Chapter 3
The Omnipresence of Common Income in a Multi-Dimensional World

Post-Communist evolution in Russia, China, and other countries marked two systemic separations. China's experience detached the market economy from limited government and private property. Russia's experience split socialism from big, restrictive government and state ownership. Ubiquitous socialism in Russia and similar countries is run by the private enterprise network with free transactions under limited government. The new-entrant market economy in China and similar countries functions under restrictive government controls and with government ownership at the local and national level. Chapters 1 and 2 documented these developments. Chapter 2 extended them into a multi-dimensional perspective summarized in figure 2.4. This chapter follows with a multi-dimensional cross-section, accounting, measurement, and organization of economic systems.

Multi-dimensional permutation after central planning is extreme but not unique. Table 3.1 assembles a three-dimensional catalog of all major economies for the last 10,000 years and beyond by the qualitative types of income, government, and property. It classifies economies by private vs. common income (the market economy vs. socialism), by restrictive vs. non-restrictive (limited) government, and by private, cooperative, local government, and national state ownership vs. common property. Table 3.1 demonstrates that income types, government types, and property types are uncorrelated and form multiple combinations. Their heterogeneity runs through time and space. Figures 3.1 to 3.3 quantify and locate economic groups from table 3.1 on a multi-dimensional map. Table 3.1 disaggregates into the table of economic species, akin to the Periodic Table of Elements. The two-dimensional and four-dimensional versions follow this chapter. Species are economic systems that are unique, self-contained, non-overlapping, and indivisible without breakups. The table of economic species currently enumerates 110 elementary systems and is expandable.

Socialism operates through common income, the market economy though private income. To recapitulate from Chapter 2, private income and common income are ontological and accounting concepts. Private income means exclusion of non-earners from a given income. Exclusion equalizes production and remuneration of redistributable goods. These are goods that can be taken away by non-producers from producers. Ordinary output and income itself are ontologically redistributable. Income redistribution is addition of one man' income by subtraction of another man's income. This non-exclusion diverges remuneration from production of redistributable goods. Income redistribution from earners to non-earners is the operational process of common income.

What unfolds in this chapter is the omnipresence of common income under *all* extents of government restriction and *all* types of property. Common income transpires as an original, enduring, and predominant phenomenon of human existence. Private income phases in slowly, belatedly, and rarely. There is no amount of liberalization and property privatization that can make income not common. But the policy challenge is even bigger than that. The next chapters submit that common income suppresses production. The breakup of common income, the phase-in of private income is the missing link in understanding and making long-term economic progress.

Section A. Charting a Multi-Dimensional World

A multi-dimensional perspective returns Russia, China, and other post-Communist economies to the map of the world. Figures 3.1 and 3.3 expand figure 2.4 to actual world economies. Russia and China fit the map together with all other major groups of economies, past and present. Russia and China add to the map which includes primordial societies, historical economies around the globe, Western market economies, Communist central planning, and contemporary developing economies. Not a single major economic cluster is missing. The multi-dimensional map is comprehensive.

In contrast, Russia and China are missing on the one-dimensional map in figure 3.2. It tries to fit empirical world economies along the linear dichotomy of market vs. government. This map defines socialism as big government and state ownership and it equates the market economy with limited government and private property. On the single dimension, the market economy can be measured only as a residual of government, after accounting for the extent of government controls in the economy. Enterprise Network Socialism in Russia with free transactions, limited government, and private property and the new-entrant market economy in China with restrictive government and marginal private property do not fit the line and fall out. They are off the one-dimensional map. Their fitting in figures 3.1 and 3.3 becomes possible due to multi-dimensional accounting. It separates common income (socialism) from restrictive government and state ownership and splits private income (the market economy) from limited government and private property.

The two-dimensional frame

The government dimension on the vertical axis in figure 3.1 makes up the longitude of the map from absent to limited to restrictive to total government. The income dimension on the horizontal axis limns the latitude of the map from the market economy to total socialism. They form the two-dimensional frame for figure 3.1 and similar subsequent figures in this book.

This two-dimensional frame covers the entire flow of economic activity which adds up to Gross Domestic Product (GDP). It is the flow of funds between a multitude of economic actors—firms or enterprises, households, and the government. They all interact in a variety of allocative markets: product markets, factor markets of labor, capital and land, and intermediary, financial markets. The flow of funds, in turn, embodies a multitude of bilateral exchange transactions and unilateral confiscations and subsidies between organizations (firms or enterprises), organizations and households, organizations and the government, and households and the government. For brevity, we can call them transactions.[1]

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[1]The most elaborate analysis of the flow of funds can be found in the Flow of Funds Accounts of the United States, compiled by the Federal Reserve Board at http://www.federalreserve.gov/releases/z1/current/data.htm. Methods of accounting for specific line items can be consulted in the National Product and Income Accounts compiled by the U.S. Department of Commerce at http://www.bea.doc.gov/bea/dn/nipaweb/SelectTable.asp?Selected=N. An excellent reconstruction of the flow of funds in Russia in 1991, the last year under central planning, is in The World Bank, *Russian*

FIGURE 3.1. THE WORLD ON THE INCOME AND GOVERNMENT DIMENSIONS

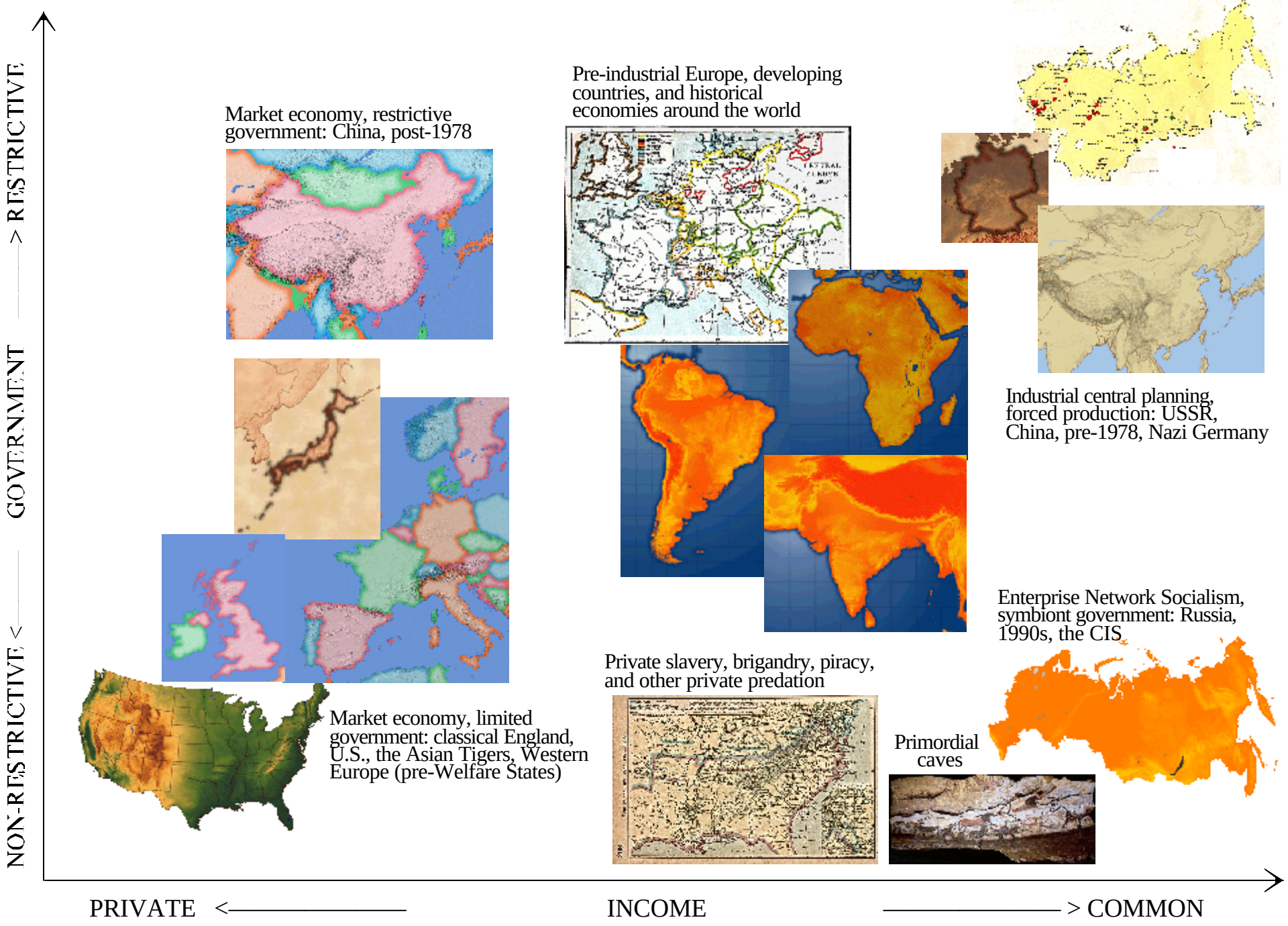
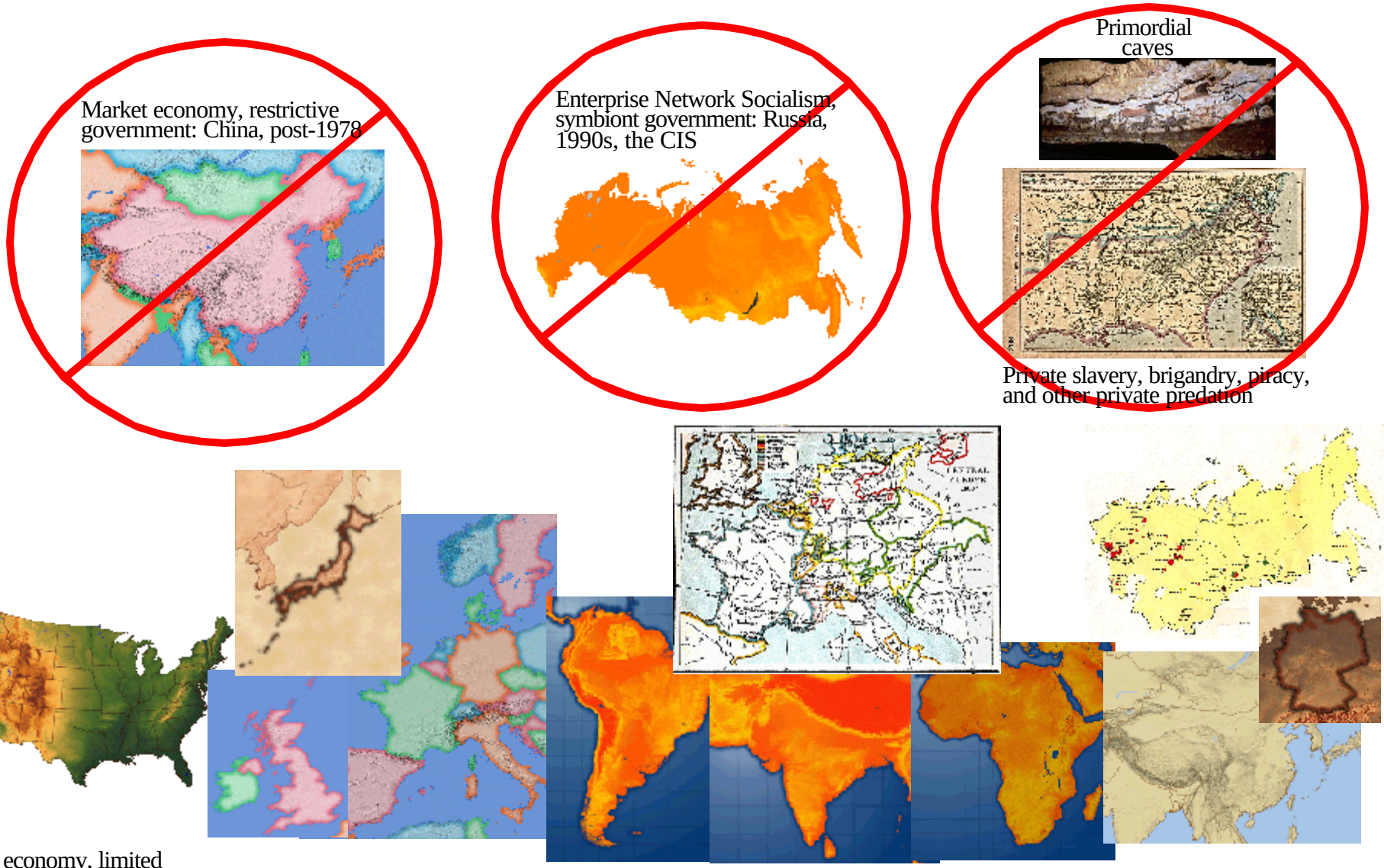


FIGURE 3.2. THE WORLD ON ONE DIMENSION



In earlier economies, transactions enter the flow of non-monetary exchange of output. For uniformity, we will treat this exchange as an implicit case of the flow of funds.

The flow of funds yields direct measurements of economic systems on the government and income dimensions. These direct measurements are the rates of government restriction and income redistribution in the flow of funds.

Each transaction is controlled by the government to one or another extent of its value, from zero to 100 percent. Like in science, control means exclusion of extraneous influences. To emphasize the governmental source of economic control, we will call it government restriction or, simply, restriction. As transactions follow one another in the flow of funds, the extent of government control of each transaction in value terms represents the marginal rate of restriction. The weighted average of the marginal rates of restriction yields the rate of government restriction in the flow of funds in a given economy. This approximates the extent of restriction in GDP from zero to 100 percent on the government dimension, from absent to total government. Conversely, exclusion of government from economic activity defines economic liberty in the accounting sense in the flow of funds. The rate of exclusion of government restriction provides direct measurement of economic liberty as a share of GDP.[2]

In a similar vein, every bilateral transaction and every unilateral confiscation and subsidy contain one or another extent of income redistribution, from zero to 100 percent of the value of a given transaction. These are redistributive transfers from producers/earners of a given income in a given transaction to non-producers/non-earners. For brevity, producers/earners can be called makers of income in a given transaction and non-producers/non-earners can be called takers of the redistributive transfer in this transaction. They are makers and takers in each specific transaction. This is not an occupational status. The qualifier 'redistributive' distinguishes redistributive transfers from charities, donations to causes, transfers in the family and, most importantly, from accounting government transfers such as taxes. Accounting government transfers include taxes and subsidies. While all subsidies constitute redistributive transfers, taxes are ambivalent. Taxes may or may not be equivalent to the value of pure public services. Taxes may approximate effective user fees, making the government a public utility, and taxes may largely

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Economic Reform: Crossing the Threshold of Structural Change (Washington: The World Bank, 1992), pp. 239-241. We owe to Yakir Plessner the idea to compare economic systems by their structures of the flow of funds.

[2]For an elaborate and quantitative discussion of measurement of economic liberty, see Walter E. Block, ed., *Economic Freedom: Toward a Theory of Measurement* (Vancouver, B.C.: The Fraser Institute, 1991), especially Alvin Rabushka, "Preliminary Definition of Economic Freedom," pp. 87-108; Alvin Rabushka, "Freedom House Survey of Economic Freedoms," pp. 57-71; and Zane Spindler and Laurie Still, "Economic Freedom Ratings," pp. 135-175. See also Michael A. Walker, ed., *Freedom, Democracy, and Economic Welfare: Proceedings of an International Symposium* (Vancouver, B.C.: The Fraser Institute, 1988), especially Raymond D. Gastil and Lindsay M. Wright, "The State of the World Political and Economic Freedom," pp. 85-119; and James Gwartney and Robert Lawson, with Chris Edwards, et. al., *Economic Freedom of the World: 2002 Annual Report* (Vancouver, B.C.: Fraser Institute, 2002).

contain redistributive transfers.[3]

Redistributive transfers in each specific transaction between all economic actors measure exactly the difference between returns to the economy and returns to the producer or, simply, between production and remuneration (compensation). This difference applies equally on both ends of the given transaction, that is, as a subtraction of income from the maker and an addition of income to the taker. This measurement of non-equivalence between production and remuneration is specific to the income dimension. It measures takeovers as opposed to uncompensated spillovers on the externalities dimension. By definition, spillovers of ideas, invention, innovation, and other additive goods do not take income from their producers and do not give it to non-producers. There are no transactions and no transfers in spillovers. Uncompensated spillovers measure the difference between production and remuneration of additive goods outside of transactions in the flow of funds.

As transactions follow one another in the flow of funds, the share of each redistributive transfer in the value of each transaction represents the marginal rate of income redistribution. In accounting practice, exactly because of transfers, these values and rates must be imputed from the full market value of output in each transaction. The weighted average of the marginal rates of redistribution yields the rate of income redistribution in the flow of funds in a given economy. It can be simply calculated as the sum of all redistributive transfers divided by the sum of the values of all transactions. This approximates the extent of income redistribution as a share of GDP from zero to 100 percent on the income dimension, from totally private to totally common income.[4] The rate of income redistribution in the flow of funds gives the share of common income in GDP. Conversely, the rate of exclusion of income redistribution measures the share of private income. Private income defines the market economy in the accounting sense in the flow of funds. The share of private income yields direct measurement of the market sector in GDP.

Both the government and income dimensions in figure 3.1 and subsequent figures measure non-exclusion rather than exclusion. They measure government restriction instead of economic liberty. They measure income redistribution instead of equalization of production and remuneration of ordinary output. One can readily set the government and income dimensions in reverse. They would then line up economic liberalization and progression towards the market economy. This reversal will not change the frame, the multi-dimensional cross-section, and comparative positions of economies on the map. But it may give an

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[3]James A. Mirrlees set forth that, in practice, redistribution is technically embedded in taxation. It is impossible to match lump-sum payments from individual taxpayers for total government activities and government services for individual taxpayers as specific users and as members of the public. James A. Mirrlees, "An Exploration in the Theory of Optimum Income Taxation," *Review of Economic Studies* 38, no. 2 (April 1971): 175-208.

[4]Approximation is due to the difference between the flow of funds and GDP in the coverage of home-produced output. Contemporary measurement of GDP in developing economies imputes the value of home-produced output and adds it to the value of marketed goods and services. Transactions include only interactive portions of home-produced output—informally exchanged, confiscated by the government or private predators, and restricted by national and local governments. By definition, transactions leave out non-interactive portions consumed within the household.

Matrix 3.1. A Multi-Dimensional Cross-Section: the Accounting Mechanisms, Exclusion, and Measurement

Dimensions	The returns dimensions		The infrastructure dimensions	
	Income	Externalities	Government	Property
Accounting mechanism	The flow of funds	The flow of spillovers and compensation	The flow of funds	The balance sheet
Exclusion of subjects from objects	non-producers/non-earners (takers) from the income of producers/earners (makers)	non-producers of ideas from returns on invention	government from economic activity	non-owners from property (assets) of owners
Mechanism of exclusion	Equalization between production and compensation		Control by actors over	
	in redistributable goods (ordinary output)	in additive goods (ideas, invention, innovation, etc.)	their economic actions	equity = assets - liabilities = retained earnings + net income
Measurement of non-exclusion	The rate of income redistribution in the flow of funds = the weighted average of marginal rates of redistribution . the share of **common income** in GDP	The rate of uncompensated spillovers	The rate of government restriction in the flow of funds = the weighted average of marginal rates of control of transactions	The level of redistribution of the net value of assets (equity) and of accrual of returns on assets
Exclusion is	**Private income**	**Internalization of externalities**	**Economic liberty**	**Property rights**

Notes:

1. The measurement is of non-exclusion as the share of the total. It measures the difference from complete exclusion, which means non-exclusion.
2. The weighted average of marginal rates of redistribution refers to redistributive income transfers in all bilateral transactions and unilateral subsidies and confiscations. It can be calculated as the ratio of the sum of redistributive transfers to the sum of singular, non-overlapping, self-contained bilateral transactions and unilateral subsidies and confiscations.
3. Restriction as a share of GDP = The weighted average of marginal rates of government control of transactions in the flow of funds

illusion of a predetermined course of history. That is refuted by the experience of Russia and similar post-central plan economies and other economic failures around the world. The two-dimensional frame in figure 3.1 and thereafter is neutral. It avoids historical determinism and focuses on multi-dimensional organization of economies.

The third, property dimension and the fourth, externalities dimension complement the two-dimensional frame in figure 3.3. Matrix 3.1 summarizes multi-dimensional accounting. We will continue its exploration during and after the following empirical inventory.

Around the world at a glance

The two-dimensional layout in figure 3.1 is simple and intuitive. By an unintended visual coincidence, the private income strip with market economies lies in the proverbial West of the map. The common income area with socialist economies spreads over the Eastern expanse of the map. In the accounting sense, private income is always present as the residual of income redistribution. In this spirit, private income can characterize the empirical continuum with the minimal range of income redistribution, from zero to less than 20 percent of GDP. This range would set apart predominantly private income economies with more than 80 percent of GDP excluded from redistribution. It seems to correspond empirically to the critical mass which creates a functioning market economy. The rest are predominantly common income economies.

Private income economies with limited government occupy the south-western corner of the map. These are market economies of classical England, the U.S., Western Europe before the Welfare States, and the Asian Tigers—Japan, Taiwan, South Korea, Hong Kong, and Singapore. Primordial societies with near-total common output and absent or common governance are depicted as primordial caves in the south-eastern corner. Private slavery, brigandry, piracy, and other species of private predation with partial common income and low government restriction lie in the south central segment of the map. Pre-industrial Europe, developing economies, and historical economies around the world are clustered in the area of partial common income and restrictive government in the central section. Industrial central plan economies with forced production in the USSR, Communist China, and Nazi Germany take up the north-eastern corner of near-total common income and near-total government. To make the map readable and not overcrowded, we omit their systemic neighbors and predecessors. These are agricultural central plan economies with state-run irrigation and forced delivery of output to the state wholesale monopsony and monopoly in ancient Egypt, Mesopotamia, China, Japan, India, the Great Zimbabwe, the Maya, Aztec, and Inca Empires.

The two-dimensional map in figure 3.1 readily incorporates post-Communist Russia and China among other world economies. Russia and China settle near opposite corners of the map. Enterprise Network Socialism in Russia finds its place in the south-eastern intersection of near-total common income and non-restrictive government. It is to the north of primordial common output with common governance (pictured as primordial caves on the map). As we documented in Chapters 1 and 2, Russia redistributes

around 80 percent of GDP through the private enterprise network under limited, indeed symbiont government and largely private property. China is located in the north-western intersection of private income and restrictive government, north of Japan and Northern Europe. As we discussed earlier, China runs a two-track economy. It separates the preexisting state enterprise sector and the new-entrant market sector. The latter consists largely of township and village enterprises (TVEs), family farms on state-owned land, and a small segment of private firms, including foreign. The two-track structure needs restrictive government controls. The government must restrict the residual network of state enterprises from redistributing income of the new-entrant market firms and vice versa. This restriction of income redistribution gives rise to a new market economy. As we calculated in Chapter 2, this market sector produces nearly 80 percent of GDP. The rest is redistributed by the old state sector.

Can the world fit on one dimension?

Non-governmental socialism in Russia and a predominant market economy with restrictive government in China are the hallmarks of post-Communist experience. They do not exist on the one-dimensional perspective where restrictive government and state ownership define socialism and the market economy equates with limited government and private property.

Market economy, limited government, private property	Socialism, restrictive government, state ownership

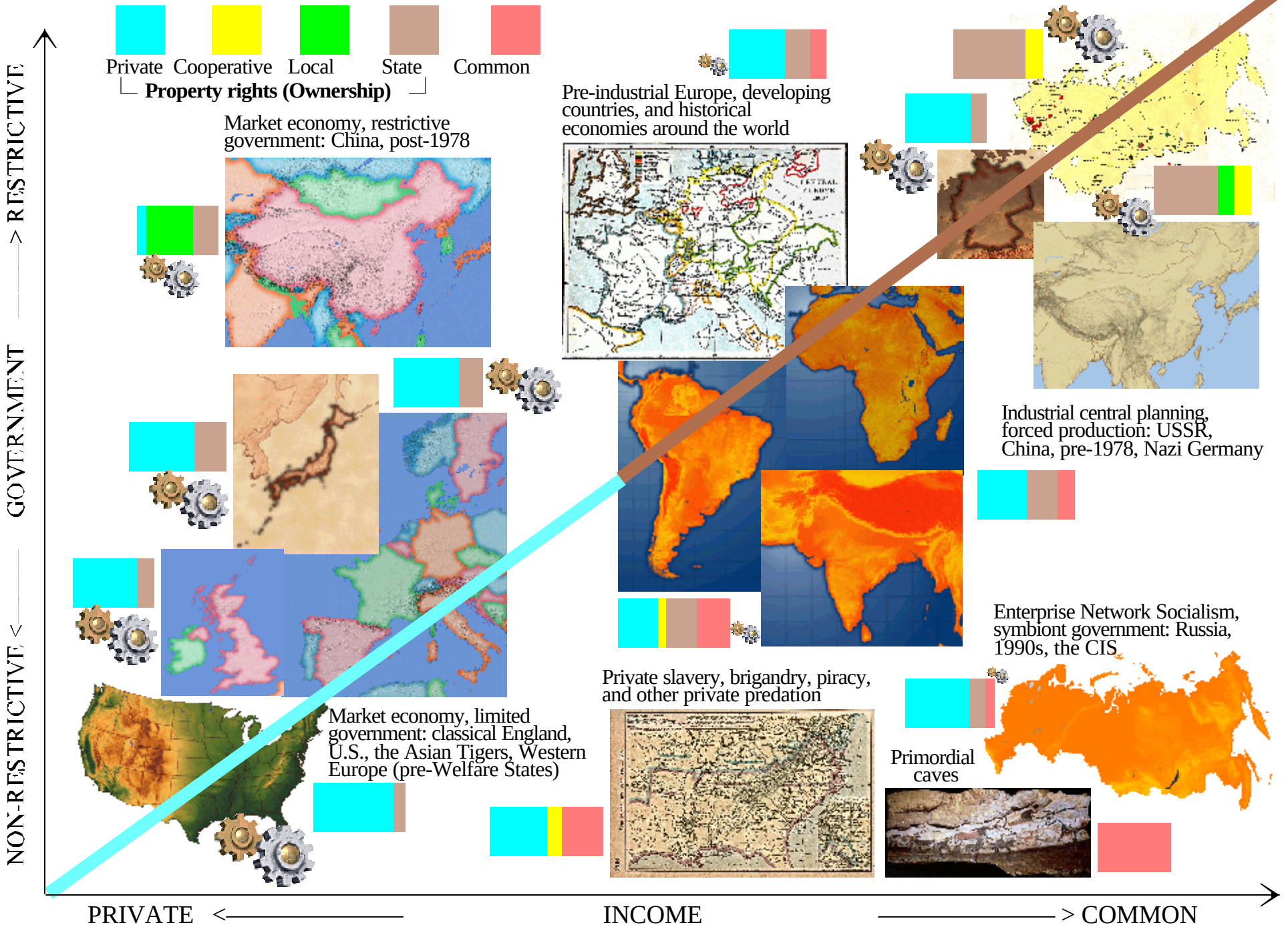
In a mental experiment, figure 3.2 maps this perspective. It shows that the unidimensional map in figure 3.2 merely flattens and linearizes the two-dimensional map of figure 3.1. Many economies fit the map in figure 3.2, but far from all. Post-Communist Russia and China do not fit. If the market economy matches only with limited government and private property and if socialism matches only with restrictive government and state ownership, and vice versa, Russia and China are rejected. It is easy to refute this statement: one has to find some place, any place, for Russia and China on the map in figure 3.2.

Ditto for private slavery, brigandry, piracy, and other species of private predation, widespread in many countries during long periods. Ditto for primordial common output with absent or common governance which constituted the bulk of human history. They all cannot fit the one-dimensional map in figure 3.2. Too much socialism or too little government.

A two-dimensional expansion

Figure 3.3 and a comparison of the two matrices below render another mental exercise. It submits that the one-dimensional perspective of market vs. government is a selection of special empirical cases. Figure 3.3 copies the two-dimensional map from figure 3.1 and superimposes the diagonal from the north-eastern to the south-western corner. It runs from central plan economies with near-total common income and near-total government, through partial common income with restrictive governments in historical and developing economies, to Western market economies with private income and limited government. It

FIGURE 3.3. THE WORLD ON ONE, TWO, THREE, AND FOUR DIMENSIONS



misses the rest of the world. This diagonal is the one-dimensional perspective per se. It lines up all empirical cases that fit the one-dimensional map in figure 3.2. A unidimensional table takes their inventory:

Market economy and non-restrictive government	Socialism and restrictive government
U.S., classical England, the Asian Tigers, and Western Europe (pre-Welfare States)	Central planning (the USSR, China pre-1978, other Communist countries, and Nazi Germany); ancient slavery, feudalism, and mercantilism in pre-industrial Europe; and statist pre-colonial and developing non-Western economies

This table accommodates only special cases where the market economy coincides with non-restrictive government, and socialism with restrictive government. This is a large selection. Empirically, it covers much of human experience as one can observe in figure 3.2, but it is far from universal. In contrast, the two-dimensional matrix below includes *all* economies from figure 3.1.

	Private income (market economy)	Common income (socialism)
Restrictive government	China, post-1978	Central planning (the USSR, China pre-1978, other Communist countries, and Nazi Germany); ancient slavery, feudalism and mercantilism in pre-industrial Europe; and statist pre-colonial and developing non-Western economies
Non-restrictive government	U.S., classical England, the Asian Tigers, and Western Europe (pre-Welfare States)	Enterprise Network Socialism in Russia and similar countries; private slavery in the Antebellum South; brigandry, piracy, conquest; primordial common output

This two-dimensional matrix subsumes the unidimensional table. The market economy with non-restrictive government—the left-hand cell of the unidimensional frame—becomes the bottom-left cell of the two-dimensional matrix. Socialism with restrictive government—the right-hand cell of the unidimensional frame—forms the top-right cell of the two-dimensional matrix. These are two cells of the total four. This makes the entire one-dimensional table a partial and special case.

It is this particular experience that is generalized in the one-dimensional paradigm which identifies the market economy as limited government and unifies socialism with big Government. This is a typical fallacy of generalization of the particular. This generalization creates the unidimensional paradigm of market vs. government which we discussed in the previous chapter. It reduces the world to one dimension which cannot hold all economies. It assumes equiproportionality or a strong positive correlation between income

redistribution and government restriction in all special cases it covers, in order to collapse the world into the one-dimensional line. Visually, this amounts to compressing all economies onto the diagonal in figure 3.3.

This diagonal may hold equiproportional shares of income redistribution and government restriction, downward from one hundred percent to zero. The diagonal can be drawn also as a regression line with a different positive slope. It will not be equiproportional and would simply express a positive bivariate correlation between the extent of income redistribution and government restriction. The trade-off between market and government in the one-dimensional paradigm does not specify whether it is a one-for-one or some other proportion. We leave the diagonal in figure 3.3 quantitatively loose within the two-dimensional frame with the scales of unequal length.

The brown color on the diagonal line stands for state ownership, the blue color for private property. This corresponds to the one-dimensional perspective of socialism, restrictive government, and state ownership vs. the market economy, limited government, and private property. However, even the empirical cases which the diagonal fits deviate from this assertion about property types. To mention the most salient examples, Nazi Germany had predominantly private property while Singapore, Taiwan, and, to a lesser extent, Japan have a substantial share of state ownership.

In the two other cells of the two-dimensional matrix, private income (the market economy) coexists with restrictive government and common income (socialism) combines with non-restrictive government. They encompass post-Communist experience in China and Russia, as well as private slavery, brigandry, piracy, other species of private predation, and primordial societies. The two-dimensional matrix is a qualitative summary which assumes no equiproportionality or positive correlation in the extent of income redistribution and government restriction. Accordingly, there is no trade-off between market and government.

The two-dimensional expansion accommodates empirical cases with all possible quantitative combinations between the rates of income redistribution and government restriction, uncorrelated and scattered all over the map. Visually, the two-dimensional perspective expands the world beyond the diagonal in figure 3.3 in all directions throughout the map.

A three-dimensional expansion

There is a simple empirical proof that the one-dimensional view of the world, the dichotomy of market vs. government, cannot stand even as a first approximation. Table 3.1 further expands the two-dimensional matrix into three dimensions by adding property types. It takes an empirical inventory of economies mapped in figure 3.1 and organizes them by qualitative types of income, government, and property. The trilateral cross-section includes private vs. common income, restrictive vs. non-restrictive government, and a sequence of private, cooperative, local government, national state, and common property.

Table 3.1
Three-Dimensional Characteristics of World Economies

Dimensions	Income	Government	Property
U.S., classical England, Japan	Private (market)	Non-restrictive	Private
USSR, China pre-1978	Common (socialism)	Restrictive	State
Nazi Germany	Common (socialism)	Restrictive	Private
Private slavery, Antebellum South	Common (socialism)	Non-restrictive	Private
Russia, post-1992	Common (socialism)	Non-restrictive	Private
China, post-1978	Private (market)	Restrictive	Local and state
Primordial societies	Common (socialism)	Non-restrictive	Common
Brigandry, piracy	Common (socialism)	Non-restrictive	Private
Pre-industrial Europe	Common (socialism)	Restrictive	Private
Pre-colonial and developing non-Western economies	Common (socialism)	Restrictive	Private, state, and common
Singapore, Hong Kong, Taiwan, South Korea	Private (market)	Non-restrictive	Private and state

Note:
In the empirical and classificatory context, the terms private income and common income approximate the ranges of income redistribution in the market and socialist economies, respectively. Private income classifies economies with the range of income redistribution of less than 20 percent of GDP. Common income classifies economies with income redistribution of more than 20 percent of GDP.

Sources:
Figures 3.3, 3.4, and 3.5 and the literature in footnotes 36 and 51 in Chapter 2 and in annex 3.4 to this chapter

Table 3.1 assembles eleven self-contained, non-overlapping groups of historical and contemporary, national and supra-national economies. These are more or less arbitrary clusters of different sizes which merely copy the selection in figure 3.1. One can make up different clusters and more clusters and thus rerun the test. Actually, it would be useful to do for verifying and falsifying our findings.

Table 3.1 demonstrates why the one-dimensional diagonal in figure 3.3 is a bunch of special cases. These are the cases which can be reduced to two trilateral combinations: (1) the market economy, limited government, and private property and (2) socialism, restrictive government, and state ownership. Together, these two combinations make up the one-dimensional perspective of market vs. government. They occupy the first and the second rows in the inventory in table 3.1. Table 3.1 submits that these are just two of *at least* eight empirical combinations of income types, government types, and property types observed through history and around the world. They made up two cells out of four in the two-dimensional matrix. They make up two trilateral combinations out of eight in the three-dimensional table.

The qualitative types in table 3.1 are not subject to refined quantitative measurement. They disregard specific locations of economies on the map in figure 3.1. The breakdown by qualitative types is simplistic but, in return, it escapes measurement errors. It takes a mere qualitative judgment based on general knowledge about empirical cases by asking basic questions about income types (private or common?), government types (restrictive or non-restrictive?), and property types (private, cooperative, local, state, or common?). Errors of judgment are easily detectable in each empirical case. If errors of judgment are random, corrections will change the three-dimensional conjunctions of specific cases but will not curtail the multiplicity of trilateral combinations and will not erase the overall three-dimensional heterogeneity. If errors of judgement are not random but all err uniformly, away from the one-dimensional perspective, corrections will annul multiple trilateral combinations and render the three-dimensional heterogeneity null and void. This result will converge empirical cases to the unidimensional dichotomy and repudiate the multi-dimensional approach. In any event, the test gives a definite answer to the question on whether one dimension is sufficient or more dimensions are necessary.

The one-dimensional perspective like the diagonal in figure 3.3 accommodates only positive correlations between income redistribution, government restriction, and property types from private to state. Qualitatively, it asserts homogeneity of the market economy, limited government, and private property and between socialism, restrictive government, and state ownership. Table 3.1 records heterogeneous relationships between types of income, government, and property in multiple combinations. There is no correlation and no uniform trilateral pattern in this empirical table, which covers all major economies around the world and throughout history. One dimension covers a large selection of economies. A multi-dimensional framework covers all economies.

A four-dimensional expansion

In this vein, figure 3.3 expands the map to four dimensions. It takes the basic two-dimensional frame of income and government and adds proxy layers of the property dimension and the externalities

dimension. These layers incorporate property types and compensation of spillovers (internalization of externalities). They increase multiplicity of combinations and add to empirical and analytical heterogeneity on the map of the world.

Empirically, the externalities dimension distinguishes specific historical and modern industrial economies by the extent of internalization of returns on production of ideas and other spillovers. To approximate their measure, the size of the gears symbolizes remuneration for technological development. It stands for various, crudely estimated rates of internalization of returns on ideas, invention, and innovation. The depiction notes the early, if modest, patronage of scientific discoveries in medieval Islamic states and pre-industrial Europe; promotion of science, invention, and innovation in industrial central plan economies; and a vast system of appropriation of returns on invention through market institutions, government institutions (e.g., patents), and subsidies in Western market economies, especially in the U.S.[5] It also reflects the shrinkage of this sphere in post-Communist Russia and similar countries, in contrast with post-Communist China with its emphasis on technological advancement. We leave the externalities dimension aside for the time being.

Addition of the property dimension in figure 3.3 visualizes empirical heterogeneity cataloged in table 3.1. It distinguishes Communist central planning with state ownership in the USSR and China from that with private property in Nazi Germany. It distinguishes primordial common output with common property from Enterprise Network Socialism with its predominantly private property. It distinguishes private slavery in the Antebellum South, with its private property rights firmly settled, from brigandry, piracy, and other private predation, which confiscate private and other property and make property common until ownership settles. All other property combinations in major historical and contemporary clusters of economies are also sketched on the map in figure 3.3.

Alas, operationalization of the property and externalities dimensions presents conceptual and technical difficulties. Compensation of spillovers is conceptually simple but technically difficult, if not insurmountable, because of the very long-run effect of ideas. Can one relate Louis Pasteur's remuneration to the billions of lives and tens of trillions of dollars his discovery has saved? The denominator grows exponentially, the numerator is fixed. Inventors of nuclear fission, genetically modified plants, vaccines that stopped major epidemic diseases, and information technologies that boosted secular productivity, appropriated a small and incalculable fraction of their contribution to human progress. Incalculable is the operative word, especially in view of future spillovers.

Measurement of property types is technically simple but conceptually difficult, if not insurmountable, because of the multiplicity of property types and the inherent paradox of property rights. The difficulty stems from the hierarchical structure of property types. All observable property types subordinate to the

[5]Patents evolved from monopoly rights on ordinary services, such as the weighing of hay and straw in the city of London (a renown poet Aemilia Lanyer held this grant in the early 17th century), to inventions and technologies.

principal dichotomy of human relations to property: property rights (ownership) vs. common property.[6]

Property rights (ownership)				Common property
Private	Cooperative	Local	State	Common

Any type of ownership can exist only if ownership as such exists, and if it does not, property is common. This truism generates the above hierarchy. One can single out at least five major, unique, self-contained, and non-overlapping property types. These are private property, cooperative ownership, local government ownership (for brevity, we call it local), national state ownership (in short, state), and common property.[7] The first four are types of property rights (ownership). The common status of property derives from process and incidence. Commonness as process reflects collective access to assets which rules out their exclusive control. The incidence of common property includes confiscations and other redistribution of assets by the government or private predators, until property rights are settled and the new owners installed. For consistency and visual recognition, we assign permanent colors to each property type in figure 3.3 and thereafter. Private is blue, cooperative is yellow, local government is green, state is brown, and common is red.

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[6]Thomas Hobbes cast in stone the dichotomy of common property and property rights (ownership): "Where all things are common, there can be nothing proper to any man (...) nor is there that thing which any man can so call his, as any other may not, by the same right, claim as his own." Thomas Hobbes, *De Cive or The Citizen* (New York: Appleton, Century, Crofts, 1949), p. 80.

[7]The taxonomy of property types can readily expand, add other property types, and subdivide the major five. It can incorporate sub-national states, non-profit organizations, and quasi-property rights of non-owners, such as usufruct, fees, concessions, land tenure or occupancy rights, and trusts. Further refinement can distinguish sub-types of private property, for instance, private ownership of publicly traded shareholder corporations, holding companies, partnerships, and private family companies. State ownership can be subdivided into direct property of government agencies (e.g., U.S. Postal Service and Russian Ministry of Atomic Energy which runs nuclear power plants), state holding companies (e.g., Temasek, which holds controlling stakes in Singapore's twenty largest companies), and government-owned separate firms such as Japan's National Oil Corporation and 77other state corporations, Italian railroads, French automotive plants, and Amtrak in the U.S. Cooperative ownership can be broken down into workers' cooperatives, consumer cooperatives, and church-owned enterprises (e.g., the Trappist Abbey of Chimay in Belgium). Common property can be sub-classified into common access to no man's land, common access of the community as a whole, and confiscated property before settlement, which, in turn, breaks down into government confiscations, conquests, and private plunder or piracy. On top of all these refinements, one can make an additional cross-section which distinguishes de jure and de facto property. One is legal, the other is control (exclusive rights) over equity and over accrual of returns on assets. Collective farms and rural communes in central plan economies can be de jure cooperative and de facto state-owned. Enterprises in Russia and similar countries under Enterprise Network Socialism can be de jure fully or partially state-owned and de facto partly private and partly common. They do not remit profits or dividends to the government, which would make them usufruct. The government has forfeited control over equity so that managers strip assets. The disposable value of equity reverts to the government only when it sells the enterprise. Until then, the government has no exclusive rights to equity (net assets) and distribution of earnings, which makes property partly private and partly common.

Accounting makes is possible to work out a simple, unambiguous, and comprehensive definition of property rights (ownership). It derives property rights from the balance sheet and the profit and loss statement. Ownership signifies exclusive control over equity (assets less liabilities, or net assets) and over accrual of net disposable returns on assets (profits, distributed earnings or dividends, interest, other returns on financial assets, and rent). Control constitutes exclusion of non-owners from the disposable value of net assets and from accrual of net disposable returns on assets.[8] We submit that this accounting definition is more rigorous than the existing legal and economic definitions.[9] It is fully and equally applicable to every possible type of property rights and it clearly and unambiguously identifies the type of ownership in each specific case. One can run a simple test. In any empirical case, the disposable value of equity and returns on assets accrue to one or another owner. One can take any empirical case and determine the type of ownership and the identity of owner by this yardstick.[10] If a case emerges wherein this test fails to perform,

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[8]Thomas Hobbes laid down the definition of property rights as exclusion of non-owners, both private actors and the government. "Each particular citizen has a propriety to which none of his fellow-citizens hath right." "Each subject hath an absolute dominion over the goods he is in possession of: that is to say, such a propriety as excludes not only the right of all the rest of his fellow subjects to the same goods, but also the magistrate himself." Thomas Hobbes, *De Cive or The Citizen*, pp. 80, 134. "Every private man has an absolute propriety in his goods; such as excludeth the right of the sovereign. Every man has indeed a propriety that excludes the right of every other subject." Thomas Hobbes, *Leviathan* (Cambridge: Cambridge University Press, 1996), pp. 224-225. "Whatsoever right any man requireth to retain, he allow every other man to retain the same (...) The breach of this law is that which the Greeks call A8,@<,.4", which is commonly rendered covetousness, but seemeth to be more precisely expressed by the word encroaching." Thomas Hobbes, *The Elements of Law Natural and Politic* (Oxford: Oxford University Press, 1994), p. 94.

[9]Modern literature rediscovered Thomas Hobbes' idea of exclusion as the existential difference of humans. Property rights (ownership) are the most tangible manifestation of exclusion. Modern literature defines it as residual control of owners over assets. Control is residual after allowing for the exercise of control by the government, creditors, the community, and the customary authority. See Sanford J. Grossman and Oliver D. Hart, "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration," *Journal of Political Economy* 94, no. 4 (August 1986): 691-719, and Oliver D. Hart and John Moore, "Property Rights and the Nature of the Firm," *Journal of Political Economy* 98, no. 6 (December 1990): 1119-1158. The accounting definition supercedes this formulation. The balance sheet automatically includes and separates control by creditors because equity subtracts liabilities from assets and limits exclusive control of owners to assets net of liabilities. The balance sheet and the profit and loss statement incorporate control by the government in both fiscal and regulatory capacity because tax liabilities are subtracted from assets as part of overall liabilities, and because equity and returns on assets accrue after any impact of regulation on the income from a given property. The latter allowance also applies to control by the community and the customary authority. The advantage of thinking in terms of exclusive control over equity and returns on assets rather than residual control of owners over assets is twofold. First, it is unambiguously identifiable and quantifiable. Second, it is a universal definition. It accommodates ownership of the modern corporation. The characteristic of the modern corporation is separation between ownership by shareholders and control by managers. Residual control over assets can be exercised by managers, not shareholders. Defining ownership as residual control over assets does not answer who owns the modern corporation—shareholders, managers, or both. Residual control and other non-accounting treatments of property rights leave the modern corporation in analytical limbo. Exclusive control over the value of equity and distributed earnings (dividends) identifies the modern corporation as the private property of shareholders.

[10]The above example of the modern corporation is just such a test. Another, more complex test concerns de jure state ownership of Russian enterprises under Enterprise Network Socialism and their de facto combination of private

the definition of property rights proposed here is not sufficient and may not be necessary.

Common property is simply the antipode of property rights. It entails absence—non-existence or nullification—of ownership. There is no exclusive control over equity and over accrual of returns on assets. This makes assets common property.[11]

The technical part of measuring property types is simple. Consumer assets and most financial assets by the nature of savings are in private hands. They can be set aside. This leaves non-financial producer assets which consist of production factors—capital stock and land—and inventories. The share of producer assets by each property type in total assets gives a distribution of property types in the economy. Valuation of producer assets is based on their returns. It is sufficient to estimate the share of GDP produced by capital stock and land of each property type as a first approximation. One barrel of oil or one pound of butter add the same value to GDP regardless of who owns assets. Distribution of production by property types can approximate the distribution of assets by property types in every and all economies.

The conceptual difficulty begins to arise from the multiplicity of property types. If there were only two types, most conveniently, private and state ownership, the shares of their output in GDP would give a comparative property measurement across all economies. Alas, there are at least five disparate property types: private, cooperative, local, state, and common. Several historical and contemporary economies exhibit only one or two types, for example, common property in primordial societies and predominantly state ownership in industrial central plan economies (except Nazi Germany and Communist Yugoslavia) with the subordinate cooperative sector. But the rest of the world, past and present, extends to more than two property types. A comprehensive cross-national comparison over time requires a uniform standard which can measure all known property types on one scale.

The paradox of property rights, which we approach now, renders a unique standard for the scale

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ownership by managers and common property between managers and the government. It was also discussed above.

[11]Common property spawned seminal literature. See H. Scott Gordon. "The Economic Theory of a Common-Property Resource: The Fishery," *Journal of Political Economy* 62, no. 2 (April 1954): 124-142; Garrett Hardin, "The Tragedy of the Commons," *Science* 162 (December 1968): 1243-1248; Vernon L. Smith. "The Primitive Hunter Culture, Pleistocene Extinctions, and the Rise of Agriculture," *Journal of Political Economy* 83, no. 4 (August 1975): 727-755; Garett Hardin and John Baden, eds., *Managing the Commons* (San Francisco: Freeman, 1977); Carlisle F. Runge, "Common Property Externalities: Isolation, Assurance, and Resource Depletion in a Traditional Grazing Context," *American Journal of Agricultural Economics* 63, no. 4 (November 1981): 595-606; Elinor Ostrum, *Governing the Commons* (New York: Cambridge University Press, 1990); and Garrett Hardin, "The Tragedy of the Unmanaged Commons: Population and the Disguises of Providence," in Robert V. Andelson, ed., *Commons Without Tragedy: Protecting the Environment from Overpopulation—A New Approach* (London: Shepheard-Walwyn; Savage, MD: Barnes & Noble, 1991), pp. 162-185. On the impact of property confiscation, see Douglass C. North, William Summerhill, and Barry R. Weingast, "Order, Disorder and Economic Change: Latin America vs. North America," in Bruce Bueno de Mesquita and Hilton Root, eds., *Governing for Prosperity* (New Haven: Yale University Press, 2000), pp. 17-58.

on the property dimension impossible. The standard is inherent in the principal dichotomy of property rights vs. common property and in the accounting definition of property rights. It is the level of exclusion of non-owners from the value of equity and from accrual of returns to owners. It ranges from 100 percent exclusion, which is total property rights, to 100 percent non-exclusion, which is totally socialized property, namely common property.

Property rights	Common
Private, Cooperative, Local, State, in one or another order	Common

<————Exclusion————————————————————Non-exclusion————>

Common property is ultimate non-exclusion. But which ownership type makes ultimate exclusion? How the four types of property rights (ownership) can be measured by the level of exclusion? How to determine the order in which each subsequent type has more property rights than the other or is more socialized than the other? Enter the paradox of property rights. Assets (and hence equity and accrual of returns) that are more private and less statist, and thus less socialized by status, are also more liable to confiscation by the government or private predators, and are thus less proprietary and more socialized in practice.

Property types by status:

Property rights				Common
Private	Cooperative	Local	State	Common

<————Privatized————————————————————Socialized————>

Property types in practice:

Property rights				Common
State	Local	Cooperative	Private	Common

<————Proprietary————————————————————Socialized————>

The order of socialization of property by types of ownership runs in opposite directions in status vs. practice. The more ownership *is* atomized (de-socialized) the easier it *can be and has been* socialized. This is the inherent paradox of property rights. It rules out the possibility of a unique standard for measuring property types on a uniform scale on the property dimension.

What is left possible? One can try four alternative imperfect strategies.

1. Simply measure the level of redistribution of property. Estimate the share of GDP produced by assets which are either in common property from the start or confiscated by the government and private predators during a given period. It can approximate the level of redistribution of the net value of assets (equity). This is the best measure of security and enforcement of property rights, with the opposite sign. It captures one of the key influences on economic performance across economies. This is an advantage of this strategy. The downside is that it skips specific types of property rights (ownership). One cannot use it to study empirical heterogeneity of income, government, and property types on a multi-dimensional map of the world.

2. Reduce five property types to a dichotomous binary. The simplest method is to select one type of importance and lump together the rest in the opposite group. The obvious groupings are a) private vs. non-private property; and b) state vs. non-state property. Use the GDP share of the primary type or group as a measure. The advantage of this strategy is sharp contrasts between comparable economies within specific samples, e.g., post-Communist economies or Western market economies vs. Communist and developing economies. The disadvantages are serious. First, it does not incorporate security and enforcement of property rights. This minimizes its usefulness for historical and developing economies. Second, it misses key distinctions such as common property, which prevailed over long periods of history, and ownership by local governments in post-Communist China. One cannot use this strategy to study empirical multi-dimensional heterogeneity.

3. Use the entire distribution of GDP by five property types in lieu of the property dimension. Each economy has its own distribution. All economies make up a tabular assembly with five typological columns. In a diagrammatic form, a color distribution can be inserted in lieu of the third dimension inside the two-dimensional frame. Figures 3.3 and 3.4 apply this strategy. Figure 3.3 attaches an estimated distribution of property types to major historical and contemporary economies on the map. Figure 3.4 disaggregates the map into 33 empirical property episodes in specific economies. As before, the size of the gears indicates the extent of compensation of spillovers. The upshot of this strategy is that it incorporates all property types into a multi-dimensional map and captures its empirical heterogeneity. The downside is that it loses a uniform measurement of property types on a continuous scale.

4. Apply separately each of the two alternative standards for the continuous scale of five property types. The two small color tables above line up these standards. One standard is the extent of socialization vs. privatization, from private to cooperative to local to state to common property. The second standard is the extent of socialization vs. proprietary ownership, from state to local to cooperative to private to common property. With any standard, one can treat each property type as a discrete value on the scale from 1 to 5 or a range on the scale from zero to 100 percent. Then the share of GDP by each property type in a given economy serves as a weight. The distribution

FIGURE 3.4. PROPERTY TYPES ON THE INCOME AND GOVERNMENT DIMENSIONS

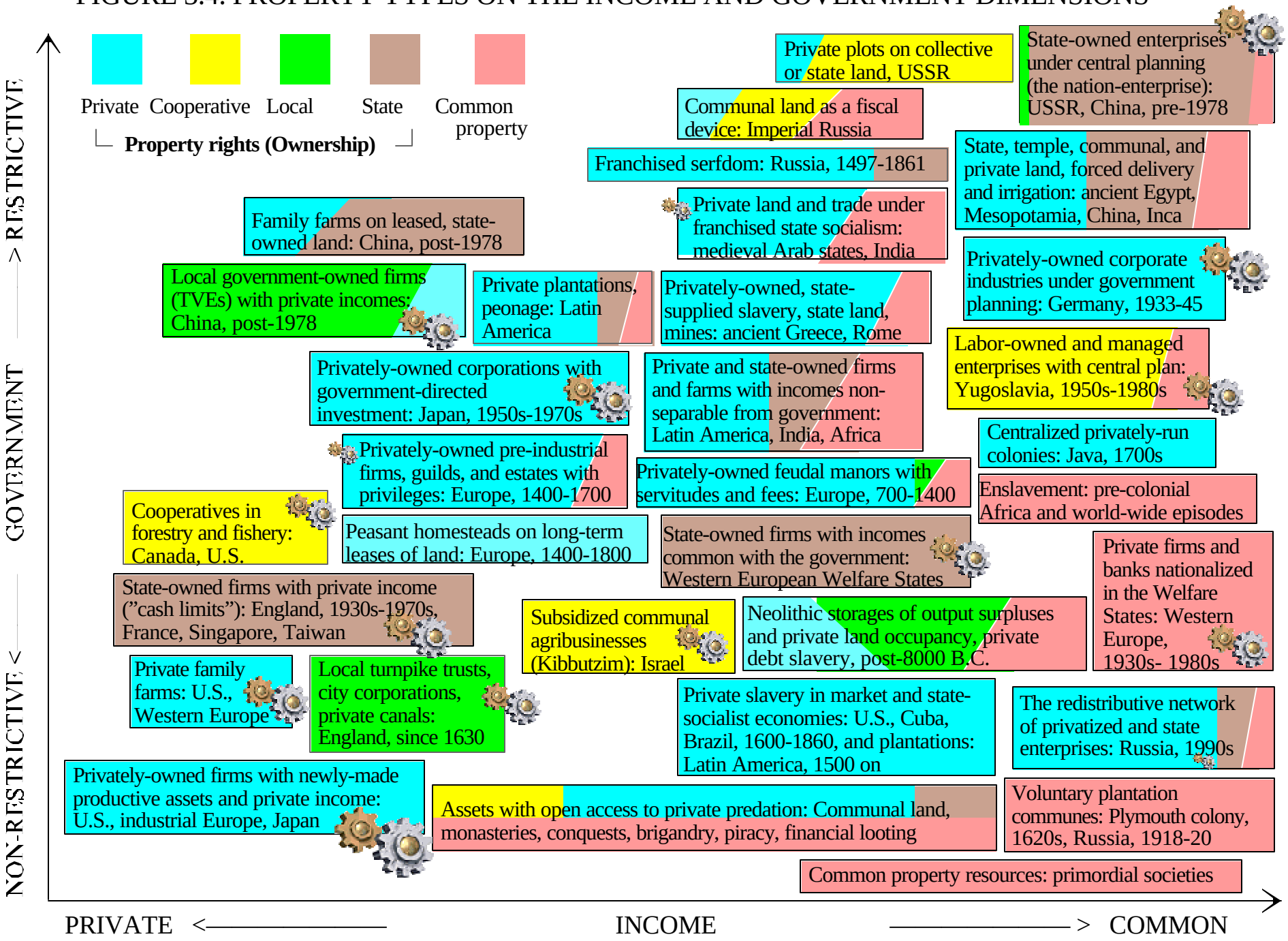


FIGURE 3.5. PROPERTY TYPES, INCOME TYPES, AND GOVERNMENT RESTRICTION: 33 EMPIRICAL EPISODES

(Common property is in red. The crowd symbolizes common income;double crowd near-total common income)

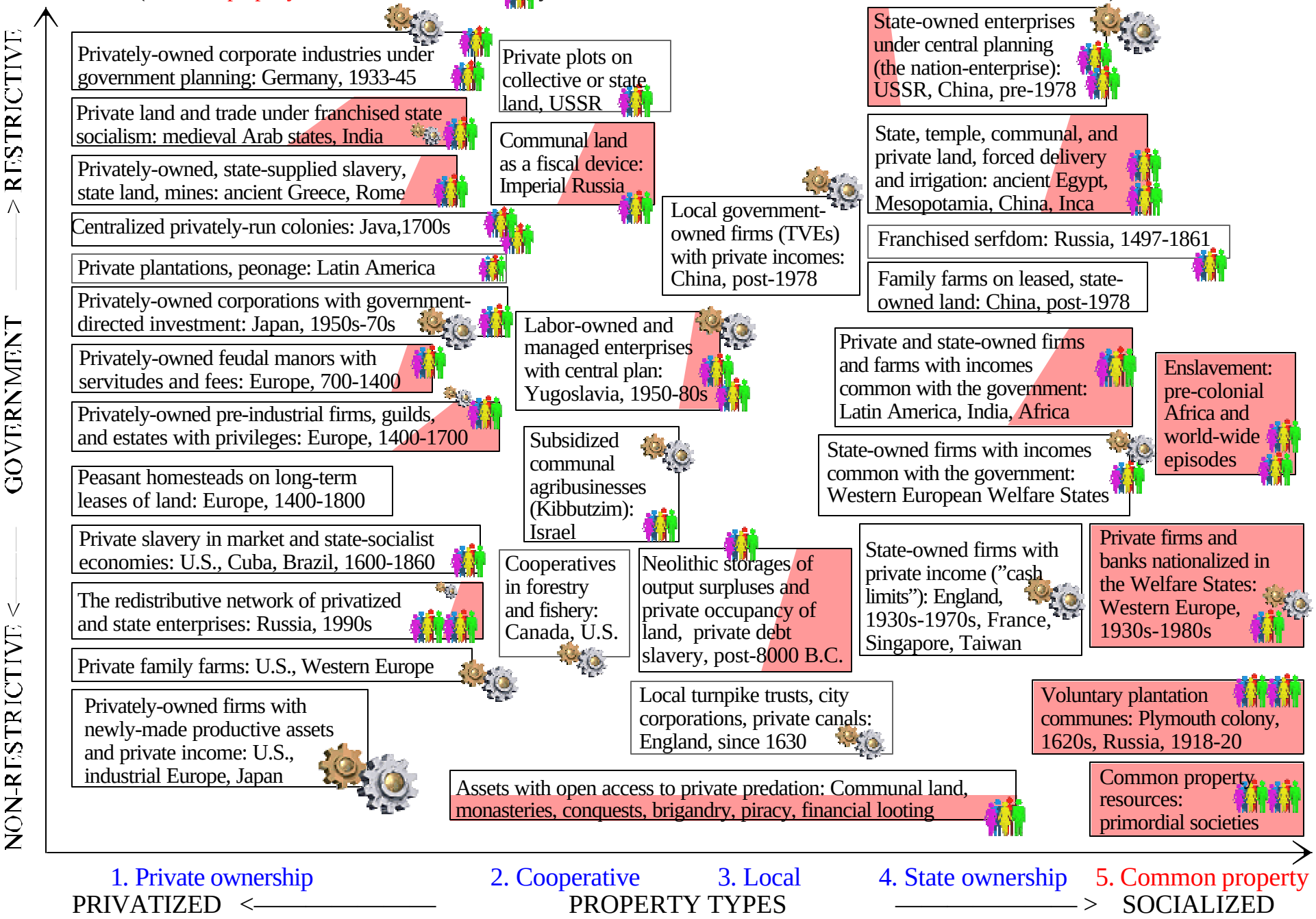
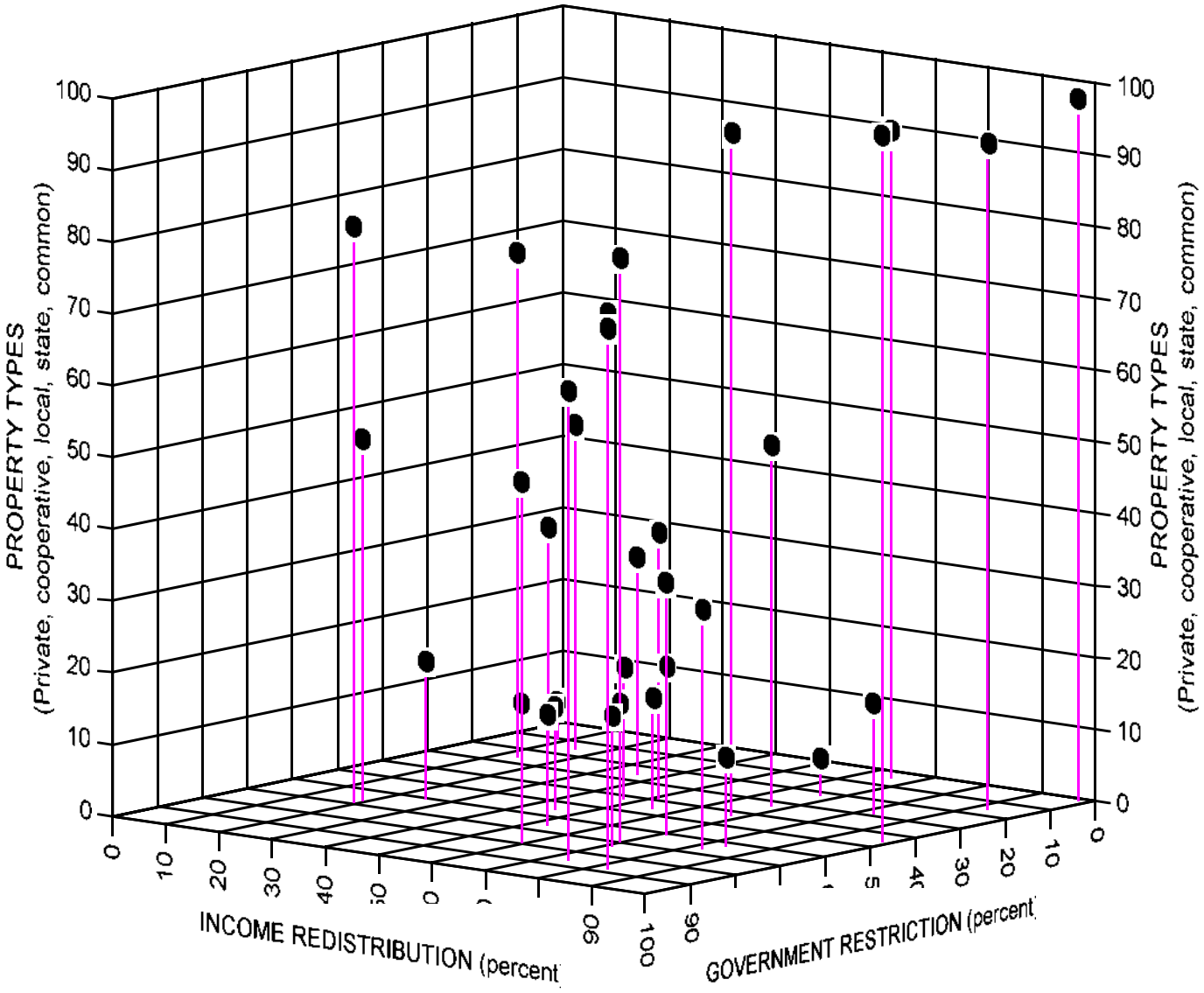


FIGURE 3.6
A THREE-DIMENSIONAL VIEW OF INCOME REDISTRIBUTION, GOVERNMENT RESTRICTION, AND PROPERTY TYPES: 33 PROPERTY EPISODES



Sources: Figures 3.4 and 3.5, Annexes 3.1 and 3.2, and the literature in footnote 51 in Chapter 2

of GDP by property type yields the weighted average of property types in each economy. Figures 3.5 and 3.6 chose as the standard the extent of socialization vs. privatization. Figure 3.5 arranges 33 empirical property episodes by their dominant property type as an index from 1 to 5. To account for the additional extent of socialization due to confiscation of assets, figure 3.5 adds red color for the share of common property in each relevant episode. Figure 3.6 applies directly the weighted average of socialization by property types (weighted by their share in production of GDP) estimated for the same 33 property episodes. One can choose an alternative standard of the extent of socialization vs. proprietary ownership. It will take a simple rearrangement of columns in figure 3.5 (4 becomes 1, 3 becomes 2, 2 becomes 3, and 1 becomes 4) and a corresponding recalculation of weighted averages in figure 3.6. The format of both figures will remain the same. The downside is that neither standard is definitive.

Figures 3.3 and 3.4 and figures 3.5 and 3.6 form two alternative pairs of the four-dimensional expansion. Figure 3.3 attaches crudely estimated distributions of property types (measured as shares of GDP produced by given property types) to the countries and supra-national regions located on the two-dimensional map.[12] By analogy with geographical maps, one can think of the property dimension as the altitude while the income dimension serves as a latitude and the government dimension is the longitude. Unlike the altitude in geographical maps, we do not spread colors over territories because each specific distribution of property types is scattered throughout a given economy. A geographical distribution of property types in each economy is interesting in itself but does not necessarily correspond to the distribution of property types as shares in production of GDP. This is why we merely attach the distribution of property types to each country or region.

Figure 3.4 disaggregates the map to 33 empirical property episodes. They are dispersed inside the two-dimensional frame according to their extent of income redistribution and government restriction. Instead of national and supra-national economies, this map organizes the world by property types. Some property episodes represent historical or contemporary economies as a whole or almost as a whole, for example, cental plan economies with state ownership in the USSR and Communist China, with cooperative ownership in Communist Yugoslavia, and with private ownership in Nazi Germany or privatized and nominally state-owned enterprises under Enterprise Network Socialism in post-Communist Russia. Other property episodes exhibit only segments of complex economies in which multiple property types are prominent. In this case, the same economy appears at least twice on the same map. For example, private plots on collective and state land, which accompany cooperative ownership in Communist countries, coexist with state-owned enterprises. The two-track economy in post-Communist China combines separate property episodes of the inherited state-owned enterprises, private family farms on state-owned land, and local government-owned firms with private income, Township and Village Enterprises (TVEs). Although the property dimension is inserted inside the two-dimensional frame of income and government, the distinguishing variable in figure 3.4 is property types.

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[12]We use the 33 empirical property episodes from figure 2.3 for reference. Their documenting literature is listed in footnotes 36 and 51 in Chapter 2. Figures 3.4 through 3.6 reapply these 33 empirical property episodes directly.

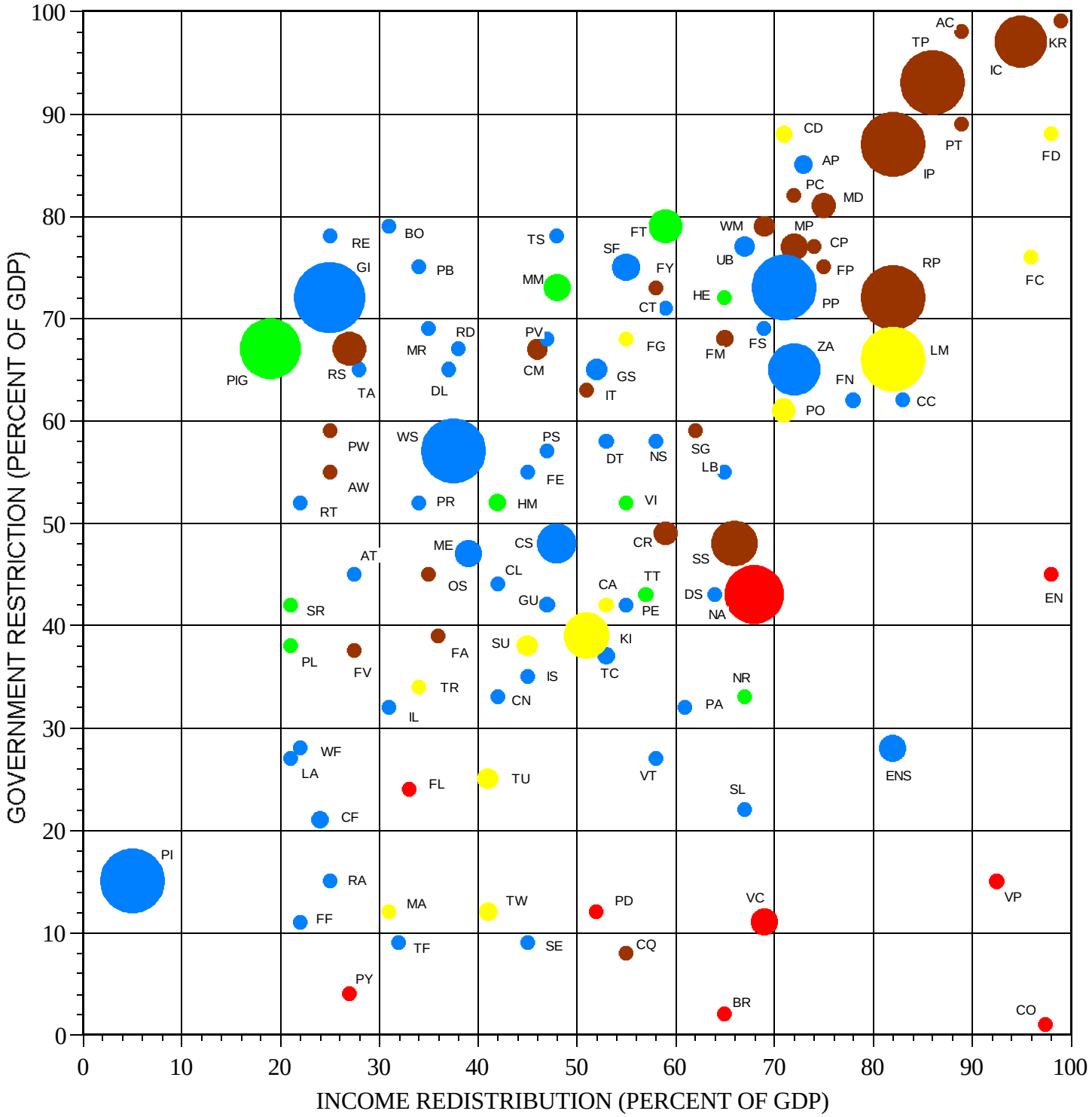
Figure 3.5 makes the property dimension the primary dimension and property types the organizing variable on the scale of privatization vs. socialization. The 33 property episodes line up by their dominant property types, with the adjustment for the extent of confiscation of assets in each episode. The income dimension is inserted in three qualitative categories. The sign of the crowd symbolizes partial common income. Double crowd stands for near-total common income in ancient agricultural central plan economies, modern industrial central plan economies, the privately-run central plan colony of the Dutch Java, voluntary plantation communes from the Plymouth Colony in the 1620s to Russian War Communism in 1918-20, in primordial societies, and under Enterprise Network Socialism in Russia and similar countries. Economies with private income escape a crowd sign. In one glance, one can assess the property status around the world and through history on the scale from privatization to socialization of assets under limited and restrictive government.

Figure 3.6 quantifies figures 3.4 and 3.5 in the three-dimensional frame. It maps the same 33 empirical property episodes. It uses the same continuous standard of property types as figure 3.5 by the extent of socialization vs. privatization. Figure 3.6 drops the externalities dimension for simplicity. Quantification of the rates of income redistribution and government restriction as shares of GDP on the left and right horizontal axes, respectively, is direct. All errors of measurement are correctable; they are not due to limits to measurement. Quantification of property types on the vertical axis as the level of privatization vs. socialization in production of GDP in each economy or sector suffers from limits to measurement.

The principal limit is that we estimate a continuous dimension over the sequence of discrete ranges assigned to each property type. The levels of privatization and socialization in each property type, in each economy, and in each empirical episode are additive to 100 percent. This linear approach prescribes no intrinsic rule for the selection of ranges for specific property types. One can say that common property starts at 60 percent socialization and goes to 100 percent whereas the four types of ownership cover equal 15 percentage-point ranges. Alternatively, one can view private property as zero percent socialization, in the same vein as pure private income equates with zero rate of income redistribution. This would line up a continuum from zero socialization of assets under private ownership to total socialization under pure common property. In this case, the ascending of property types towards socialization starts with cooperative property at one percent socialization and passes through equal or unequal ranges to total common property at 100 percent socialization. The choice of unequal ranges of the level of socialization for each property type is infinite. For example, one can always argue that local government property occupies a limited range whereas national state ownership covers a great range of socialization. The least judgmental solution is to simply ascribe the equal sequential 20 percentage-point ranges of socialization to each of the five property types. The property dimension then divides into five quintiles. Private property covers one to 20 percent, cooperative property 21 to 40 percent, local government ownership 41 to 60 percent, national state ownership 61 to 80 percent, and common property 81 to 100 percent socialization. Figure 3.6 takes this least discretionary approach. The distribution by quintiles makes it easier to adjust each specific economy or empirical case for the incidence of property confiscation. If a given empirical episode is dominated by typical private property, in the range of 1 to 20 percent socialization, and one in

ANNEX 3.2

THE FOUR-DIMENSIONAL TABLE OF ECONOMIC SPECIES



Notes:

1. Codes are listed in the legend for the two-dimensional table of economic species
2. Colors designate property types which dominate a given economic species:

Private Cooperative Local government National state Common

3. The size of the bubble estimates the rate of remuneration for the production of ideas, invention, and technological innovation

four units of assets is confiscated by the government or private predators during its life-time in the most conventional manner, one can assign the average value of 10 to 75 percent of assets and the value of 90 to 25 percent of assets. By the weighted average, this episode amounts to 30 percent socialization of property. Figure 3.6 incorporates similar adjustments for each empirical property episode with the estimated incidence of property confiscation. These are crude approximations but the illustrative nature of this exercise makes it not sensitive to measurement errors.

Finally, one can select an alternative continuous standard for measuring property types by the extent of socialization vs. proprietary ownership. A new standard requires recalculation of the values for specific economies and empirical property episodes on the property dimension within the same three-dimensional format of figure 3.6. It may be germane to employ both quantitative standards of the property dimension. This is not necessary for our purpose. A different standard of measurement rearranges values but does not diminish their vast dispersion. One property standard is sufficient to document empirical multi-dimensional heterogeneity through ages around the world.

A moveable map

To make the multi-dimensional map in figure 3.3 and other figures readable and not overcrowded, we singled out only big countries and aggregated other economies by supra-national regions. This broad brush lumps together historical and contemporary economies by distinctive periods or whole epochs. They all can be disaggregated to any level of detail in time, space, and economic activity. The table of 110 economic species in Annexes 3.1 and 3.2 submits an extensive, if incomplete, disaggregation. No economic cluster is too big and no economy or its sector at any time span is too small for the multi-dimensional map. One can add to the map every individual economy, past and present, at any point in time, and every sector of each economy.

North Korea and Cambodia under the Khmer Rouge, extreme examples of near-total common income under near-total government and state ownership, would fit the tip of the north-eastern corner in figure 3.3. The Inca Empire, a veritable state agricultural commune, would lie nearby. Similar economies with agricultural central planning, in ancient Egypt, Mesopotamia, India, China, Japan, the Great Zimbabwe, and the Aztec and Maya Empires, could find their place near Nazi Germany and Communist Yugoslavia. Annexes 3.1 and 3.2 approximate their locations. Post-Communist Poland, Hungary, and similar economies, judging from their progression from common to private income in figure 2.1 and the estimated extent of government restriction, can be located on a diagonal between post-Communist China and Russia. One can take the world in figure 3.3, itemize it into a long list of national economies as they have evolved through history, and place each of them. This would make up a crowded map but not one observation will be missed. The map can accommodate any and all economic entities, provided the relevant data exist. They all can find their place on the map by the extent of income redistribution and government restriction. The property type or mix and the status of spillovers in each observation enhance multilateral heterogeneity.

One can choose a variety of types of aggregation and disaggregation. Subsequent maps in our book offer a few examples. Figure 2.4 in Chapter 2 aggregated world economies by economic policy

paths, such as breakup of common income, liberalization, and privatization. Figure 3.3 uses a simple intuitive hierarchy of national economies and supra-national regions during specific periods. Figures 3.4 through 3.6 disaggregate them by 33 empirical property episodes. The table of economic species in Annexes 3.1 and 3.2 disaggregates world economies into 110 unique, self-contained, and indivisible species defined by the rates of income redistribution and government restriction. Chapter 7 disaggregates world economies into thirteen major empirical clusters during the last 10,000 years in figure 7.1. Then it aggregates them in a sequence of figures into six systemic classes and builds a taxonomy of economic systems. The learning opportunities seem to be unlimited. Various levels of aggregation can be geographic, historical, by types of economic systems, by aspects of economic activity, by economic performance and paths of economic growth, and by any other conceivable cross-section of the universe.

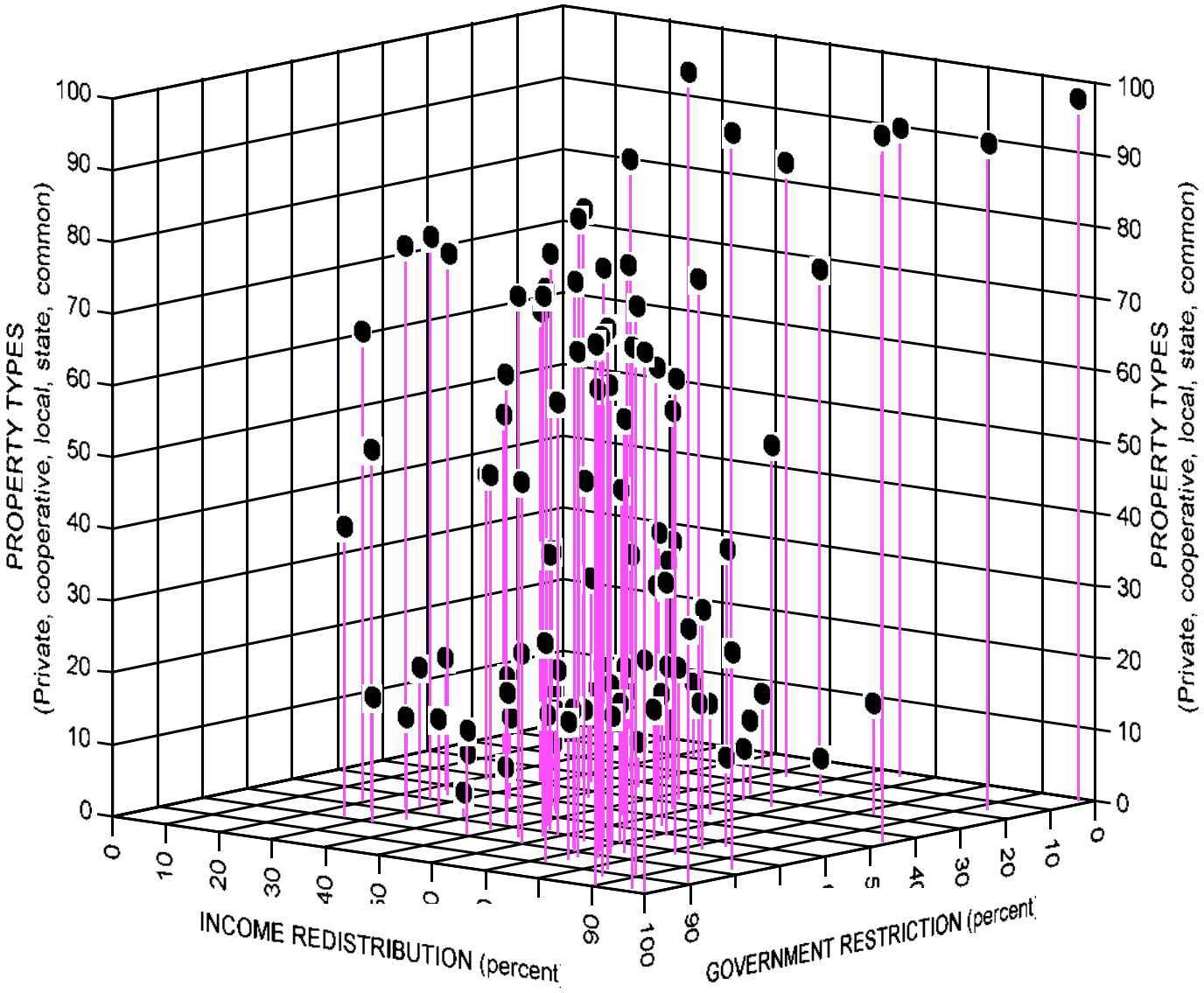
Measurement is also a learning process. It derives from a consistent accounting approach which is based on the uniform criteria of exclusion specific to each dimension. Matrix 3.1 summarizes the accounting mechanisms and measurements on the four dimensions.

Measurement improves by learning. Locations of economies in figure 3.3 are crude and tentative approximations. The multi-dimensional map does not pretend to pinpoint exact locations of specific national and supra-national economies at any period of time. Its objective is less ambitious and more fundamental. It is to show that each and every economy can be identified, located, and installed on the multi-dimensional map. The crude and tentative approximations serve merely as a starting point of learning. Each empirical case can be readily relocated on the map when more rigorous measurement and better data yield more accurate positions on one or more dimensions. All errors of measurement and judgement can be rectified by relocations. Locations can be further adjusted and refined when more reliable information arrives. We call it a moveable map in the same spirit as Ernest Hemingway called Paris of the 1920s "A Moveable Feast."

The multi-dimensional framework does not make predictions about locations of specific economic observations. It derives observations from sources of various validity and accuracy and makes the best possible estimates for each dimension. For this reason, correction of errors does not invalidate the framework and the layout of the multi-dimensional map. The map as such does not depend on the accuracy of specific locations. The quality of the map does. Correction of errors and repositioning of economies improves this quality and strengthens the multi-dimensional construct. One can say that in the process of learning, the multi-dimensional map is self-correctable.

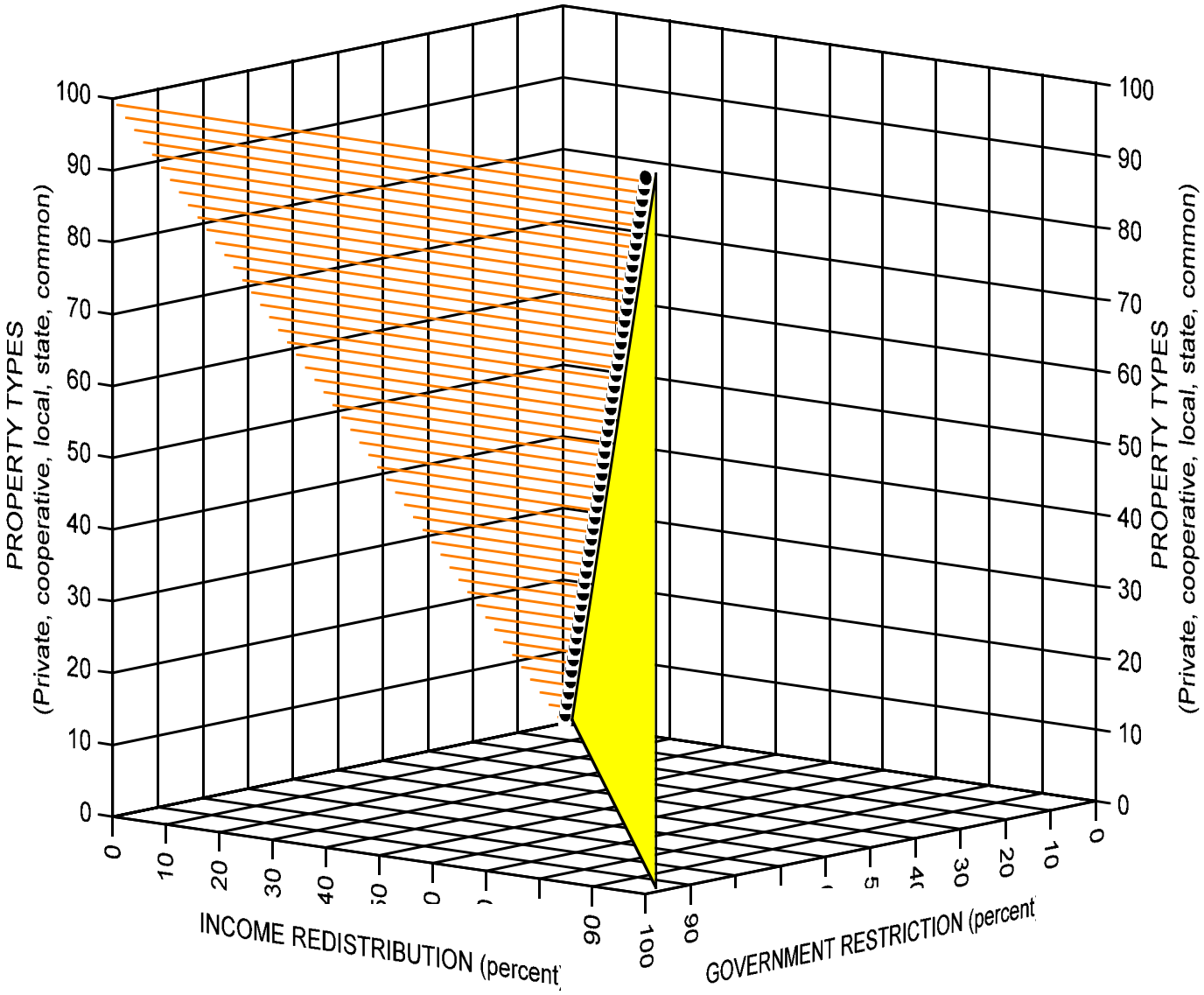
The multi-dimensional designs in figures 3.3, 3.4, 3.5, and 3.6 are different. The finding is the same. Russia and China are not just transitional outliers from a one-dimensional world. Rather, they are salient cases of a universal pattern. Figures 3.3 through 3.6 demonstrate the lack of correlations between income redistribution, government restriction, and property types. They emerge as uncorrelated independent variables. This is true around the world and through history.

FIGURE 3.7
A THREE-DIMENSIONAL VIEW OF INCOME REDISTRIBUTION, GOVERNMENT RESTRICTION, AND PROPERTY TYPES: 110 ECONOMIC SPECIES



Sources: Annexes 3.1 and 3.2

FIGURE 3.8
A THREE-DIMENSIONAL VIEW OF INCOME REDISTRIBUTION, GOVERNMENT RESTRICTION, AND PROPERTY TYPES: 50 EQUIPROPORTIONAL CASES



Is this multi-dimensional map necessary and sufficient?

Two empirical conditions can each invalidate the multi-dimensional map exemplified in figure 3.3 and subsequent figures. One makes it unnecessary, the other insufficient.

1. If all economies can be compressed to fit a unidimensional line such as the diagonal in figure 3.3 or the scatter in figure 3.7, the split between income redistribution, government restriction, and property types becomes unnecessary. This is the test of strong positive correlations between these variables. It renders the separate income, government, and property dimensions unnecessary. A homogeneous world fits on one dimension. Multi-dimensional heterogeneity vanishes.

2. If one or more economies cannot be placed on the map within the two-dimensional frame of income and government, let alone the three-dimensional frame of figure 3.6, and lie outside, this multi-dimensional framework is not sufficient. This is the test of universal inclusion.

Figures 3.3, 3.6, 3.7, and 3.8 offer two quick tests of positive trilateral correlations. These tests apply to different levels of aggregation.

The first test runs at the level of national economies and supra-national regions. One can compare the one-dimensional diagonal in figure 3.3 with the rest of the map. The rest of the map should be empty if the extents of income redistribution, government restriction, and socialization of property types converge in all empirical observations. If these extents are not equiproportional but still exhibit a strong positive correlation, a positively sloped regression line can be drawn. It will resemble the diagonal and will differ from it only in the slope. The rest of the map outside of this line should be mostly empty, with a minimum of outlying observations. For the strong positive correlation between these variables to be possible, all conceivable measurement errors in figure 3.3 should not be random. All errors should constitute deviations from the diagonal or from another positively sloped line. This is probable only if a multi-dimensional dispersion in figure 3.3 was fabricated. Corrections of these measurement errors should converge all economies towards the unidimensional diagonal or a positively sloped line, relocate economies from all directions onto or around one line. Moreover, even the heterogeneous qualitative characteristics and multiple trilateral combinations in table 3.1 should disappear. Primordial common output, private slavery, brigandry, piracy, the two-track economy in post-Communist China, and Enterprise Network Socialism in post-Communist Russia should *all* be rendered non-existent or devoid of their unique trilateral combinations. All these and other economies from figure 3.3 should find a place on the one-dimensional map in figure 3.2. This is a forthright test readily available to any observer.

The second test disaggregates national economies and supra-national regions into property episodes and into elementary units, economic species. A comparison between figures 3.6, 3.7, and 3.8 conducts this test in the three-dimensional frame with economies disaggregated into property episodes. Figure 3.6 plots 33 actual property episodes in historical and contemporary economies. They are identified in figures 3.4 and 3.5 by their extents of income redistribution, government restriction, and property types

linearized on the scale of socialization vs. privatization. We discussed these measurements in detail above. The three-dimensional scatter diagram depicts each empirical episode with the blue dot and a drop-down projection line to the respective rates of redistribution on the income dimension and restriction on the government dimension. Figure 3.7 plots 110 elementary systems which are unique, self-contained, non-overlapping, and indivisible by themselves, in the absence of breakups. Their description can be found in the Table of Economic Species in Annex 3.1. The measurement of economic species in three dimensions in figure 3.7 is the same as the measurement of property episodes in figure 3.6. We will discuss the Table of Economic Species in detail later in this chapter.

Against the two plots of actual observations in figures 3.6 and 3.7, figure 3.8 makes up 50 fictitious cases with equiproportional extents of income redistribution, government restriction, and property socialization. We limited the number of fictitious cases to 50 for visibility only. The number of equiproportional cases can be increased indefinitely. One could use any other trilateral proportions as long as the three variables are strongly positively correlated. One could also apply a different standard of continuous measurement of property types. The picture would essentially be the same. A strong positive correlation between the three variables converges the scatter of 50 observations onto one linear trajectory. For visual comparison, the blue dots of 50 observations project the drop-down yellow lines to the equal rates of income redistribution and government restriction and the drop-down orange lines to the equal extents of income redistribution and property socialization.

The three-dimensional scatter diagram in figure 3.8 is appealing. Alas, its content does not exist. Its 50 observations represent a sequence of numerical matches which has no bearing in the real world. The contrast between figures 3.6 and 3.7 vs. 3.8 is stark. The real world is scattered all over the space within the three-dimensional frame in figures 3.6 and 3.7. It is uncorrelated between variables, in the same way as the 33 empirical episodes are dispersed throughout the map in figures 3.4 and 3.5 and the 110 economic species are dispersed all over the map in Annexes 3.1 and 3.2. The imaginary world of strong positive correlations between the three variables lines up in figure 3.8. This imaginary world in figure 3.8 corresponds to the one-dimensional world in figure 3.2. If one can reduce the scatters in figures 3.6 and 3.7 to the string in figure 3.8, the multi-dimensional frame is unnecessary.

The test of universal inclusion is the same test for two and more dimensions as we applied to the one-dimensional map. The standard of proof and refutation is the same. Can the map cover, accommodate, and absorb all known and all conceivable empirical cases, big and small, around the world and through history, from the beginning of human society to the time of this reading? If one can find a single economy or segment, extant or extinct, which cannot be placed on the map in figure 3.3 or among disaggregated units in Annexes 3.1 and 3.2, the multi-dimensional framework has failed. Falsification is instantaneous and irreversible. There should be no cases outside of the map.

This is a hard test. The condition of universal inclusion applies separately to each of the two basic dimensions, the income dimension and the government dimension, because they frame the latitude and the longitude of the multi-dimensional map. A failure of one of these dimensions to accommodate and

assimilate a single empirical case throws an outlying case outside of the map and dooms the entire framework to perish. This condition tests whether the income and government dimensions are genuine and not fabricated. The underlying problem with the one-dimensional perspective of government vs. market is not that it forms only one dimension but that it is a false dimension which does not fit the world. Piling up more false dimensions or even adding a genuine dimension such as property types cannot rectify this problem. The test of universal inclusion applied to the multi-dimensional map determines whether each of its basic dimensions is genuine.[13]

Furthermore, if cases are missing due to lacunae in our knowledge and are discovered later, they must be able to be installed on the map. If they do not fit any location within the two-dimensional frame, they invalidate the multi-dimensional approach. If errors of measurement and judgement are found in the placement of any number of empirical cases, they can be corrected, cases disaggregated or aggregated, and economies or species relocated. If errors are not correctable and the cases cannot be properly identified, relocated, and assimilated within the map, the multi-dimensional system fails the test of universal inclusion and is invalidated. The multi-dimensional framework is permanently open to verification and falsification. It can be immediately and irrevocably refuted by finding a single empirical exception to its universal inclusiveness.

Pending such refutation, the world on the multi-dimensional map seems all-inclusive. It captures universal experience. It is both static and dynamic. Any systemic metamorphosis and any policy shift in each economy can be navigated on this map. When economic systems change, economies move on the map and add to the map. This is why the same countries at different times appear in different parts of figure 3.3. China, the Soviet Union, and Nazi Germany under central planning and China, Russia, and united Germany after central planning find their specific locations on the same map. Similarly, pre-industrial Europe and contemporary Western market economies appear in different segments of the map. Figure 2.4 in the previous chapter sketched the economic policy paths such as breakup of common income, liberalization, and privatization. It contrasted liberalization and privatization without the breakup of common income in Russia as it descended from central planning to Enterprise Network Socialism and the breakup of common income with limited liberalization in China on the road to the market economy. It compared these two paths with a more conventional synchronization of the breakup of common income, liberalization, and privatization in the evolution of Western market economies. We will further explore this dynamic capacity of the multi-dimensional map later in this book.

The multi-dimensional framework illustrated in figure 3.3 and Annex 3.2 can encapsulate both the evolution of economic species from primordial common output to modern market and socialist economies and the current position of all existing economies. The four dimensions render systemic characteristics of all economies. Then the map framed by these four dimensions captures all economies and their paths. This multi-dimensional map creates a contemporaneous snapshot of all economies in the world throughout more

[13]The complementary, property and externalities dimensions, seem to be all-inclusive at the outset. There are always some types of property rights vs. common property and some compensation of spillovers of ideas (even if zero).

than 10,000 years of their evolution.