annual growth rate (CAGR) of 1.13%.

No asset gaps remain. Therefore, we are cautiously confident, that despite the different sources of inaccuracy the total results are reliable within a confidence interval.

Chapter 11 – Outlook - gives an overview of the theoretical implications of this work and provides an opportunity for future work in some areas. Although the difference between monovalent and bivalent assets is fundamental, value theory does not appropriately cover such difference. Also, the theoretical foundations of intangible assets, public capital, and quantitative easing need further investigation.

Furthermore, data reliability needs to be improved and data source errors diminished. Within the SNA, measurement of existing value needs more focus. Government balance sheets need to be created;

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physical inventories need to be conducted; and accounting models with questionable accuracy (e.g., perpetual inventory method [PIM], commodity flow analysis [CFA]) should be eliminated.

Ideally, a global data capturing project for human wealth should be set up.