Macroeconomics of Impractical Prescriptions

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The Time Dimension Completely Missing in Diagnoses

By

Y.D. Ahn

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PREFACE

In various respects, we may name the "Cambridge Quantity equation" as one of the keystones of present-day macroeconomics. If something is wrong with the discipline as empirical science, we may finger-point the equation among others.

Regretfully, there are in the practice of macroeconomics many fundamental flaws including all the follies in the IS-LM model. A root cause for those flaws seems to be overemphasis of money. Another is overreliance on mathematics. To borrow from Confucius and Aristotle, excessiveness is as vicious as shortness (过犹不及, *guòyóu bùjí* in pinyin).

To us in economics, both *money* and *mathematics* are no more than instruments of convenience. Money does not make any difference in kind but some in degree when used as a medium in market trade. Mathematics is no more than a collection of expedient devices: we must reach the same conclusion with or without it. The Cambridge proposition was in a mathematical equation on the quantity of money, and nevertheless has become the critical mass of macroeconomics.

Historically, a handful of famous economists treated money as a "veil" while almost never used mathematics. Nevertheless, they are no less influential than other economists. Ever since the dividing decade of the 1930s, macroeconomists have relied on those two instruments, probably way too much. By now, a century into the new epoch, macroeconomics appears to be in great disarray while putting the innocent in dismay.

Money first: This "artificial sovereign device" is the most current of all mediums in public exchange of anything anywhere, but may cause a disaster when abused by the public sector. In academia, money does produce a lot of confusion to us students of economics as it is overused and misused, especially as "preferred liquidity," by macroeconomists.

Back to the Cambridge Quantity equation in a modernized form: $\underline{M=k\cdot(P\cdot Y)}$. Among other defects, the equation suffers from *dimension aberration*, or a mismatch in dimensions between the left- and right-hand sides.* There is no easy way to relate with a constant (k) a stock of

Y for real GDP and *P* for price level). With mathematics rightly applied, the link "*k*" would be a "variable" representing the duration of time.

For instance, we in the private sector earn money working on the ground, rarely in "thin air," before meeting "demand for money," as it is called in macroeconomics. Naturally, the money accumulated to date (*M*) depends not only on the annual earnings ($\underline{P \cdot Y}$) but also on the number of years (*k*) on the run. If "*k*" were a constant with no regard to the time period, the Quantities on the two sides of the equation would match at most once a year. Macroeconomics is so critically misconceived.

"Money is of no use to us until it is spent" (Irving Fisher, The Theory of Interest). Closer to the point, money is somewhat inconvenient to hoard but becomes swiftly current when empowered with a purchase and subsequently going for good.

When we find "incremental" money ($\underline{\Delta M/\Delta t}$ or just ΔM for short) in our hands due to benevolence of the public sector, we the rational try to "get rid of" the annoying rather quickly. As we rush to "spend" away the extra money of no use, GDP may increase (ΔY), prices may rise (ΔP) or interest rates may decline ($-\Delta i$).

Strangely, however, the IS-LM model, arguably the crown jewel of macroeconomics, posits a chain reaction $\underline{M \rightarrow i \rightarrow Y}$ with *P* constant. Above all, this sequence suffers from dimension aberration. The stock of money does not do anything: what stands still forever stands still. As such, hoarded money can in no way affect the economy.

Even more strangely, there is reverse causation vis-à-vis the Cambridge equation where $\underline{Y \rightarrow M}$. Needless to say, the Cambridge equation represents L (for liquidity preference) of the IS-LM. Apparently, the model is self-contradictory.

Second in line: Mathematics is the most expedient in calculation. Misused, however, it can lead us to an unintended world, wondrous or otherwise. As a matter of fact, miscomprehension of monetary affairs as above is partly due to a failure to differentiate between the two worlds, mathematic and economic.

By nature, mathematical equations are silent to *causality* between and *dimensions* of quantities. The two are quintessential in scientific reasoning which in turn is based on measurement of quantities, each in a particular metric of various dimensions.

More rudimentary, the "marginal" unit (1) in economics is usually small but never really a naught (0). In mathematics jargon, economic quantities are "discrete" as opposed to "nicely differentiable." For example, we can mathematically divide an apple into as many sub-units as we want, but even half an apple is not tradable in the market. In economics, "marginal" is more integral than differentiable.

All in all, between macroeconomic theories and realistic policy issues there is a gap in dimensions: most typically in the time dimension, for instance M vs. $\underline{\Delta M/\Delta t}$.* In addition, there is the mathematical trap such as taking dt for Δt. Overused "for the sake of convenience," both money and mathematics sometimes become counter-purposive: instruments would turn (out to be) the other edge.

In Part I, we rethink key misconceptions in macroeconomics including multiplier effect and real variables,* popular may they be after "carriage" as it were. Advanced propositions including IS-LM and AS-AD are scrutinized in Part II.

One commonality of all those errors and "fumbles" in Part I and Part II is that the market, the "micro-foundation" of the economy, is seriously misunderstood. Part III is to help comprehend the true and correct nature of the market in economics. The conclusion in Part IV is that anti-cyclical policies belong to political economy, more of an art than a science.

A few marginal words: "The market" is a metaphor instrumental in communicating public affairs of economy; the real time never flies across the spatial run but it everywhere elapses over the temporal run, short or long.

*Dimension Denotation

In physical sciences: T for time period, L for length in space and "M" for mass. Additionally in economics: U for value of utility; borrowed from W.S. Jevons, The Theory of Political Economy

Homogeneity:	T and L homogeneous; M heterogeneous
	U heterogeneous in private, yet homogenous in public

For example;

Utility, benefit, cost, worth and price: M·U
Product, "production factor" or asset, each eligible for exchange: M·U

Medium of exchange: M·U
Efficiency (or economy): $M \cdot U \cdot T^{-1}$ vs. physical productivity $M \cdot T^{-1}$
The sovereign currency name: U
Legal tender: U·m (m as public numeraire of mass)
M for money stock: U·m (*M* in italic for money)
$\underline{\Delta M/\Delta t}$ for money provision: $U \cdot m \cdot T^{-1}$ (*t* in italic for time variable)
Venue of the market: L^{-2}
The market price: U·m

Note: The negativity in dimension denotation is only for the purpose of accounting; for instance, T^{-1} means *per* period and L^{-2} *per* venue. In practice, the word "value" sometimes means a unit/scale/name (U) while other times worth (M·U).

PART I

CHIMERAS BETWEEN NOMINAL AND REAL

Macroeconomic indicators must be aggregated in monetary terms due to indefinitely diverse activities of households. For instance, monetary summation is the only way of adding three apples to five oranges. A great trouble with the inevitability of monetary aggregation is that the value of currency is subject to inflation.

Macroeconomists call monetary aggregates "nominal variables," while they define "real variables" for the purpose of removing the inflation effect. Here, *real* is supposed to mean "in physical quantities." Unfortunately, however, real variables are misconceived: they are nothing but indexes among other defects. Worse, theories in macroeconomics as an "empirical science" are constructed mostly with real variables. Worst, there would not be a "rigorously" economic way to test the so-claimed theories.

At any rate, there are nominal and real variables in the practice of macroeconomics. Researchers, practitioners and researcher-cum-practitioners, particularly from a couple of commonwealths sharing a certain name of city, quite frequently mix the "real" and the "nominal" together and propose "theories." Many of these have been unexpectedly popular and extraordinarily influential since the late 1930s inside and outside of the origins.

A case in point is the "real" aggregate saving (denoted as S). We in actual life can and do save *nominal* money from the spending budget and put it under a mattress. On the contrary, we cannot and never do that with *real* quantities. If we ever did, the very "saving" would be given another name, "investment" (I). In other words, we make real investment by way of real saving, or $\underline{S \equiv I}$. In this respect, the powerful concept of fiscal multipliers could possibly be born or stillborn as an odd mixture of real and nominal savings.

There are many other examples of the same kind, very much current in present-day macroeconomics. The eight chapters in Part I are related to

mismatching between nominal and real variables.

After all, the monetary prices are stringently real to *each* of us through life but "outside-shockingly" become nominal to *all* of us in macroeconomics. We might call such an outlandish phenomenon "fallacy of composition," as a matter of actual fact or just "for the sake of convenience."

To be realistic, in the first place, we must not forget that economics is not about quantities of physical mass ("M"), but the utilities (M·U) accounted for at the monetary price (U·m) "as revealed" in the market. Economics is one, physics is another.

CHAPTER 1

THE FANTASY OF FISCAL MULTIPLIER

Money, also called "liquidity," stands at the center of macroeconomics. We might attribute the errors and mistakes, if any, of macroeconomics, among other areas, to our great misunderstanding of money. In this opening chapter, we double-check for its real value the popular *claim* of the "multiplier effect," which appears to be the alchemy of monetary, financial and economic affairs.

Money is useless until it is spent, as Irving Fisher commented nearly a century ago.[1] Money is neither consumable as a good nor does it bear returns as an asset. Nevertheless, when employed for "spending" it becomes the medium of exchange, a type of currency. On the contrary, money when hoarded does not affect the economy in any way whatsoever. Worse, holding money is not only inconvenient but also unsafe as illustrated in the popular song *Ma Baker* in the 1970s.[2]

The only reason we carry sterile money around is to save "time and money," or more specifically transaction costs, required in transforming a return-yielding asset (financial instrument included) into currency at the spot where we need it. Hoarding money, we forego the return on an asset of choice but can save the transformation costs; or, the *benefit* of saving the transformation costs comes at the *cost* of forgoing the return on asset. Nevertheless, money on spending may affect the economy in certain ways.

At first, we revisit the functions of money as explained in economics textbooks. We come back in Chapter 7 to dimensions of *metrics*, a critical set of devices in diagnosing the economy. In Chapter 23, we discuss the optimal amount of money for us "preferably" to hold.

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[1] Fisher, The Theory of Interest, 5. See also Samuelson and Nordhaus, Economics, 458.

[2] In the middle of the song by the musical group Boney M, we can hear the shouting, "The money or your life," supposedly of the great robber Ma Barker or one of her four sons.

Functions of Money

Macroeconomists explain that money has three functions, namely, a unit of account, a medium of exchange and a store of value. This practice is somewhat misdirected. First, in the US, the dollar (U for utility value in dimension denotation), not the greenback, is the unit of account. As a matter of fact, the currency unit is the only possible metric in value accounting that can cover all the economic affairs in the commonwealth. Consequently, the dollar sign ($) must function as the unit of account.

Second, money maintains the same nominal value when stored, on the contrary to assets (M·U, "M" for mass in dimension) which make real returns. As we discuss in later chapters, households are forced to store some money, rarely for the purpose of voluntary investment. In other words, a "store of value" is if anything a side effect of storage "dictated" by our rational thinking.

Thus, a medium of exchange (M·U) might be named as the sole function of money in the market economy. One limitation, however, is that money loses its identity as a medium when stored. More specifically, hoarded money goes out of value (U^0) and becomes even less useful than scratch paper ("M" with miniscule U). In other words, money does not function as currency until employed in trade as purchasing power (M·U).

Much in the same vein, a laborer is not a human power until she is employed; even Taylor Swift is no real singer while she is writing a song-to-be. A machine ($M{\cdot}U^0$) is not a creative power (M·U; $M{\cdot}U{\cdot}T^{-1}$ to be precise as discussed later) until it runs for a certain performance; even the Hubble telescope is of no use when stored in response to "preference."

After all, the currency unit (U) is the name given in accounting while money has the potential to become the purchasing power (M·U) when hired at an exchange. We come back to the difference between the potential of a stock and the performance flow of a power in later chapters.

The National Income

Accounting as a profession is always in monetary terms, so it is given the popular name "financial accounting." Somehow, on the other hand, accounting in macroeconomics as a science is more or less an arbitrary combination of monetary, nominal and real terms. This particular practice causes lots of confusion and mistakes as will be made apparent.

Hereinafter, we take the "household" as the unit of analysis in the light that the firm, the community, the government and the commonwealth are instruments of our convenience (*cf*. Chapter 16). We call economic affairs in the commonwealth "the economy" or the macro-economy, as needed.

National income accounting. Em-*power*-ed money changes hands in trade of goods, services, rental contracts on factor powers, assets and many other objects. So the name "a medium of exchange" is given to money: for instance, I give this particular item in exchange for your money and vice versa. What is taken in return for money is in general an actual thing such as an apple, a haircut, a residential unit, crude oil, cryptocurrency, etc. In macroeconomics parlance, trade is expectedly between "nominal" money and a "real" quantity.

Of all traded real objects ready to be *finally* used, those freshly created in the accounting year are aggregated into gross domestic products (GDP, *Y* for yield as denoted in macroeconomics) in real terms. By construct, GDP is the aggregate "value added" by "production factors." This means that GDP must be the same as the aggregate factor incomes, or the gross domestic income (GDI, this "I" for income) in real quantities.

More specifically, value added is measured with labor and capital incomes paid out (ultimately to the households) in the creation process. In accounting for *value added*, raw materials are excluded in order to avoid double-counting. The GDP is sometimes called aggregate supply (AS) in macroeconomics.

In addition, due to the generally accepted accounting principles (GAAP), all the spending for GDP must be identical to the gross domestic income (GDI). The *aggregate spending*, or the gross domestic expenditure (GDE) in real terms, is sometimes called aggregate demand (AD).

In sum, we have GDP (Y)≡ GDE≡ GDI due to GAAP.[3] Three of them

[3] In macroeconomics, domestic means "within the sovereign territory," while national "of the given citizenship." For example, the gross domestic products (GDP) are defined in terms of territory while the gross national income (GNI) is of nationality. Naturally, the aggregate investment (*I*) is associated with GDP, while the aggregate saving (S) is with GNI. As a result, the official names are the "gross domestic investment" and the "gross national saving," respectively. Probably, this division is old-fashioned in the globalized environment of modern times.

The terms GDI and GDE are not macroeconomics jargon. If we assume a closed economy for the sake of abstraction, GDI= GNI. In the most basic macroeconomic equation $Y= C+ I+ G$, the right-hand side represents GDE.

must always be the same due to the way that double entry book-keeping is done. In the practice of macroeconomics, at any rate, the economy is said to be in "equilibrium" when and only when AD= AS.

Propensity to consume. Macroeconomists from time to time refer to the marginal propensity to consume (MPC), as defined to be the percentage of the incremental real GDI (ΔY) used for incremental consumption (ΔC, where C for consumption). Then, the rest must be spent for incremental investment (ΔI, where I stands for investment).

In other words, the sum total of the marginal propensity to consume and the marginal propensity to invest must be the unity ($\Delta C/\Delta Y+ \Delta I/\Delta Y= 1$), where $Y= C+ I$. Thus, MPC is usually smaller than the unity (1). For the sake of simplicity, we herein omit the governmental expenditure (G) as needed: at any rate, the "government purchases" are ultimately divided into consumption and investment depending on the nature of spending.

To paraphrase, consumption (C) is defined to be the aggregate of goods and services newly-produced in the accounting year, while investment (I) is the aggregate of fresh-constructed assets. In theory, all the goods, services, and assets in national accounting mean real quantities. In practice, however, the only way of aggregation is in monetary terms; again, we cannot add, for instance, three apples to five oranges in any other way.

By nature, incidentally, the division between consumption and investment is a technical issue of accounting. According to GAAP, whatever we can amortize over multiple years is named as investment as opposed to expenses for consumption in the current year. For instance, taking an economics course is supposedly accounted for as an investment if it benefits us as a human asset, while as a consumption if taken for fun.

In practice, however, we are more often than not to hire a third party to do the accounting job. Naturally, therefore, the division between consumption (C) and investment (I) is at the accountant's mercy and more or less arcane to us. Probably, by the way, almost nobody would call financial accounting a *science*, empirical or otherwise.

The Multiplier Effect

One of the greatest debates in macroeconomics has been on the size of the so-called multiplier effect. The heat notwithstanding, the debate has little merit because the concept itself is ill founded. We review its close cousin,

paradox of thrift, first.

Paradox of thrift. A couple of household-name economists are closely associated with the term paradox of thrift. This widely-acknowledged idea suggests that the portion of GDI not expensed for consumption be "thrown into the sea," to borrow from Thomas Malthus.[4] Therefore, when some of us refrain from consumption by a certain amount ($-\Delta C$), GDP is to be reduced by as much, or $\underline{-\Delta Y= -\Delta C}$.

The macro-popular notwithstanding, the proposition is not very realistic. First, I would never ever throw any portion of my hard-earned income in the drain. Second, if the majority of people, unlike me, did that, GDP would shrink by as much. As GDP decreases, so must GDI. As GDI decreases, so must GDP. And on and on. In the meantime, GDP must become substantially smaller. Then, no matter how extraordinary those people are, how could they and I subsist?

Apparently, in the concept of paradox of thrift, there is a confusion regarding the role of money. First of all, we may put a portion of our monetary income (a part of the nominal GDI) aside, but we would never destroy what we have produced in real quantity (a part of Y, the real GDP). As such, if we put money under the mattress, we will contribute to deflation ($-\Delta P$ where P for price level) due to a decrease in monetary payouts ($\underline{-\Delta M \cdot V}$ in the quantity equation; *cf.* Chapter 4), way before we contribute to a recession ($-\Delta Y$) due to a shortage in the effective aggregate demand (AD).

In reality, moreover, we would, with "saved" money, preferably buy time deposits to hold or machines to rent. That is, "investment" in plain English, and new machines and the like, directly or indirectly purchased, would be accounted for as "incremental investment" (ΔI) in macroeconomics jargon. As such, saved money rarely heads to under the mattress. Here, it may be noted that the financial "intermediaries" must by definition pass our monetary deposits through to real demand.

At any rate, both GDP and GDI are so-called real variables, while money, cash and demand deposits are purely nominal variables. The two groups are in no case to be mixed together. If we discuss consumption (C) in real quantity, we must think of saving (S) in real quantity as well. The real objects (Y) we produce at the workplace in the year must be bought by someone (C or I) in the same year, no matter how we dispose our own

[4] Malthus, Principles of Political Economy, 325

nominal incomes. Due to GAAP, even what some would call "inventory" is accounted for as "*I*."

After all, economy is one, "money, banking and finance" is completely another: the former regards who uses GDP (a flow) for what purposes while the latter bears upon who owns money (a stock) in what expectations. As is well known to us in macroeconomics, incidentally, the central bank *adjusts* the quantity of nominal money as a profession but never the real GDP so easily.

Fiscal multiplication. The popular topic "multiplier effect" is usually linked to fiscal policy.

To illustrate, when the government makes an incremental "autonomous" spending, the GDP increases by as much as ($\Delta G = \Delta Y$), where G is for the government purchases, always for the purpose of consumption (ΔC), never for saving (ΔS). As this incremental GDP works as incremental GDI, there follows incremental consumption spending which equals to the incremental GDP multiplied by MPC ($= \text{MPC} \cdot \Delta G$).

As the process repeats itself indefinitely, GDP will increase in total by $\Delta Y = \Delta G \cdot [1/(1 - \text{MPC})]$. Infinite geometric progression gives this result when $\text{MPC} < 1$. If we suppose MPC to be 0.8, for instance, the multiplier is five (5); accordingly, GDP will increase by five trillion dollars in response to the incremental fiscal spending of one trillion dollars.

Hyper-influential may it be, this idea is more of a fantasy. In the first place, macroeconomists unwittingly discriminate money, even if "money is fungible" or said to be so by them. More specifically, they differentiate "autonomous" spending from planned or otherwise "expected" spending: the former turns around indefinite times in the fiscal year while the latter does only once. From this "politically incorrect" practice, the multiplier effect is conceived and born. For instance, when the government spends one billion dollars in September from the contingency budget, the expenditure would multiply; but another expenditure of the same amount in March for the firm's planned factory would not.

There is good news for daily bread earners whose spending is everywhere contingent, while MPC is always the unity. As their earnings are unpredictable, their spending cannot be expected. As their MPC is the unity (1), the multiplier of any case of such contingent spending is the infinity (∞). Or, incomes of such earners would multiply indefinitely

among themselves. If only one of them when saturated could be generous enough to let the rest of the population consume on her stead!

In the second place, the multiplier effect is nothing but an outcome from fallacy of composition, against which Paul Samuelson famously warned in the middle of the 20th century.[5] Owing to him, we know that each can over- or under-spend but all cannot. Or, the economy as a whole cannot spend differently than it earns. The gross expenditure (GDE) must in all cases be the same as the gross income (GDI).

As a result, in response to contingent spending by the government, private spending must be discouraged by as much. Now, to be logically consistent, the "incremental" reduction in the private spending ($-\Delta C$) "must necessarily" multiply just as much as the "autonomous" spending of the government (ΔG) would. As the two multiplier effects wash each other out, there will not be any net multiplier effect.

Again, spending, if not for the purpose of breaking bills, must always be for the real thing. With the real GDP given, the real GDE cannot be different therefrom. Put in a slightly different way, all demand in the aggregate (AD) is equally effective in comprising GDP in the "theory" of accounting; or, $\underline{AD \equiv AS,}$ always and everywhere.

Infeasibility of a Cross

Some macroeconomists illustrate the multiplier effect in a diagram with GDP (AS) on the abscissa and GDE (AD) on the ordinate. They show two lines, that is, a 45° line from the origin representing GDP, and another with a positive slope and a positive intercept representing GDE. There, the GDP line is straightforward because GDP equals GDP.

On the contrary, the GDE line is very much otherworldly. First, those macroeconomists conveniently assume MPC as the slope to be a constant coefficient between zero (0) and the unity (1). Second, the private sector can when inevitable consume what is not produced, or $\underline{GDE > GDP}$.

In this framework, the GDE line surely crosses the GDP line from above. When the government shifts the GDE line up with a contingent spending (ΔG), the new cross would produce a much bigger increase in GDP (ΔY). Then, the ratio $\underline{\Delta Y/\Delta G}$ is none other than the multiplier [$\underline{1/(1-}$

[5] Samuelson, Economics, 9

MPC)], which must by construct be larger than the unity. This multiplication is automatic as long as the GDE line is less steep than the GDP line: incremental GDP is supposed to multiply over and over again.

Now the reality check: In theory, we can borrow not only in "nominal" but also in "real," even when we produce nothing at present or in the future. In practice, however, that is not possible because no one would lend to anyone else who has no ability or will to produce something utile. Likewise, when GDP is nil, the economy cannot import anything from abroad. Needless to say, the government cannot tax the private sector before making any contingent expenditure (ΔG). In conclusion, there would not be such a thing as the positive intercept as for GDE when $Y= 0$.

Moreover, we at the subsistence level would certainly consume everything we produce so as to push MPC up to the unity (1). If so, GDE is totally from consumption (C) and the GDE line cannot be divorced from the GDP line. Eventually, with some dose of blessing, consumption or the GDE line, with saving evaporated, might go below the GDP line. All in all, the GDE line in this world would never have a chance to hit the GDP line. Then, where would the "cross," Keynesian or otherwise, be?

The case of crossing from below. Suppose a developing economy with GDP slightly larger than the subsistent level is put in recession by a comparatively large drop in consumption ($-\Delta C$), the regular culprit for insufficient effective demand. Then, GDE might fall to around the subsistence level so as to be called "ineffective aggregate demand."

Now, add a contingency fiscal package (ΔG). The new GDE line must, if ever, hit the GDP line from below rather than from above. In an economy where GDE crosses GDP from below, there would certainly be a cross. That might be good news. If so, however, we would have totally new macroeconomics: any "autonomous" expenditure by the government would crowd out the expected private spending by a larger amount; subsequently, the multiplier becomes negative.

If MPC is the unity (1), the multiplier will be infinity (∞) in algebraic progression while "impossible" (read: no answer) in the graphic illustration. If MPC is bigger than the unity, the multiplier would again be infinity in the progression while negative in the graphic. Incidentally, at any rate, some including a certain economic methodologist would posit: MPC must inevitably be smaller than the unity because otherwise the multiplier would not be definitive (Q.E.D.).

As a matter of fact, we, collectively as well as individually, live above our means from time to time. The so far unblessed among us will borrow from the future when they first become the master of the household after being wanted by the wedding guests to be blessed. Likewise are many blessed emerging economies. MPC can plausibly be larger than the unity, if and only if the household in each or the households in all have credit to sell.[6] As we will see in later chapters, credit comes from and only from the ability to create income at some point in the future.

Fiscal or Monetary

Exponents of the fiscal multiplier would say, for example, "Multiplication is expected even when the government digs a ditch and refills it." The truth, however, is that such spending does not make any difference other than supplying incremental money (ΔM, this M for money) to the private sector.

Not to mention, the private sector would surely expend the incremental money for real things rather than hoarding it nominally, entailing an increase in GDP ($\underline{\Delta Y = \Delta C}$) in the first round (*cf.* Chapter 9). Eventually, this spending, as being "autonomous," should multiply just as many times as any other, including of course ΔG.

Then, the real issue boils down to who spends the incremental money (ΔM) more efficiently, the government (ΔG) or the households (ΔC). If the conventional wisdom of "the private sector being more efficient" is right, the so-called "helicopter drop" of money to the private must be preferred to the public ditch project. In this regard, the episode of Public Work Reserve of the US in the 1940s might be a useful historical guide.

As is well known, fiscal policy in practice is sometimes "spending" by the public sector (ΔG) and other times monetary policy (ΔM) in the form of tax reduction or transfer payments. *Ceteris paribus*, the latter must be

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[6] Modern book-keeping starts from the idea that the sum total of all sources (on the credit side) must be identical to the same of all uses (on the debit side). From the national accounting in real variables, we have $\underline{Y + M}$ (M for imports, a foreign source) on the credit while $\underline{C + I + G + X}$ (X for exports, a foreign use) on the debit.

From the above, we learn that $\underline{\Delta Y - \Delta C \equiv \Delta G + \Delta X - \Delta M}$, where ΔI is assumed to be nil with "S" just leaking. There does not seem to be any guaranty, at least in theory or in *laisses-faire*, that the left-hand side of the equation will be positive; or possibly $\underline{\Delta Y < \Delta C}$. When times are particularly good or especially bad, MPC ($\underline{\Delta C / \Delta Y}$) could be greater than the unity (1).

more efficient than the former according to the age-old wisdom.

All in all, the helicopter drop must be more economical than the ditch project. Regardless of relative efficiency, however, the choice between the public project and the drop would probably be a matter of political feasibility (*cf.* Chapter 24 for rationality vs feasibility).

Practically ubiquitous, at any rate, are "elephants," "white" in some places, miscarried in other places and transparent in still other places. Probably, a ditch project will be more feasible than a helicopter drop in almost every commonwealth.

A Matter of GAAP

First of all, accounting is to record the market trade of "real" quantities in "nominal" terms. This nominalism is largely because the currency unit is the "unit of account" not only in economics as a discipline but also in accounting as a profession. Second of all, accounting must and does capture each and every occasion of trade only once, never multiple times.

After all, all entries are equal as far as accounting, national or otherwise, is concerned. In other words, one dollar spent is one dollar expended, so as to make the multiplier be the unity (1); no more, no less.

There can be neither leakage nor multiplication as for trade in the market, which the national income accounting is all about. As proof of a kind, the Harvard economist Gregory Mankiw writes in one of the most popular textbooks, "GDP is the market value of all final goods and services….".[7] The national income captures nothing other than the market trade. Therefore, all exchanges of market must enter only once into the books of accounting.

The definition of GDP as above by Mankiw is very normal and current in macroeconomics. Unfortunately, however, such a definition seems to be partial. "Goods and services" in everyday language are, if in economics, supposed to be consumed in the current year. To be correct, GDP in macroeconomics must also include fresh-constructed assets so as to represent the aggregate investment. A collateral benefit: We might not be concerned about the paradox of thrift when GDP (Y) encompasses investment (I) as well.

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[7] Mankiw, Principles of Economics, 494-495

Realistically speaking, we can refrain from spending a part of nominal incomes; on the contrary, out of the real products we cannot save but only invest. No throwing away, please.

CHAPTER 2

THE SURREALISM OF REAL VARIABLES

We shall check the respective quantity before making a choice among multiple units in a defined *population*, or a given macrocosm. In this respect, the measure of a single unit or the aggregate of all the measures in a macrocosm is useless because comparison is not applicable to either of the two cases.

Put differently, every choice is made from multiple units of the same kind while the metric must be in a particular scale of specified dimensions. For instance, before telling who is taller than whom else we have to describe the stature, either all in centimeters or all in inches. Further on, the "aggregate stature," either in millimeters or in inches, of the population would by itself not mean much.

We never compare a number in centimeters to another in inches, even if both represent the length (L for length in dimension denotation). Neither are we supposed to make a choice between the *volume* of water flowing through a cross-section of a tube ($L^3 \cdot T^{-1}$, where T stands for time period) and the *mass* of water in the tank ("M" for mass). There is a mismatch in scale in the first case while in dimension in the second.

We in everyday life are seldom confused by scale units, much less by dimensions. Somehow, on the contrary, we in macroeconomics habitually disregard dimensions. For instance, effectively neglected is the fact that the price level may "vary" across the plan vs the reality (L^{-1}) but must and does *change* over a period of time (T^{-1}). The two are in no way comparable, much less inter-substitutive (*cf.* Chapter 9 for details).

With the above said, a *gap* in the price level (*P* for price level in macroeconomics) is usually denoted as ΔP while a *change* as $\underline{\Delta P/\Delta t}$. The two are completely different in kind. They are in all cases to be differentiated from each other.

Nevertheless, when we hereinafter discuss over-time changes in the price level we often run the "marginal risk" of using the former (ΔP)

instead of the latter ($\Delta P/\Delta t$) for the sake of "marginal convenience"; as is much the same for changes in other quantities. May such omission of "$/\Delta$t" not be petrified into total oblivion!

Market Price, the Proxy of Utility

Differently from the physical world, we have the value dimension (U for utility value in dimension) in the economic world. The economic value is, of course, based on consumption utility (M·U) of goods and services. The value (U) of production factors, raw materials, "supplies" and assets (all in "M") is determined by their respective contribution to "final goods or services" (M·U) ready to be consumed. In this sense, value in economics is material as opposed to spiritual or moral in other disciplines.

The value metric. Some economists propose on the basis of consumer choice theory that the cardinal measurement of value, as opposed to the ordinal, may *not* be required in economic analysis.[8] They seem to miss the very fact that we have long been living in the market economy, not confined any more on Robinson Crusoe's island (*cf.* Chapter 17 for ordinal choices).

Home alone, we can and do make ordinal comparison between, for instance, an apple and an orange but never do that in the market. In the consumer's choice, the price in the meaning of opportunity cost of an apple is represented in the quantity of orange, or how *many* oranges there are per apple ($\Delta q_o/\Delta q_a$) (*cf.* Chapter 15 for many vs much).

In the market shoulder-by-shoulder with others, on the contrary, the price must be stated in a metric applicable to trade of all kinds among yet-to-be-identified participants of the community. In every sense, there as a universal value metric is no alternative to the currency unit of the commonwealth. If in the US, the name "dollar" must unquestionably be the value metric (U) as far as market trade is concerned.

The baton in the market. As we discuss in Chapter 16, the "monetary price" of an object in the market is its utility recognized by the community: more specifically, the price represents the consumption utility (M·U) appreciated by the community as a whole. In a word, the price is taken as the proxy of utility. Then on, (scarce) resources are allocated on the basis of the market price: or, the "price system" is "the baton" of the invisible

[8] E.g. Samuelson and Nordhaus, Economics, 89

hand.[9] Not to mention, the market price must be stated in the currency unit of the commonwealth as the sovereignty of multiple communities.

All in all, the value (U) of all objects ("M") tradable in the market is to be measured by the respective price in the sovereign unit. Specifically, we trade the monetary price (U·m) for consumption utility of a certain product or vice versa: we know, for instance, that $(M{\cdot}U)_{apple} = U{\cdot}m = (M{\cdot}U)_{orange}$, if in the same scale. In short, the *monetary* price (U·m) represents the *real* utility (M·U) of the traded object (*cf*. Chapter 7 for more on this).

The problem of inflation. One of the troubles with the price as the utility proxy is that due to inflation (or deflation) the value of the currency unit itself may change vis-à-vis utility value.

To begin, inflation is an issue for the whole economy, not for each market. As for the macro-economy, the price level (*P*) may *change* with no difference in the aggregate level of utilities. More specifically, even if there are no changes at all in the other economic activities, the price level may rise or fall when the outstanding money stock (*M* for monetary aggregate) or the velocity of money (*V* for velocity of money) varies over time. We call as inflation the *over-time* variation in the price level.

Over two consecutive periods, most individual prices have moved up if there has been inflation in that the price level is an average of prices. Then, the price loses its effectiveness as the utility proxy in *intertemporal* comparison: the price may change without a real change in utility.

Nevertheless, we can adjust the inflation effect in one way or another for the whole economy. According to the *classical* way as opposed to the general practice in macroeconomics, we know that "a dime today ain't worth a nickel ten years ago" when the inflation *rate* has been greater than 8% *per annum* in the meantime.[10] Somehow, the macroeconomics way of adjustment is totally different, for better or for worse.

Macroeconomic Indicators

The economy is a macrocosm of its own. Therein, various economic stocks and activities are aggregated into a single "macroeconomic indicator" each in the sovereign currency unit.

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[9] Mankiw, Principles of Economics, 84

[10] The calculation: $\underline{\$0.10/(1.00+0.08)^{10} < \$0.05}$. The quote is adapted from one of Yogi Berra's widely-known quips: "A nickel ain't worth a dime anymore."

For comparison only. By nature, monetary aggregates of the economy have little substance by themselves. To be meaningful, they must be *compared* to something else. Take the monetary GDP of the US in 2030, for example. Surely, it is estimated in the dollar within the commonwealth. However, it could equally-legitimately be represented in as many ways as the currency units in the world. Therefore, the number representing the US GDP in any of the currencies is literally nominal.

The only use of the monetary GDP of a certain year comes from comparison to, for example, that of the previous year, that in the plan or those of other economies, respectively, in the dollar. For example, the monetary GDP grew 5% in this year vs. the past year. Or, the monetary GDP in the first quarter was smaller than the planned GDP by 3%. Or, the US GDP was five times bigger that the German GDP, both in the dollar.

The real rate. When the inflation over the year (T^{-1}) was 10%, for instance, the purchasing power of money in our hands at the yearend (T^0) decreases by about 10% vis-à-vis that at the beginning. Therefore, any increase in the monetary value by up to 10% is *in name only*, or nominal.

The rate of return on the asset is calculated on the basis of the over-time percentage change in the monetary value. More specifically, the interest rate in practice is stated in the percentage change *per annum* (% PA) of the asset price: or $\underline{\Delta p_{as}/\ p_{as}}$. This rate is sometimes called the nominal interest rate (i in macroeconomics). On the other hand, the inflation rate (π) represents the percentage change PA in the price level [$\underline{\Delta P/\ P}$ or $\underline{\Delta P/\ (P{\cdot}\Delta t)}$ to be precise].

Traditionally, we define the "real interest rate" (r) to be the nominal rate subtracted by the inflation rate: or $\underline{r= i- \pi}$. Clearly, both rates, nominal and real, have one time dimension in the negative (T^{-1}) and have been with us since classical times.[11]

"Real variables." In theories of modern macroeconomics, the key variables such as GDP (Y) and the aggregate capital stock (K for physical capital) are regarded as "real" from the outset. On the flipside, monetary aggregates from the real practice are automatically treated as "nominal," pejorative or not, and belong at best to the side story or afterthought.

Macroeconomists say "real variables" while they mean "monetary

[11] E.g. Fisher, The Rate of Interest. He in the book does not exactly call it as such but nevertheless means it.

aggregates after removal of the inflation effect." Specifically, they call a nominal variable divided by the price level (P) a real variable; for instance, the real money stock ($\underline{M/P}$) or the real wage ($\underline{w/P}$). The purpose of doing this is said to be turning monetary aggregates into "real quantities." Unfortunately, however, this practice does not make much sense.

Following such a way of naming, we get "real" macroeconomic quantities through dividing the respective monetary aggregate (e.g. Y_N or K_N, where the subscript $_N$ for "nominal") with the price level (P); for instance, $\underline{Y= Y_N/P}$, $\underline{K= K_N/P}$ and the like.

We can right away think of two problems respecting this particular practice, though it may rarely have been questioned by any of us. First, the price level does not have to do with the inflation rate. Therefore, this "real" in the real variable (with P, in T^0) has a completely different meaning from the same in the real rate (with ΔP, in T^{-1}): two of them should in no case be juxtaposed to have the same qualifier "real."

Second, we do not need to devise in the first place such artificial aggregates. On one hand, all macro-aggregates are meaningful only for comparison. On the other hand, we in economics do not need real variables for the purpose of comparison.

In the reality of the economy, we make comparison either in terms of *ratio*, as in the US GDP vs. the German GDP in the same currency, or in terms of nominal percentage *rate*, as in the GDP growth rate. If so, all that we need is the monetary aggregates of GDPs. When we are further interested in substantive growth, we can use two monetary price levels in calculating the inflation rate. We do not *need* "real variables" at all: worrying about anything of no need might be uneconomic.

The possible logic of "real variables," at any rate: If we divide the total expenditure (E_a) for a basket of apples by the apple price (p_a), we find the quantity of apples ($\underline{q_a= E_a/p_a}$); "we can extend" the logic to the aggregate consumption (C), investment (I), GDP (Y) and so forth. Unfortunately, however, we have just committed fallacy of composition: what is true for each product may be false for all the products. To illustrate, the sum of one apple and two apples is three apples but another sum of one apple and two oranges does not make three.

Before going forward, the concern about inflation is not on the price level (T^0) being too high, but on its over-time change (T^{-1}) being too fast. The two are different in the time dimension. Confusing between the two is

one of the most typical cases in macroeconomics of *dimension aberration*, or mismatching dimensions of two or more measures to be compared.

Raison D'être of the Index

Unfortunately, real variables defined as above are even less substantive than their respective nominal aggregate. As long as the price level (P) is stated in the dollar, a surety in globally-popular macroeconomic textbooks, "real variables" are nothing but indexes in sheer purity: if we put the price level to 1.00, the monetary variables in the dollar are transformed into real variables. This is the precise definition of indexation.

Indexes are of no use by themselves, much like monetary aggregates for the economy are. In the first place, the index is created for the purpose of measuring the percentage change over time in a certain measure. For example, the only use of a stock index such as DJIA (for Dow Jones Industrial Average) is in calculation of its percentage change (rate).

In addition, some indexes may be usable in finding the percentage gap in a certain measure across different situations. The popular Big Mac Index is devised for comparison among the prices at McDonald's stores in various locations of different currency units.

Now, the real GDP, as conceived to be $\underline{Y= \$(Y_N)/ \$(P)}$, loses the metric of the dollar, goes value-less ($U \cdot U^{-1} = U^0$, but in "M"), and becomes useless all by itself; so will all the other real variables do. If so, the real GDP and the like might not be called a "variable" in macroeconomic models as long as our interest is in the aggregate welfare consisting of individual utilities (M·U); which are from consuming various goods and services. The real variable (M) and welfare are completely different in species, while "variable" is the name for something of our prime interest.

After all, there in reality cannot be such a thing as "real quantities" as far as real theories of macroeconomy are concerned. Again, we cannot aggregate three apples and five oranges, even the metric for "three" and "five" is a real metric called an "integer." No matter when and where, mass ("M") is one, utility (M·U) is another, the market price (U·m) is still another and numeric ($M^0 \cdot U^0$) is the other.

Fortunately, there is an alternative to "real," or rather virtual, quantities. We aggregate welfare in "nominal" terms, as it is called in macroeconomics. From then on, we make adjustments, if needed, to remove the distortion

due to inflation. We come back in Part IV to the right way of reasoning for economic affairs in the commonwealth.

Price Level, the Common Denominator

Another problem with real variables is the price level itself. In practice, the only way to suggest a price level is through a certain way of *indexation*, with the dollar sign added later on, as "a rite of passage," so to speak. Such a practice is inevitable because there is no other way to average, for example, the apple price and the orange price, not to mention across all different products and assets comprising GDP.

Furthermore, the choice of a particular price level out of indefinitely many possibilities cannot be but arbitrary. If so, we may reach a different conclusion with different index numbers from different ways of indexation, among other problems of real variables.

The acid test. Without comparing the price levels over time (P_0 to P_i), we can hardly make the call whether the price level as of now (P_i at t_i) is too high or too low. If we cannot say anything about the magnitude, neither can we call the price level (P) a "variable." In fact, all the real variables have the same problem of being unqualified for a variable.

Before all else, economics is a discipline on how to economize on means to the defined end. In other words, economic activities are all about choices after cost-benefit analysis. Literally or effectively, we try to pull the price down when too high while pushing up when too low. As the first methods in macroeconomics for that purpose, we would have liked to know how high the present price level (P_i) was by and in itself.

The real rate and limitation. As opposed to real variables, the real rate is defined to be the *substantive* rate, after removing the inflation effect from the monetary rate.[12] Typically, there are the real interest rate (r in

[12] Most percentage changes *per annum* (PA) in macroeconomics are smaller than 10%, or 0.1. In that regard, we in calculating rates usually choose to take approximation in forms of addition and subtraction over precision from multiplication and division.

A few typical approximation formulae when both a and b are substantially smaller than the unity (1): $(1+a)\cdot(1+b) \fallingdotseq 1+a+b$; $1/(1+a) \fallingdotseq 1-a$; $(1+a)/(1+b) \fallingdotseq 1+a-b$. For example, if the nominal interest rate is 7% while the inflation rate is 2%, we say the real rate is 5% ($=0.07-0.02$) instead of precise 4.902% ($=[1.07/1.02]-1$). After all, precision and convenience are in a trade-off.