FIRST DRAFT

DOOMED TO CHOOSE:

INDUSTRIAL POLICY AS PREDICAMENT

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"We are doomed to choose and every choice may entail an irreparable loss."
-- Isaiah Berlin

Introduction

According to the view that has dominated the thinking if not the practice of economic policy in the past quarter century, industrial policy is a bad idea. It is bad because the allocation of resources in an economy is too complex and too information-sensitive a process to be centralized. That is the why central planning did not work. By contrast, the market allows production to self-organize by linking many independent decision-makers – the producers of eggs, milk, cheese, butter, olives, olive oil, wheat, bread, coffee and sugar, salt, pepper and their inputs, (cows, poultry, tractors, seeds, animal feed, gasoline, credit, electricity, transportation, retailing, refrigeration, accounting, advertising, etc.) – so that we can decide to have a cheese omelet, toast and coffee for breakfast. Economists since Adam Smith have been in awe of the miraculous capacity of the market to solve coordination problems that would be dauntingly complex if they were to be made through the *purposeful* planning of any collection of agencies. Moreover, the market can use a fundamental human trait – self interest – to address the incentive problems that this coordination entails, something that is harder to achieve through self-interest in government bureaucracies. In the Fable of the Bees, published in 1705, seventy-one years before The Wealth of Nations, Bernard Mandeville highlighted the importance of what he called private vices, i.e. greed, to achieve good social outcomes.

These are powerful and insightful ideas, and they have had long-lasting impact on the way in which economists think about the world. Since these early days, economists

have been deeply skeptical of the capacity of well-meaning bureaucrats and politicians to improve on the market outcome. As in these 17th century books, the fundamental arguments are two: information and incentives. First, governments cannot substitute for the decentralized information processing that markets can achieve. Second, even if they could, it is not clear what incentives would make them use this capacity to advance the public interest. In short, governments don't have the requisite information to *pick winners* but even if they did, they may not have the incentives to do so and if they tried, they would set off powerful rent-seeking behavior that will distort the achievement of the good intentions that motivated them in the first place. The proverbial road to hell is paved with well meaning industrial development plans.

In this paradigm, governments are needed to provide some basic public goods that are critical for an economy. The list may be longer or shorter. In one formulation, the market only needs three fundamental things for economies to flourish: a system of property rights and contract enforcement, sound money and openness to trade, investment and ideas.[1] One could add education, health and infrastructure, but the point is that a limited set of broad-based, sector-neutral and relatively independent interventions is what it takes. "Once a developing country government establishes the rules to a fair game and ensures their enforcement, it would be well advised to stand back and enjoy the self-generating growth" (Roll and Tallbott 2001).

And yet, governments have Ministries of Agriculture, Industry, Mining, Forestry and Energy. They have hundreds of specialized agencies that regulate food safety,

[1] See Summers (2003). Elsewhere he has stated that: "Traditional development prescriptions take a field of dreams approach--if you just create the right environment good things will happen--industries will come and flourish--there is no need to plan which ones or set strategy. And yet while industrial policy has often been a disaster, most growth does have some active driver" (personal communication).

financial markets, professional accreditation and telecoms. They have agencies that promote labor training, research and development, small loans and the arts. They have complex international trading rules and restrictions that are actively managed and constantly negotiated.

In the traditional formulation, these interventions arise because of some market failure. The list of potential failures has become more nuanced and sophisticated over time. Markets may be incomplete, or suffer from coordination failures or from positive or negative externalities such as information spillovers or pollution. Hence, the fear of government failure must be balanced with the risks of market failures. But without a clear understanding of what these failures may be and without a strategy to address the information and incentive problems that a well-meaning government would face, it may be best to refrain from much activism.

And yet, for all the philosophical discussions regarding these issues, in the last quarter century—a period in which the view we have just summarized became the dominant one in Sub-Saharan Africa and Latin America—the income gap between these regions of the developing world and the industrial countries has been steadily rising. In 1980, 32 Sub-Saharan countries had an income per capita at purchasing power parity equal to 9.3 percent of the US level, while 25 Latin American and Caribbean countries had an income equal to 26.3 percent of the US average. By 2004, the numbers had dropped to 6.1 percent and 16.5 percent respectively for these two regions. This represents a drop of over 35 percent in relative per capita income.[2] Why has the new wisdom not performed better than its predecessors?

[2] This is not a question of averages. The whole distribution of relative incomes moved down. The best performers in Africa and Latin America in 1980 reached 49 percent and 51.7 percent of US income

This has lead to a renewed willingness to consider amendments to the received wisdom of what constitutes best practice in economic policy. However, to make progress we need a more precise description of the nature of the potential market failures that may constrain the development process. In this paper, we set out to present some stylized facts about the development process and reflect back on the meaning that these may have for our conceptions of what it takes to promote development.

Poor countries export poor-country goods, rich countries export rich-country goods

Rich countries don't just produce more per person. They also produced different kinds of goods. Since countries tend to export the things they do relatively better (i.e. the products in which they have comparative advantage), it is instructive to know what happens to the composition of exports at different levels of development. In Hausmann, Rodrik and Hwang (2006) we developed a measure of the income level of exports, which we called *EXPY*. We constructed this in two steps. First, for each product traded internationally, we calculated the weighted average of the GDP per capita of countries that export that good, where the weights are the revealed comparative advantage in that good of the countries that export it. Hence we associate a certain income level to each product, which we call *PRODY*. Then, for each country we calculate *EXPY* as the weighted average of the *PRODY*s of the country's export basket, where the weights are the shares that each good has in the export basket of each country. Figure 1 shows a

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respectively. In 2004, the best performer in Africa, still South Africa, averaged 28.2 percent and 32.1 percent of US income, respectively, the countries being South Africa and Argentina. At the bottom, the worst performers in Africa and Latin America had incomes equivalent to 2.7 percent and 10.9 percent of the US level respectively, but these numbers dropped to 1.6 percent and 4.3 percent in 2004.

strong upward relationship between the level of income of a country and the level of income implied in its exports.[3]

The idea that rich (poor) countries tend to export goods exported by other rich (poor) countries is quite obvious and is compatible with many possible theories. For example, in conventional trade theory *a la* Heckscher-Ohlin, countries export products that are more intensive in the factors of production that are relatively abundant at home. As development takes place, physical, human and institutional capital is accumulated and the products countries export become more intensive in these factors. While this is no doubt part of the story, we shall argue below that there are also other important processes at work behind the relationship captured in Figure 1.

One implication of this relationship is that as the process of development takes place, countries change their export package, i.e. they must undergo structural transformation. Depending on one's view of the world, this may be easy or hard. In a Hecksher-Ohlin world, products have no major significance: they are a mechanism for countries to exchange the relative endowments of the underlying factors of production. Labor-abundant countries trade with land- or capital-abundant countries in order to acquire more efficiently the goods that are intensive in the factors they don't have. The transition between goods is of little significance: they are the passive consequence of changing factor endowments.

However, if changing products is complicated, i.e. if there are important market failures in the process of structural transformation, then for any given level of development, countries that have a more advanced export package are likely to grow more rapidly in the future. Since they have already upgraded their export package, their

[3] For ease of exposition, we will also refer to *EXPY* as the level of sophistication of exports.

income level can more easily catch up with this upgraded package. Those that have not yet gotten around to improving what they export, on the other hand, will be constrained by the low productivity associated with their export package, just as crustaceans cannot grow until they change their external shells. Hausmann, Hwang and Rodrik (2006) test this proposition. We illustrate the central finding in Figure 2. Controlling for other determinants of growth, a more sophisticated export package in 1992 is predictive of growth over the following 11 years. Countries converge to the level of income implied by their exports, or said differently: *you become what you export.* [4]

This is somewhat difficult to square with a strict interpretation in terms of conventional comparative advantage or Heckscher-Ohlin theory. Under received theory, a country with an export package that is significantly more sophisticated than that indicated by its current income level is one that has misallocated resources (by pushing them into areas where the country does not have a comparative advantage). Such a country should perform badly relative to countries whose export packages are more in line with current capabilities. That we observe the opposite suggests that the process of structural transformation is rifer with market failures than is implied by standard trade theory. What is the nature of those failures?

Market failures that impede structural transformation

In general, there are two classes of problems that may be involved: coordination failures and information spillovers. Coordination failures occur when markets are incomplete so that the return to one investment depends on whether some other

[4] Even though we show only cross-section results here, in Hausmann, Hwang and Rodrik (2006) we also perform 5-year and 10-year panel regressions using different estimation techniques and applying several robustness checks.

investment is also made: building a hotel near a beautiful beach may be profitable if somebody builds an airport. The opposite may also be the case. However, there may not be a way for the market to coordinate both investments. A typical solution is for the government to provide a guarantee to both investors. If done well, this will be costless for the government ex post as the investments will be profitable when they both take place. If the guarantee is not credible, then the government can just build the airport and the hotels will follow.

Another source of market failure is information spillovers. In Hausmann and Rodrik (2003) we stressed the spillovers in self-discovery, which we defined as the process of finding out the cost structure of an economy for the production of new goods.[5] The first mover will find out whether something is profitable or not; if it is, she will be copied by other entrants. But if she fails, she bears the whole loss. Because of this, the private returns from engaging in this type of innovation are lower than the social benefits, and the market incentives for self-discovery are inefficiently low. The typical policy implication is to provide a subsidy in order to bring the private returns in line with the social returns.

Labor training is another source of spillovers. A firm that trains its labor force provides a potential benefit to other firms that may poach its workers. This dampens the incentives to provide the optimal amount of training for fear of losing the investment. Clearly, labor mobility may not entail a social loss, as the worker can deploy his skills elsewhere, but the company cannot appropriate these benefits while incurring the training

[5] Structural transformation is not really about inventing new products. It is about identifying which of the products that exist in the world a particular country profitably produce. Hence, it is not a discovery of a product, but of a national capability: hence the term.

cost. The problem is inadequate investment in labor training; the solution is to subsidize training.

It is clear that coordination failures and spillovers are more acute for new activities than for already established ones. In the first place, coordination is impeded by the proverbial chicken and egg problem: new activities are hard to develop unless their suppliers are present, but why would the suppliers exist if they have nobody to sell to. Secondly, by definition, new activities must incur self-discovery costs. And finally, they cannot find workers with experience in the new activity, since the activity has not been in existence and hence has not been hiring and training workers for it.

So how would structural change ever take place? One way forward is the development of new activities that can use the factors and capabilities that an economy has already developed for other purposes.

Each new activity requires custom-made inputs—some private, many public

Let us be more precise. Production of a particular good or service requires a set of rather *specific* inputs. By *specificity* we mean that these inputs would be much less productive if deployed in some other activity. Hence, the degree of specificity can be approximated by how much less productive an input would be in its alternative use. These inputs include physical installations and machinery, workers with particular skills, a set of specific intermediate inputs, a logistic system to transport the inputs and deliver the outputs, a procurements and marketing system to acquire information about suppliers and customers, a system of property rights and contracts that society finds legitimate and is willing to respect, a set of standards and regulatory rules on product characteristics,

labor norms, financial rights and consumer protection that affect the behavior of other stakeholders, etc.. These inputs or requirements are developed to solve the more or less particular needs of existing activities, but they may or may not be supportive of some other, potentially not yet existing activities. Hence, development will be path dependent on the opportunities opened by the assets and institutional bequeathed by previously existing activities.

Let us consider, for example, a market as apparently simple and straightforward as the real estate market. In this market, assets already exist, they just need to change hands. Buyers need to find out what properties are on sale and what their specific characteristics are. Sellers need to transmit that information to buyers. So a market of real estate brokers develops to achieve these goals. Now, not all the characteristics of a house or apartment are easily visible to a naked untrained eye. There may be hidden defects in the house that the owner knows about and has an interest in concealing from the buyer. This creates an asymmetric information problem that is addressed through a market for inspectors. These inspectors are licensed by some entity and hired by the buyer to report on the conditions of the property and its abidance by the building code. Then it is important to know whether the seller has full rights to the property and that there are no liens or other impediments on his right to sell. This implies that a buyer may pay, only to find out that others also have a legal claim on the property. A system of property registries and a system to track financial and tax claims are needed. But it may be inefficient for the buyer to bear the risk of any surprises, so a market for title insurance is helpful. Also, public authorities may have imposed some easements on that property to secure some public interest, or there may be municipal plans to change the conditions

around the property that may significantly affect its value. In addition, the buyer needs finance to purchase the home, for which he needs a market for loans. To address willingness to pay and other incentive and information problems in this market it is convenient to be able to pledge the house as collateral to a lender with a set of rights in case the buyer does not abide by the mortgage contract. A legal system needs to enforce these rights. The lender may also require insurance against fire, storms, etc, lest the collateral blow up in smoke. Hence, a home insurance market is needed. Furthermore, the sale takes time because after an initial agreement has been reached, the inspection needs to take place and the buyer needs to secure financing, title insurance and home insurance. Many unexpected events may happen during that process and it is important to clarify how to deal with them. It may be helpful to require a deposit, a down payment or establish an escrow account to deal with some of these contractual problems, for which a real estate lawyer is needed. The real estate lawyer in turn needs to be accredited (by some body) to carry these functions. If the property is an apartment in a condominium, it is important that the rights and obligations of the apartment owner vis-a-vis the rest of the condominium be clearly established and understood.

The previous paragraph shows how complex a simple transaction such as the sale of an existing property actually is and how it is related to a network of markets and institutional arrangements that must co-exist. We described not just a market for homes, but also a market for brokers, mortgage loans, inspections, title and home insurance and lawyers. It involves registries, municipal rules, accreditation of the different specialized agents, rules on creditor rights and condominiums, etc. And this is just some of what is

required for trade in existing homes. Imagine now the added complexity involved in urban development and construction.

There are several implications of this description. First, *the way a market is organized depends on the existence of other markets that can support it*. The market for real estate in the US uses a market for realtors, title insurance companies, inspectors, mortgage lenders and real estate lawyers. It is interesting to note that not all of these markets are present in other countries and that even within the U.S. there are significant differences across states in how these different markets are articulated.

Second, *each one of these markets requires a set of rules and norms that clarify roles and responsibilities*. Some of these *rules may be imposed by convention and sustained by reputation* while *others may be required by law*. Some of the roles performed by different participants may require official accreditation while others don't. Hence, the institutions and norms that are required for each of these markets may be either the product of self-imposed private agreements between market participants or dictated by the state.

Third, *roles that the government may play in this field are highly specific*. They cannot be conceived as activities designed to cover all markets. They are specifically designed to address issues that are particular to the real estate market in this case and not to the market for tomatoes, CDs or health insurance.

Fourth, the *transaction costs* that a buyer or a seller will face (including the expected cost of fraud, unseen defects or leans, etc.) *depend on the way different markets and institutions are organized and how they interact*.

Fifth, there is *enormous variability or plasticity* in the manner and form that these functions can be organized or are in fact organized in different settings.

It is clear that the real estate example refers to a mature market. Over time, a multiplicity of inter-related markets have developed (real estate, brokerage, insurance, finance, legal services, inspection services) where participants are motivated by self-interest. There are rules, norms and institutions agreed to by market participants on a voluntary basis in each of these markets. There are legally imposed rules and norms. To function well, markets need all these. New activities must confront the fact that these conditions are unlikely to be present.

Back to self-discovery: is there a stairway to heaven?

It is easy to imagine the difficulties that a new activity will face. The related markets may not yet exist, thus creating a serious coordination problem. The norms around transactions may yet need to be developed and agreed upon. Legal rules and standards may be missing, specific infrastructure needs remain unattended. Solutions to these problems have uncertain characteristics and costs.

For this reason, the new activities that do develop need to exploit *existing capabilities*, by which we mean *the markets, physical and human assets, norms and institutions that were developed and accumulated for other pre-existing activities.* These capabilities will be useful to the extent that they are *similar* to the needs of the new activity in question.

The *degree of similarity* of those needs may vary widely between any pair of activities. The export of garments requires an industrial zone with good access to (young

female) workers and energy, a logistic system that allows for the import of required intermediate goods and the export of the final product with little cost or delay in customs and ports, market access rules that guarantee the right to sell in foreign markets, a labor code that facilitates the management of labor relations, a tax regime that is adequate, etc. These capabilities may be similar to those needed for car harnesses, or shoes, but quite different from those needed for the production of soybeans, fruit, steel, natural gas or copper. Just think how different are the infrastructure requirements (dedicated train lines for mining, rural roads for soybeans, cold storage and transport systems for fruit, gas pipelines), the kind of trained labor force required (seamstresses, farmers, metallurgical workers, geologists, chemical engineers, etc.) the regulatory needs (phyto-sanitary, industrial standards, etc.), property rights (concessions for gas and mining, agricultural land property rights, rights for building roads, railroads and pipelines, etc.).

The view that capabilities are quite specific to each activity is consistent with a puzzle discussed in Hausmann and Rodrik (2003). There we pointed out that Korea exports many microwave ovens and almost no bicycles, while the opposite is true of Taiwan. Bangladesh exports hats but no soccer balls while Pakistan does the opposite. Production seems to require something more specific than just broad asset categories. Otherwise, countries with similar endowments of these broad categories would export similar goods. Specificity is needed to explain what would otherwise look as a quite haphazard pattern of specialization.

It makes sense to think of products as being at some distance from each other in terms of the requisite capabilities. Hausmann and Klinger (2006) use the metaphor of a forest. Each product is a tree and is placed at some distance from each other tree in the

forest or product space. Some are nearby and others are farther away. Firms are like monkeys that live on a tree, off a tree, i.e. they exploit a certain product. The distance between the trees reflects the similarity of the requisite capabilities. It is a measure of how useful are the capabilities needed for the production of good A when deployed in the production of good B. This implies that it is easier for new activities to develop near the areas where monkeys already exist, because many of the requisite capabilities are already present. Producing at larger distances involves the need for capabilities that have not been previously accumulated. Trying to accumulate these capabilities in the process of self discovery may create more serious coordination problems, since the new capabilities need to be developed at the same time that the new activity is put in place. In this context, the market on its own will only jump short distances. The proverbial social planner could potentially coordinate the development of new activities with the new requisite capabilities.

In the context of our metaphor, the process of structural transformation can be described as follows. The Hausmann, Hwang and Rodrik (2006) finding implies that a part of the forest is rich (some goods have high *PRODY*) and a part of it is poor (others have low *PRODY*). Rich (poor) countries have their monkeys in the rich (poor) part of the forest. The process of structural transformation involves the monkeys jumping from the poor part to the richer part. The ability of firms to do so depends critically on the topography of the forest. If the forest is very regular in the sense that trees are at a similar distance from the next tree then there is always a parsimonious way forward: a stairway to heaven. It is common to describe this ladder in the East Asian experience as starting with garments and toys and moving into electronics and autos. But is this really so? Is

there always a stairway to heaven or are their missing rungs in the stairway that may block or slow down progress in different countries. And if the starting-off point *is* conducive to an uninterrupted ascent to heaven, what are the respective roles of natural forces and government action in its selection?

Hausmann and Klinger (2006) proceed by proposing first a measure of the distance between products. Instead of trying to identify commonality of inputs, which are unknown, they adopt an outcome-based measure. They base their measure of the distance between product A and product B on the conditional probability that countries that have comparative advantage in A also have comparative advantage in B.[6] In other words, if the capabilities needed to produce two different products are similar, this would be revealed in the fact that countries that are good at one are also good at the other.

With this measure, they document several characteristics of the product space. First, there is indeed an enormous heterogeneity in the forest. Parts of it are very sparse while others are very dense. This is not without consequence. They show that the development of comparative advantage in new products is strongly affected by how far the products in which a country already has comparative advantage are from potential new ones. They show that indeed monkeys tend to jump short distances. Progress in the sparse part of the forest is much slower. They demonstrate this point in three different ways. First, the average distance to the trees that are eventually occupied is much smaller than the distance to a randomly chosen tree. Second, the probability of jumping to an individual tree is strongly affected by how far the occupied trees are from it. Finally, they

[6] For technical reasons discussed in their paper, Hausmann and Klinger take the minimum of the conditional probability of A given B and of B given A. This creates a symmetric measure of distance that is less sensitive to spurious coincidences. To calculate these probabilities they use global trade data that is disaggregated by country and product at the 4-digit level, which includes over 120 countries and over 1000 goods.

develop an aggregate measure of the position of the country in the forest and show that it predicts how quickly a country upgrades its exports over time.

To make this last point, Hausmann and Klinger (2006) develop a measure of "how green is your valley," which they call "open forest." The idea is to measure how valuable are a country's unoccupied trees by weighting the *PRODY* of each unoccupied tree by its distance to current occupied trees. The paper argues that "open forest" strongly predicts the speed at which countries increase the level of sophistication of their exports (*EXPY*). This shows that not all roads lead to Rome, or alternatively, that the rungs in the stairway are very irregular and do not all lead to heaven. For some countries, there are indeed missing rungs in the stairway and it is often very difficult to make progress because there are no nearby trees, i.e. no easy ways to use the existing capabilities in new products.

Figure 3 shows the value of "open forest" and GDP per capita, while Figure 4 presents the relationship between "open forest" and *EXPY*. Two things are important to note. First, while in general there is a positive relationship between the level of development (as captured by GDP per capita) and "open forest", the relationship shows enormous heterogeneity. Some developing countries like China, India, Turkey, Poland and the Czech Republic are in a very propitious part of the forest, while other countries at the same level of income are much less so. The positive relationship between *EXPY* and "open forest" suggests a positive feedback loop: if a country is able to improve its *EXPY*, it moves to a better part of the forest where it is easier to further improve *EXPY*.

Figure 5 shows how the forest looks as seen from a selection of individual countries. The horizontal axis measures the average distance to the each empty tree, i.e.

to each product in which a country has not developed comparative advantage. The vertical axis shows the difference between the *PRODY* of that product and the average *EXPY* of the country. This variable measures whether the product in question is upscale vis-a-vis where the country stands now. The color codes refer to the type of product each point represents. Countries differ markedly in how far and how upscale are the empty trees.

Working with physicists Albert-Laszlo Barabasi and his student Cesar Hidalgo, Hausmann and Klinger developed a map of the forest based on the above-discussed concept of distance. The map, shown in Figure 6, clearly indicates the center-periphery nature of the product space. Countries that are able to establish themselves in a well connected part of the forest can move to other products with much more ease than those that have their export activities established in peripheral products. Figure 7 shows the path of structural transformation taken by Malaysia and Colombia. After Malaysia established a foothold in the electronics cluster in the upper right-hand part of the forest, it was able to move quickly around that highly connected area. By contrast, much of the comparative advantage of Colombia was in the periphery. As a consequence, it was never able to breakaway into a dynamic export path.

Upgrading within product vs. between products

Our view of the process of structural transformation and its co-evolution with the development of the requisite capabilities is reinforced by recent work on quality improvements in existing products. In forthcoming work, Jason Hwang has examined the within-product distance to the (quality) frontier by looking at U.S. import unit values

across highly disaggregated product categories from different exporting countries. As is typical in this literature (see Schott 2004), he defines distance to the frontier as the percentage difference in the unit price earned by a country on the export of a given product and the highest unit price observed among all exporters of that good.[7] Three findings are particularly significant for our discussion. First, once a good is exported, there appears to be *unconditional* convergence to the frontier within that good. By contrast, we know from the empirical literature on growth that economy-wide productivity does not exhibit unconditional convergence. Whatever convergence may exist in aggregate is conditional on a large number of other covariates. Second, productivity convergence at the product-level takes place at a relatively fast rate, usually in excess of 5 percent. This contrasts with measured rates of (conditional) income convergence between countries of less than 2 percent. Hence, the process of learning and improving within product appears to be quite universal and fast. Third, when a country moves to a new product it usually does so at a greater distance to the frontier than its average distance in the products it has already been exporting. Put differently, when monkeys jump to new trees, they land in the lower branches of the tree. But once established in the tree, it is easy for them to move up.

These stylized facts are supportive of our story. Once an activity develops, it is much easier to work out the coordination failures and accumulate the specific capabilities that it requires. However, moving towards new products implies producing without the requisite capabilities and hence this can only be done at lower qualities[8].

[7] To avoid potential measurement errors in looking at the highest price, he chooses instead the 90th percentile as the frontier.

[8] See Jovanovic and Nyarko (1996) for a seminal model on vertical (within-product quality improvements) and horizontal (new product) innovations.

An important implication is that moving between products is more likely to become the binding constraint on development, since improvements within products seem to be much easier.

Growth collapses and "open forest"

Hausmann, Rodriguez and Wagner (2006) look at growth collapses and find that they are often triggered by export collapses. However, the duration of the crisis that ensues is very strongly influenced by the size of the "open forest". The interpretation is that countries that are in a dense part of the forest can respond to a collapse in the earning capacity of their existing exports by jumping to new trees with more ease than countries that are in a sparser part of the forest.

To illustrate the problems involved, it is instructive to look at the case of Bolivia. Bolivia's GDP per capita has yet to return to the level achieved in the 1970s in spite of an impressive stabilization and structural reform program accompanied by substantial foreign assistance and debt forgiveness. How come? In the early 1980s Bolivia lost its tin mining industry. This lead to a fiscal and balance of payments crisis and an annualized inflation rate of 25,000 percent. In 1985 it was able to reestablish macro balance quite spectacularly. But growth was lackluster afterwards. Why so?

Our interpretation is that the macro imbalance that led to the hyper-inflation was triggered by the fact that the loss caused by the collapse of tin mining had not been allocated, leaving a large fiscal imbalance. When the loss was finally allocated, the fiscal imbalance disappeared and macro stability returned. But allocating the loss does not eliminate it. The resumption of growth would require the identification and development

of alternative export activities that could use the displaced miners and the local farmers and traders that had moved to the mining areas to cater to the local market. The only alternative export products that the country did identify were soybeans, natural gas and coca.

It is interesting to note how different the required inputs and capabilities are for each of these products. Soybean production requires roads to connect the expanding agricultural frontier in the rather unpopulated lowlands to export markets. It requires the clarification and protection of property rights on lands that had never been under production and international trade agreements to assure market access for soybeans. Natural gas requires the definition of a property rights scheme that includes a revenue sharing agreement between the producers, the central government and local governments plus the rights to building pipelines through large expanses of the territory. Coca is an input for the production of an internationally banned substance and a major foreign affairs issue. It is clear that these represent radically different institutional and political problems that cannot be subsumed under a general sector-neutral view of public goods provision. They cannot be usefully described as being dependent on a general system of property rights. They are very specific to each case. Moreover, it is clear that the willingness of the median voter to invest scarce public resources in far away agricultural lands may be weak at best, while the lack of support for the property rights of private investors is evident, for rather different reasons, in both coca and natural gas. The social underpinnings of alternative productive activities is not simply the province of getting prices right. The provision of public inputs into these activities is a rather complex

matter. When production needs changing, the provision of new public inputs may become a binding constraint.

In sum, development involves the enlargement and improvement of productive capabilities. These are both complex (i.e. many different capabilities are required for many different activities) and specific (these capabilities tend to be relatively different for each activities). For this reason, new activities tend to exploit capabilities that were developed for other activities. This creates path-dependence in the process of structural transformation. The dependence of activities on pre-existing capabilities means that a purely market-based structural transformation will be too slow as it will involve jumps that are fewer in number and shorter in distance than would be socially optimal. Individual innovators have to take the existing capabilities more or less as given. A social planner can potentially make sure that new capabilities actually develop in tandem with the new activities. But obviously social planners (in the sense that economists use the term) do not exist.

Market vs. public inputs

It is important to make a distinction between the inputs for an activity that can be purchased on the market and those for which the market does not operate. In our real estate example, once established, there are markets for mortgages, inspections, brokers, real estate lawyers, fire and title insurance, etc. If the supply is inadequate, prices go up and more people want to enter the market.

The problem is that there are no markets for accreditation, registries, norms, contract enforcement or laws. In general, there are no markets for the elements that

involve government rules. There are also no markets for certain activities that for one reason or another, the state has taken over, such as the provision of infrastructure.[9] Since these capabilities are complements to the market-based inputs and are highly specific, an inadequate supply of them will bring down the overall productivity of the activity. If the rules or the roads are not there, the machines and the workers will not be very effective. Now, while the market is very effective at decentralized allocation through price signals, how are government activities and interventions coordinated if the government cannot follow the self-organizing properties of the market? How can governments respond to the disparate needs of different activities in terms of the highly specific, numerous and changing requirements of these activities?

Note the level of complexity that is involved here for the government: there are many different activities that require many different kinds of interventions and there are no clear price signals to orient the government in terms of evaluating what it is doing right, what it is doing wrong and what things it should start doing.

One important question relates to how the specific institutions develop. What causes market competitors to cooperate in the creation of a set of rules, norms and institutions? What makes them overcome the free-rider problem of just letting others do the job? What causes the government to intervene and provide legal norms or specialized government agencies, such as a mortgage lending law, property registries and accreditation agencies?

[9] Note that even when infrastructure is "privatized", as when the government assigns rights on highways, ports or airports, the location and design of the infrastructure is usually either decided or highly influenced by the government. There is no competitive supply of highway designs that responds to decentralized price signals.

How do these motivations change across countries?[10]

The industrial policy predicament

Activities are numerous and varied and each one requires a large set of relatively specific inputs and capabilities. Some of these inputs can be purchased in well-supplied markets, whether domestically or abroad. The task of making sure that the very many varied inputs are present in the right amounts for the very many different activities–the omelet example with which we started the paper–is so daunting that it has always fascinated economists. The fact that the decentralized decision-making of the market can coordinate the provision of inputs when they are supplied by markets means that a significant part of the job takes care of itself. Prices give signals as to the relative attractiveness of alternative options and individual firms and consumer can make up their minds as to what to do and how to proceed.

But what about the inputs that are not supplied by markets? The traditional view holds that these are few, very broad and have no major interactions between them. They are constituted by a general system of property rights and contract enforcement, a good general-purpose business environment, infrastructure and education. All this should be financed with reasonable taxes and a fiscal position that is consistent with sound money.

[10] Avner Greif makes the interesting point that much of the specific government involvement through legislation or otherwise is often promoted by market participants, but their willingness to promote the involvement of the state is dependent on the existence of what he calls coercion-constraining institutions that limit the ability of the government to use its involvement to extract rents, taxes or privileges. At the limit, if the government is kleptocratic, entrepreneurs will not want to see it getting involved in any activity that affects them. The implication is that the more voracious the government, the smaller will be its institutional involvement in the economy.

These tasks can be defined for the economy as a whole and allocated to different government agencies for their implementation.

But, as we have seen, this is a rather poor description of reality. The areas of participation are many, highly specific and deeply interacting with each other and with the different markets in existence. In our real estate example, rules and accreditation for brokers, insurers, inspectors, mortgage lenders, urban land-use regulations, property rights within condominiums, etc. are inter-related and specific. These rules are in fact complex, specific and hard to design ex ante. The complexity does not only come from the fact that the list of non-market inputs and capabilities is long, but also from the fact that it is relatively specific to each activity and deeply interacting. And to make matters that much more difficult, the market mechanism does not work in the provision of these inputs. There are no effective price signals and no profit-making bureaucracies to automatically adjust supply to potential demand.

Viewed in this way, industrial policy conceived as the provision of inputs that are specific to subsets of activities is not a choice; it is an imperative. The idea that the government can disengage from specific policies and just focus on providing broad-based support to all activities in a sector neutral way is an illusion based on the disregard for the specificity and complexity of the requisite publicly provided inputs or capabilities. In this respect, paraphrasing Wittgenstein, problems in economics are often problems of language. We use imprecise words such as property rights, institutions and infrastructure as huge buckets in which we stick very many different activities that are highly specific and need to be conceived, planned and performed by a myriad of different organizations or networks of organizations. Not recognizing this fact creates the fiction that the

government can somehow disengage from these messy aspects of the world and focus on a small set of more macro issues. As we have argued, not doing a good job in the area of planning and executing the provision of publicly provided specific inputs to economic activity can become a major constraint on structural transformation and development.

Note that in this presentation of the facts, the government is only focused on providing complementary inputs to the market. It is not an issue of state vs. market. If the government does not provide the inputs, market efficiency will be low. In this world, laissez-faire is a dead-end street. Instead, the ideal alternative is for the government to provide all the complementary inputs to all potential activities. There are two major problems with this solution. First, it is unaffordable. The government cannot address all potential infrastructure needs or fix all the standards and rules affecting all existing and potential economic activities. It would overwhelm its financial, managerial and political resources. It is just not in the feasible set. Second, the list of interventions is unknowable ex ante. Institutions and markets co-evolve[11] and this implies that transaction costs and problems will be revealed as new transactions appear and new markets develop. Solutions have to fit the specifics of the context. This may be the reason why there is such an enormous variability of institutional arrangements across industrial countries.

The fact that providing the complementary inputs is costly implies that choices need to be made. It is in this sense that, as Isaiah Berlin pointed out, “we are doomed to choose”. It is not that choosing is desirable. It is regrettably inevitable.

[11] Going back to our real estate example, the home insurance market may or may not have developed on its own, but its development is fundamental for the expansion of the mortgage market, otherwise the collateral of the mortgage may go up in flames, undermining the mortgage loan. This requires setting rules and regulations for both mortgage lending and insurance markets.

Interestingly, governments often act in ways that show they are cognizant of this point, even when they fail to fully internalize the general logic (and would vehemently oppose it if someone put it to them). Consider policies towards direct foreign investment and export processing zones. During the 1990s, their official attitudes notwithstanding, market-fundamentalist governments were highly focused on providing specific public inputs to these two types of activities (Rodrik 2004). Direct foreign investors require subsidies to overcome lack of familiarity with host countries, navigation through domestic laws and regulations, protection against corrupt officials, trained workers, and assurance that they will not be expropriated. Governments in Latin America responded by providing tax incentives, labor training subsidies, access to international arbitration, one-stop shopping, and special regulatory regimes. Export processing zones require speedy customs procedures, good infrastructure, cheap inputs, and flexible labor. Governments made corresponding regulatory adjustments for firms located in designated areas. In both instances, governments engaged in active industrial policies in the sense of providing public inputs which differentially benefited particular economic activities.[12]

Finally, this line of analysis indicates that the requisite degree of interaction between governments and markets is much deeper and complex than is often assumed and requires a structure and a culture of cooperation between the public and the private sector. This cooperation is only likely to be forthcoming if there is a fundamental legitimacy of this relationship vis-a-vis the rest of society. If the dominant perception is that the principal motivating force behind public-private partnerships is a conspiracy against the public interest, the constraints on cooperation will be huge.

[12] One may point to tourism as yet a third area where many governments engaged in explicit industrial policies in this sense.

An aside: Investment Climate Assessments and Doing Business Surveys

Recently the World Bank has recognized that the business environment requires many potential inputs, from labor training to customs services, from finance to security. It has attempted to measure the provision of these inputs by surveying businesses and using the average responses as a measure of the quality of the provision. This is a step in the right direction in the sense that it recognizes the multiplicity of requisite inputs. However, it does not recognize the specificity of the inputs for each activity. This is implicit in the fact that the questions are chosen so that they are meaningful to all respondents and that the answers are then averaged out. However, what is relevant for each activity may be very different from what is asked and the answers may be very different depending on the specific context. Focusing on the most popular answers to broad classes of questions may not be the right way to identify the critical improvements each activity needs.

Parsimonious vs. strategic industrial policies

How does the government organize the supply of the different inputs to each activity? How does it know when it is not supplying the right amount or the right design? How does it find out what is needed? How does it know if it is doing a good job?

The process of structural transformation will be heavily dependent on the position of a country in the forest. For some countries, there are plenty of nearby trees that are upscale where economic activity can move into. There may be a stairway to heaven that would naturally occur through the process of improving the provision of publicly provided inputs to the existing activities. This is so because, by definition, nearby activities need similar inputs and hence are bound to benefit from the improved public

provision. Coupled with some general support for innovative investments, this may be all that is needed for a successful industrial policy.

Alternatively, countries may be positioned poorly in the forest.[13] Their areas of current comparative advantage may require public inputs that are so specific that they are useless to other potential activities. Improving the business environment demanded by existing activities and new investors will keep the country from moving to other parts of the forest where progress might be much easier. No private entrepreneur, by himself is likely to jump to that part of the forest because the requisite public goods are just not on offer. Here, the commitment of the government to provide those public goods and to identify and sort out what they are and how to best deliver them would be critical for the private sector to take the plunge. But this, unfortunately, cannot be done in a sector-neutral fashion. Creating the conditions for business process outsourcing involves very different publicly provided inputs than creating the basis for an auto parts industry, bio-fuels or a tourism sector. If creating the conditions did not require budgetary, managerial or political resources, the obvious decision would be to create the conditions for all potential new activities. But resources are limited, as is the technical capacity to work out the needed public inputs and how best to provide them. Choices must be made, including the choice of how many resources to allocate to the general area of providing the public inputs to economic activity. We may be doomed to choose, indeed.

Jumps to new parts of the forest face the additional problem that there may not be a local constituency that know what is required. Potential investors do not know what inputs they would need if the activity existed. There may be a potentially important role

[13] Even countries that are well positioned in the forest may benefit from strategic jumps to distant parts of the forest.

for foreign direct investors in these new areas. These stakeholders know what kinds of things the activity needs, although they may not be able to figure out what is the best way to provide them in the local institutional context. Nevertheless, they can provide very valuable information to define the problems and initiate a search for solutions.

The perennial problems

Because the provision of publicly-provided inputs and capabilities for productive activity cannot be supplied by markets, it faces serious problems of information and incentives. First, can government entities acquire the information about the characteristics and qualities of the demand for publicly provided inputs when market signals do not work? Second, how can these entities be structured to respond efficiently to the information, when the profit motive cannot be relied upon?

(a) Eliciting information

It is clear from our arguments that the information required to address the efficient supply of publicly-provided inputs is very diffuse and varied. Each activity has a demand for actual or potential inputs. Given the interactions between inputs, it may even be hard for those activities to figure out what potential new inputs are most valuable. After all, firms are in the business of finding solutions to the problems they face, taking some things as given. They are not in the business of asking what changes to their environment would be most beneficial to them. Having said this, it is clear that existing economic activities and potential investors have information that would be potentially very valuable and that the government cannot access on its own.

It is clear from this account that industrial policy cannot rely on an omniscient government. It must rely on mechanisms that reveal information, wherever it may be. There are many alternative ways of doing this. Firms lobby the government directly or through trade associations, thus revealing their preferences. They participate in the political process by funding elections and lobbying members of the parliament and the administration. And they may attempt to influence the public bureaucracy directly in more or less legitimate ways. There is a long-standing tradition in economics, best represented in the work of George Stigler, that is suspicious of the motives behind public regulation of market activities. These motives are seen to emanate from rent-seeking and involve the creation of barriers of entry to limit competition and protect incumbents. Proof is provided by examples of such behavior.

Our argument provides important qualifications to this perspective. New economic activities need inputs—rules, organizations, infrastructure, labor training, etc.—that provide real value and that are win-win or Pareto-improving. However, there is a participation constraint: if these improvements are going to be shared by all existing and potential market participants, it is best to free-ride on the lobbying efforts of others. Hence, to address the participation constraint there may be indeed the need to share part of the potential improvements with those that exert effort by providing information and engaging in the policy process to find and implement solutions. In this interpretation of the world, trade associations may be a cooperative solution to the free-rider problem among private participants. Their main motivation might be to secure the provision of the right publicly-provided inputs, which is socially and privately productive. They need

some sort of benefit to justify their efforts, but they may also stray into more negative forms of rent-seeking, i.e. activities that imply negative-sum transfers of resources.

Therefore, the relationship between the government and the lobby groups is potentially an excellent source of information but also of problems. How to create an environment that maximizes the informational benefits and limits the rent-seeking costs? How to make the relationship with lobby groups legitimate in the face of society as a whole?

We argue that it is important to follow three principles: open architecture, self-organization and transparency.

Open architecture. It is important that *whenever possible* the government not predetermine who it will deal with in terms of sectors or activities. Opportunities may exist in areas that were not under consideration when an organizational decision was made. It is important to let the potential areas of attention evolve with the appearance of opportunities and of agents willing to act on them. We may be doomed to choose, but we should only choose when the maximum amount of information has been revealed and when we are unable to do otherwise. Open architecture makes choices endogenous to an open process. Picks are weaned out of this process, not capriciously decided.

An open architecture strategy can serve both the parsimonious and the strategic approaches, by creating a space for either. Strategic best can emerge from a relatively open process that considers these initiatives, while the more parsimonious solutions to specific needs may emerge from a similarly open process implemented at a different level.

Self-organization. Inputs have a high and varying degree of specificity. Forcing groups to organize according to some predetermined criteria, e.g. by sector classifications, may create groups that have few specific needs in common. The fruit producers of a certain region may require a particular type of public good that may be quite different from cereal producers of a different region. A large single investor, whether foreign or domestic, may have highly specific requirements not shared by existing groups. Forcing them into a single channel of communication with other activities and regions and explicitly or implicitly requiring them to all agree on their common requirements may bias the requests towards the items they have most in common, like tax holidays, and away from the more specific, and potentially most valuable requests, like particular infrastructure projects.

Transparency. It is important to create an environment where the requests that private sector groups pose to the government be biased towards those that are socially productive. One way to facilitate this is to make the requests public knowledge and by committing to perform an independent evaluation of the request from the point of view of the public interest. This evaluation should also be part of the public domain. This will force the petitioners to select, among their many potential demands, those that are socially most productive. Interventions that increase the size and profitability of certain activities are legitimate if they contribute to the rest of society through taxes and higher productivity jobs. The credibility of the independent evaluator and the openness of the

public discussion around them may enhance the legitimacy of the whole endeavor and facilitate the achievement of political consensus around reforms.

One way of setting up self-organizing, open architecture, transparent entities is to create windows. A window is an entity that receives requests. It has a set of pre-determined rules as to what issues it hears and what kind of instruments it is willing to deploy. Beyond that, what activities it deals with and who gets its attention and support is determined by the interaction between the design of the window and the realities of firms, private-sector organizations and markets. We shall return to the issue of how many windows to set up and how to coordinate work among them.

One element that may encourage the self-selection of socially productive initiatives and increase the legitimacy of the endeavor vis-a-vis society at large is to take some requests off the table ex ante. One principle is to focus only on requests that increase productivity, and not on interventions that compensate a sector financially for other inefficiencies in the system. Another is to focus only on new activities—defined as new products, processes, training, investments, and so on that are not currently taking place in similar form elsewhere in the economy—to ensure that policy serves the needs of structural transformation rather than simply enriching incumbents.

(b) Addressing the incentive problem: How should the government organize itself?

In principle, governments are hierarchical organizations. There is a head of government to which a set of ministries report to and a set of departments and agencies that report to those ministers. As pointed out by the literature on complexity (Bar Yam

2004), the amount of complexity that such a structure can handle is necessarily limited. The collision between the desire for clarity and simplicity and the inevitable complexity of the underlying issues often leads to permanent periodic reorganizations in search of simplicity followed by a gradual reversion back to a messier situation.

The World Bank is a good example of this problem. The Bank must deal with many different countries which face a variety of problems requiring highly context-specific solutions. Formally, the Bank is a hierarchy with a president and a board of directors that reports to a board of governors. This hierarchy often collides with the inevitable complexity of the task at hand. As a consequence there is a tendency for the Bank to get into a rapidly changing portfolio of activities that create increased complexity, followed by the desire to streamline operations and for the Bank to focus on a few things it does well. The Bank has toggled between organizing itself along areas of competency (e.g. economic policy, social policy, infrastructure, etc.) and organizing itself with a country focus. In its current structure, the Bank has a matrix structure with small country departments that have the bulk of the budgetary resources and a small staff, and networks of experts that have the bulk of the personnel but that must “sell” their services to the country departments. This structure attempts to reproduce an internal market where many allocation decisions can be taken in a rather decentralized manner with greater information about country needs and institutional capabilities.

In some sense, this structure is akin to that used by so-called “global” banks, i.e. banks that offer a wide variety of financial services that used to be offered by separate industries (e.g. business loans, mortgages, brokerage services, credit cards, etc.). Each

department is specialized in the provision of one of those services, but a structure exists – the so-called banker or account executive – to help the customer navigate across services.

Governments face a similar problem. Each activity needs a myriad of relatively specific inputs but these inputs are the administrative responsibility of different agencies. Getting the whole system to work well is a high complexity function that requires many tasks to be performed well lest a few dysfunctional elements destroy a lot of value. The temptation is to centralize decisionmaking and control in a clear hierarchy. As with the case of the World Bank, some times this is done by function, while at other moments it is done by sector. But either solution is bound to bump against the inability of any hierarchy to deal with high complexity.[14]

It is useful in this context to explore more network-like arrangements that may deliver what is required without any single node of the network being fully aware of all the things that are going on at any point in time. In this interpretation, many of the existing organizations, whether private or public, may be acting as part of an institutional tissue that identifies opportunities, creates the incentives to act and coordinates the outcome. In this respect, trade associations may play a role akin to that of the account executive in a global bank, coordinating the relationship between a particular sector of activity and the myriad of public institutions it must deal with. Also, departments and ministries that deal with particular industries may also play the role of account executive, maintaining a conversation with particular industries and then trying to coordinate the different government agencies involved in implementing solutions. Development banks, beyond their financing function, may be in the role of identifying opportunities and

[14] One typical example of the attempt to limit complexity is the push towards a one-stop shop in government regulation.

obstacles. They regularly try to use their insider status in the public sector to raise awareness of factors impeding potential activities.

It seems useful to think of two classes of organizations: first, there are the instrument-based organizations that specialize in the management of a given policy instrument (e.g. labor training subsidies, transport infrastructure, industry regulation, etc.). Each one of these entities accumulate specific know-how in the management of a given policy instrument. Second, there are the coordinating entities that attempt to make sure that the right mix of policy instruments is deployed. These are organized by area of activity. The question then is how to assure that they have the capacity to coordinate the instrument-based organizations while respecting their autonomy. This is reminiscent of the problem that the current structure of the World Bank is meant to address. In that case, the question was how to coordinate many disparate technical capabilities of the Bank with the needs of the clients (the countries). Here the question is how to coordinate the different policy instruments to address the needs of each activity.

The World Bank solution involved placing budgetary discretion with the client-centered country divisions and while creating an internal market for sector-specific talent. For governments, creating strong activity-based coordinators empowered with either political or budgetary discretion may be a way to create an institutional network that can better address the underlying complexity.

Concluding remarks

Economic activity is dependent on highly specific capabilities that are partly provided privately through markets and partly provided by the state. This creates a

serious problem for the government in supplying those capabilities as it cannot rely on the market mechanism for information and incentives. Creating a structure that can do this for existing activities is in itself a serious challenge. It involves deep complementarities between state and market that can only be achieved in an environment of extensive public-private cooperation.

The problem becomes even more difficult when coupled with the need for structural transformation. In the process of development countries need to not only increase output per worker in existing activities, but also to transfer resources to higher productivity activities.

Incentives to accumulate specific capabilities useful for new activities are rife with coordination failures. In this context, the process of structural transformation is limited by the capabilities bequeathed by previous activities and the capacity for markets to move to new ones will depend on the existence of potential activities that can use the existing specific capabilities. But here, there is an enormous heterogeneity across countries in terms of how similar are the capabilities required by potential new activities relative to the existing capabilities. Unless purposeful action is taken to move towards new activities, countries may not be able to overcome the market failures that affect the process of structural transformation. Seen in this perspective, industrial policy is a central part of any development strategy.

The challenge in the pursuit of industrial policy is that the government cannot rely on markets for information or incentives. We have argued for a governance architecture based on a multiplicity of public agencies that act as a network capable of dealing with the underlying complexity of the problem. We have proposed an open architecture

approach that allows stakeholders to self-organize and that achieves discipline through transparency. Moreover, we have argued for an institutional design where some entities are organized around policy instruments while others are focused on attending to the needs of areas of economic activity.

Ultimately, what will work in specific settings must remain highly uncertain and unpredictable. An open-minded, experimental approach, together with a penchant for evaluation to ascertain what is working and what is not, is more likely to produce structural transformation than an approach that relies on first principles or best-practice blueprints imported from elsewhere.

Industrial policy is hard, but that is no argument against its use. Fiscal policy, say, or education policy is hard too, but few people would argue that governments should just give up on them. Theory and evidence have convinced us that governments need well designed tax and expenditure programs and that they must invest in human resources. And so it is with industrial policy. Governments need well articulated strategies to provide the specific inputs that markets need in order to foster the structural transformation that drives economic development.

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Figure 1. *EXPY* and GDP per capita

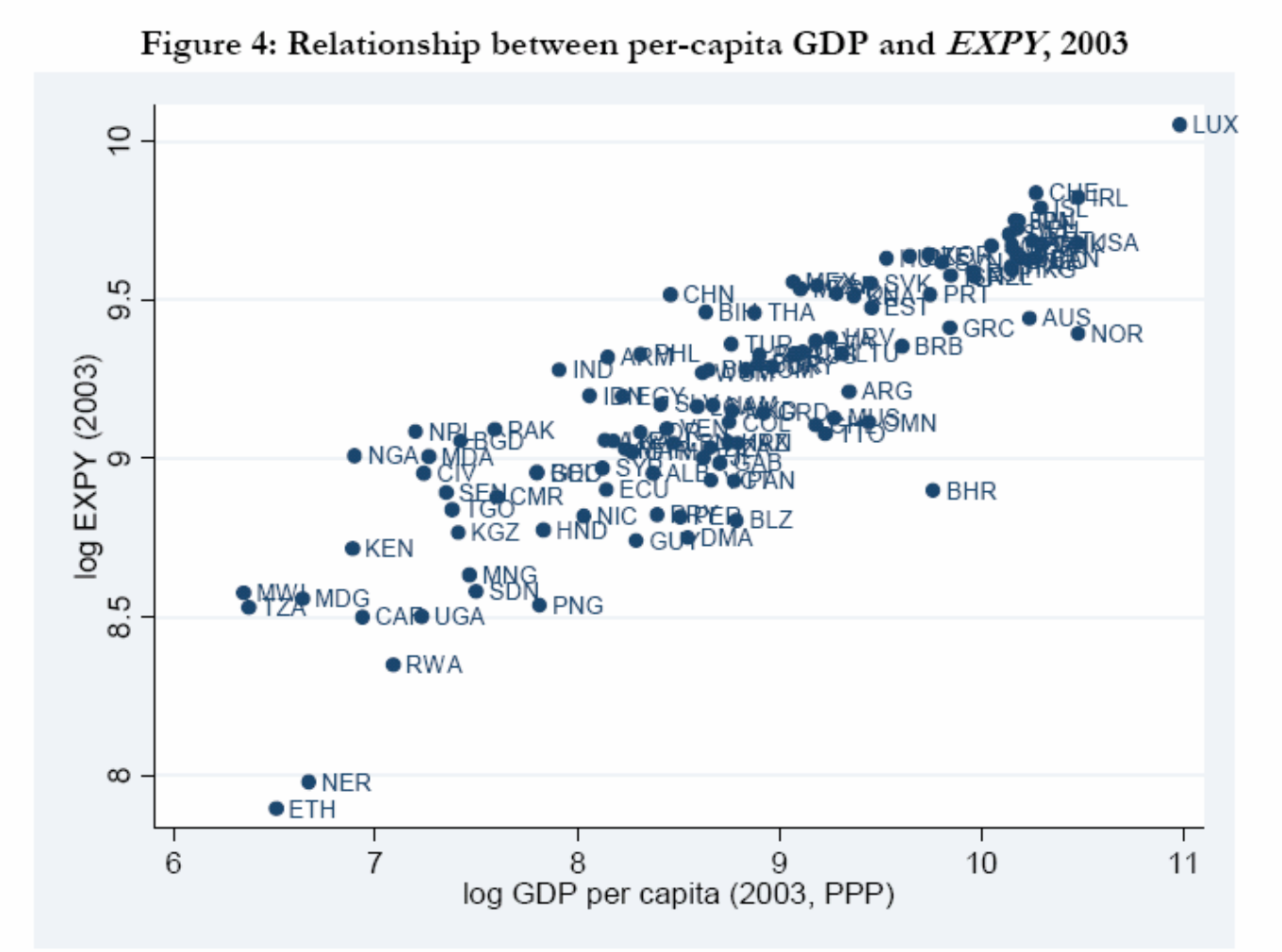


Figure 2. *EXPY* in 2000 and growth in GDP per capita 1992-2003

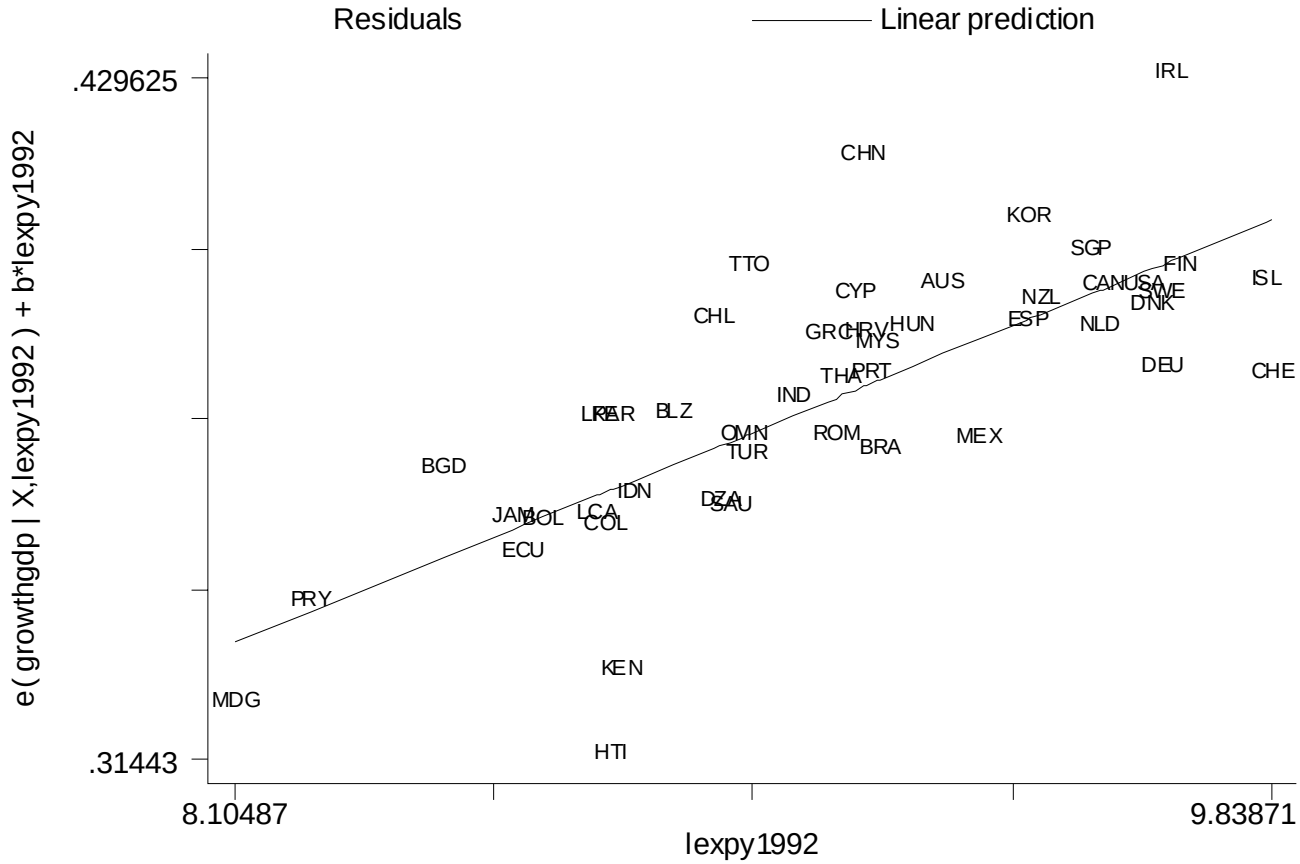


Figure 3. Open Forest vs. GDP per capita (2000)

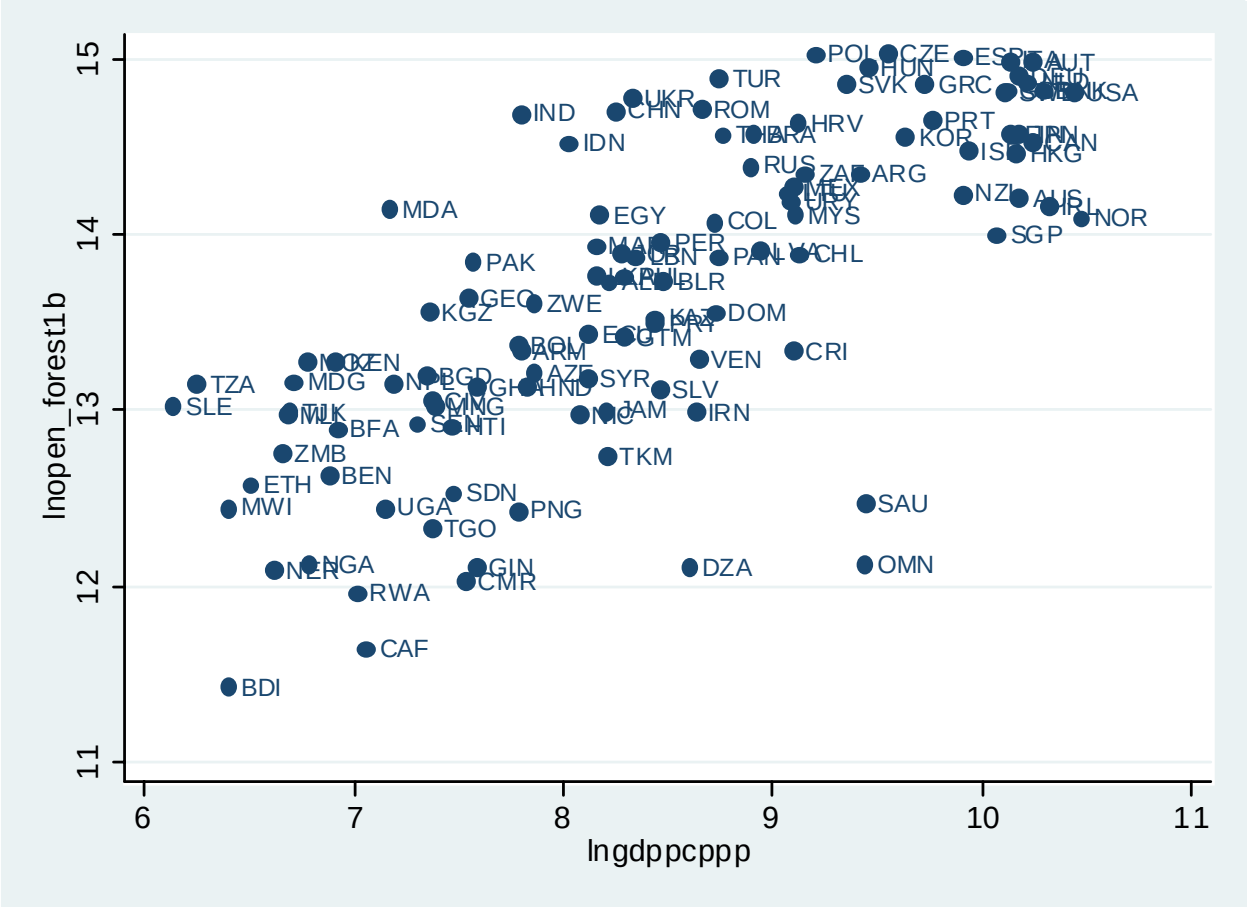


Figure 4. Open Forest vs. *EXPY* (2000)

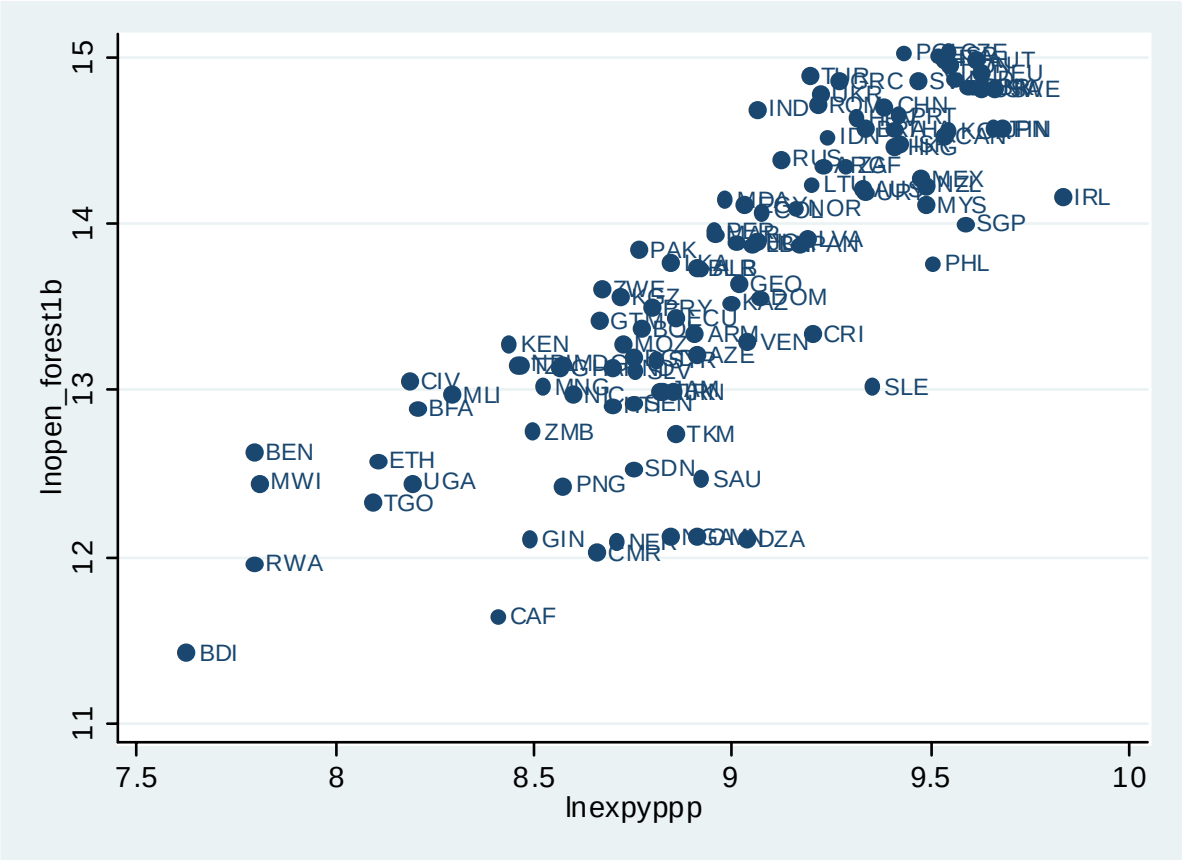
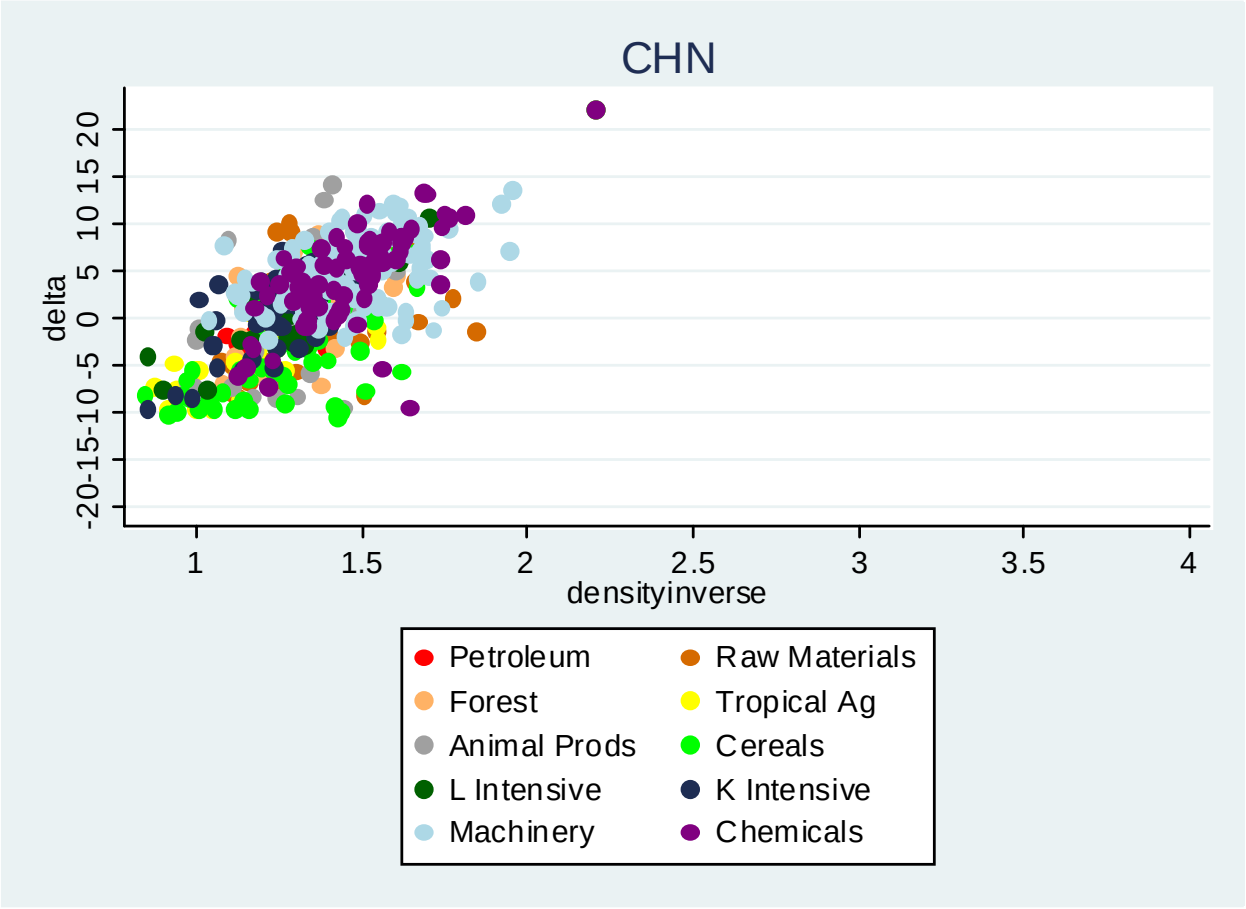
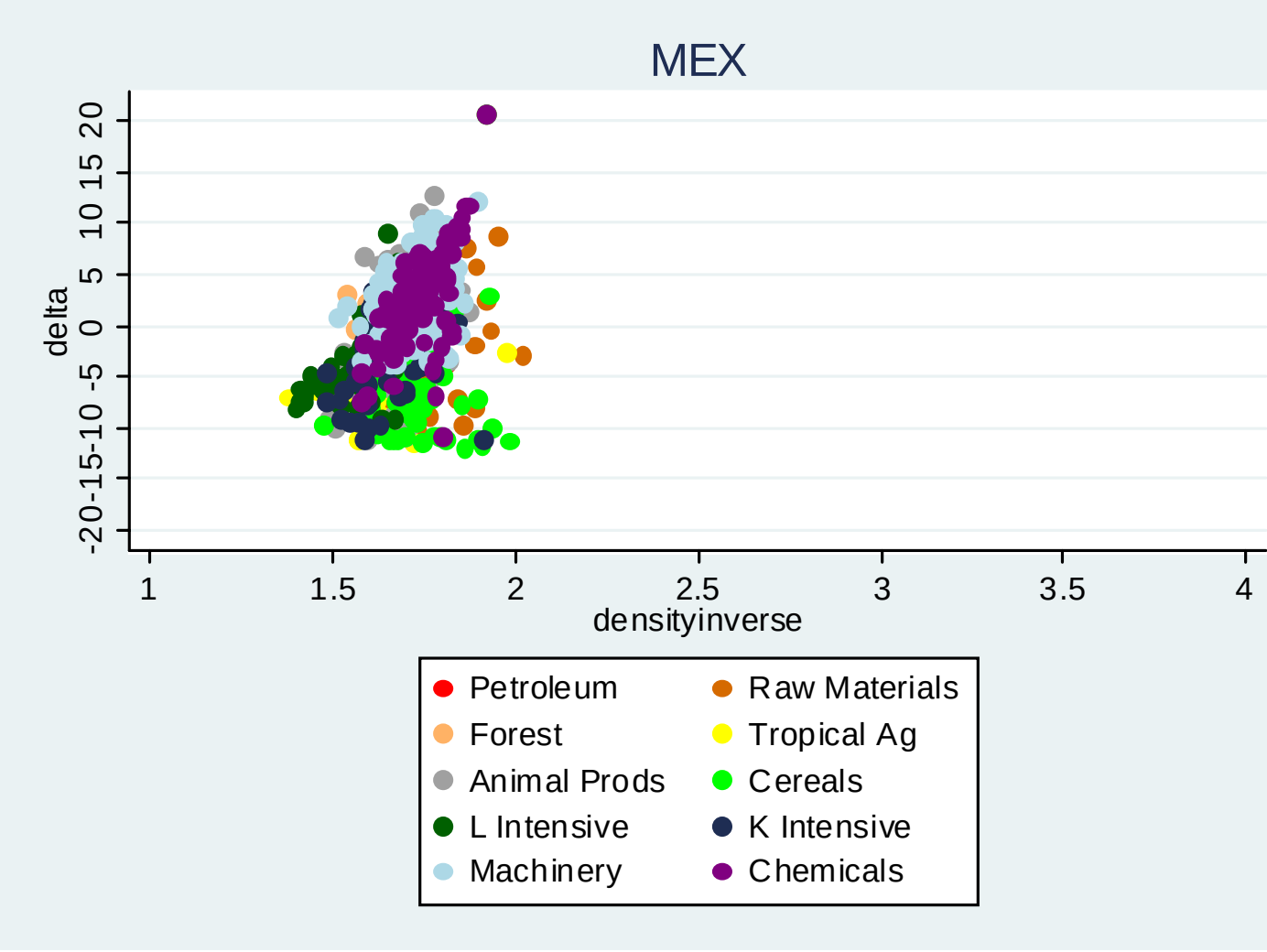


Figure 5. The unoccupied forest seen from each country: upscale vs. distance

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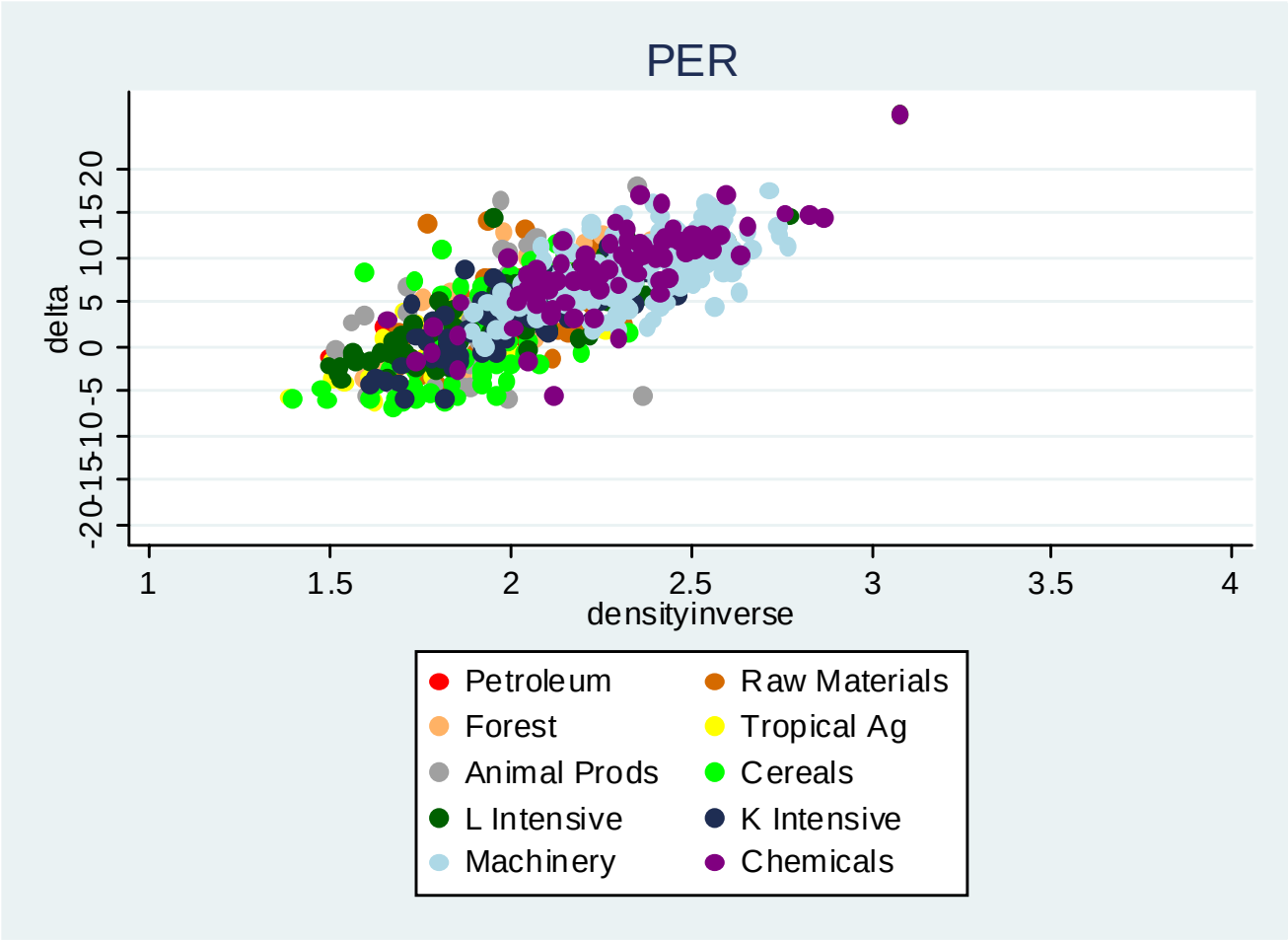
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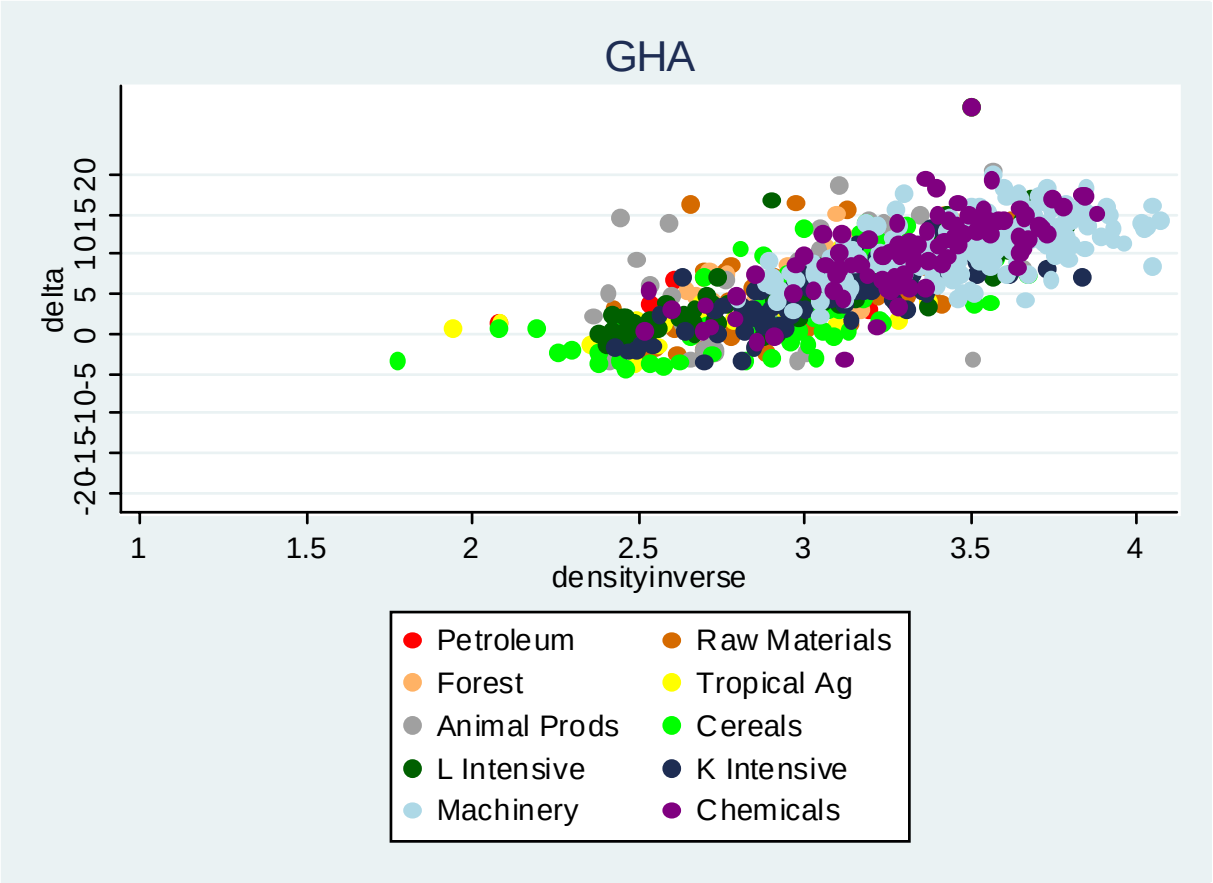
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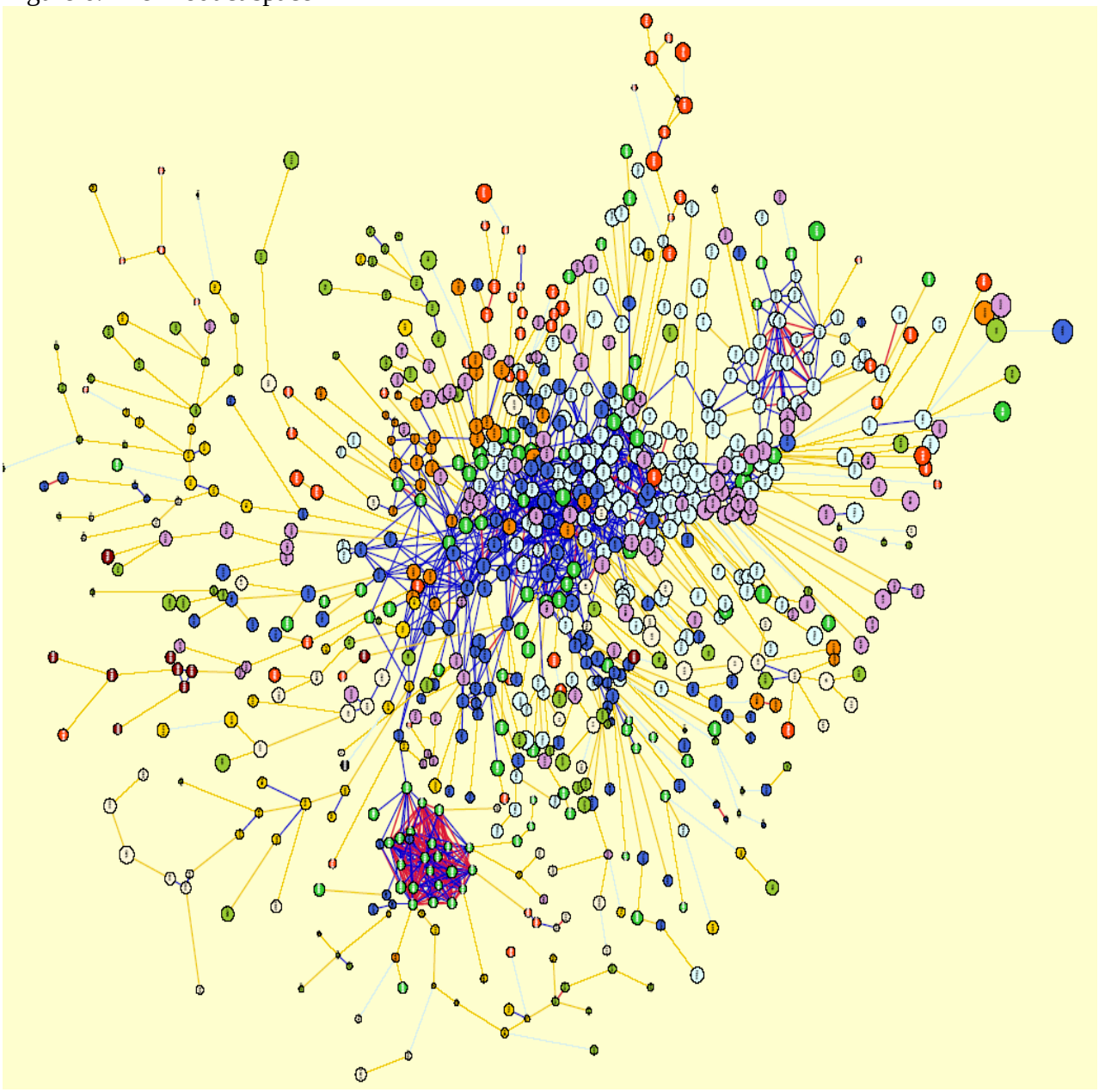
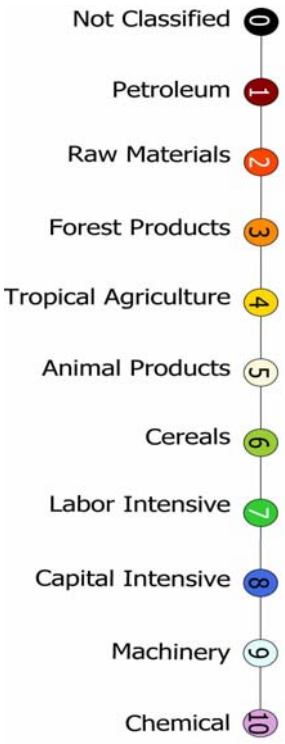
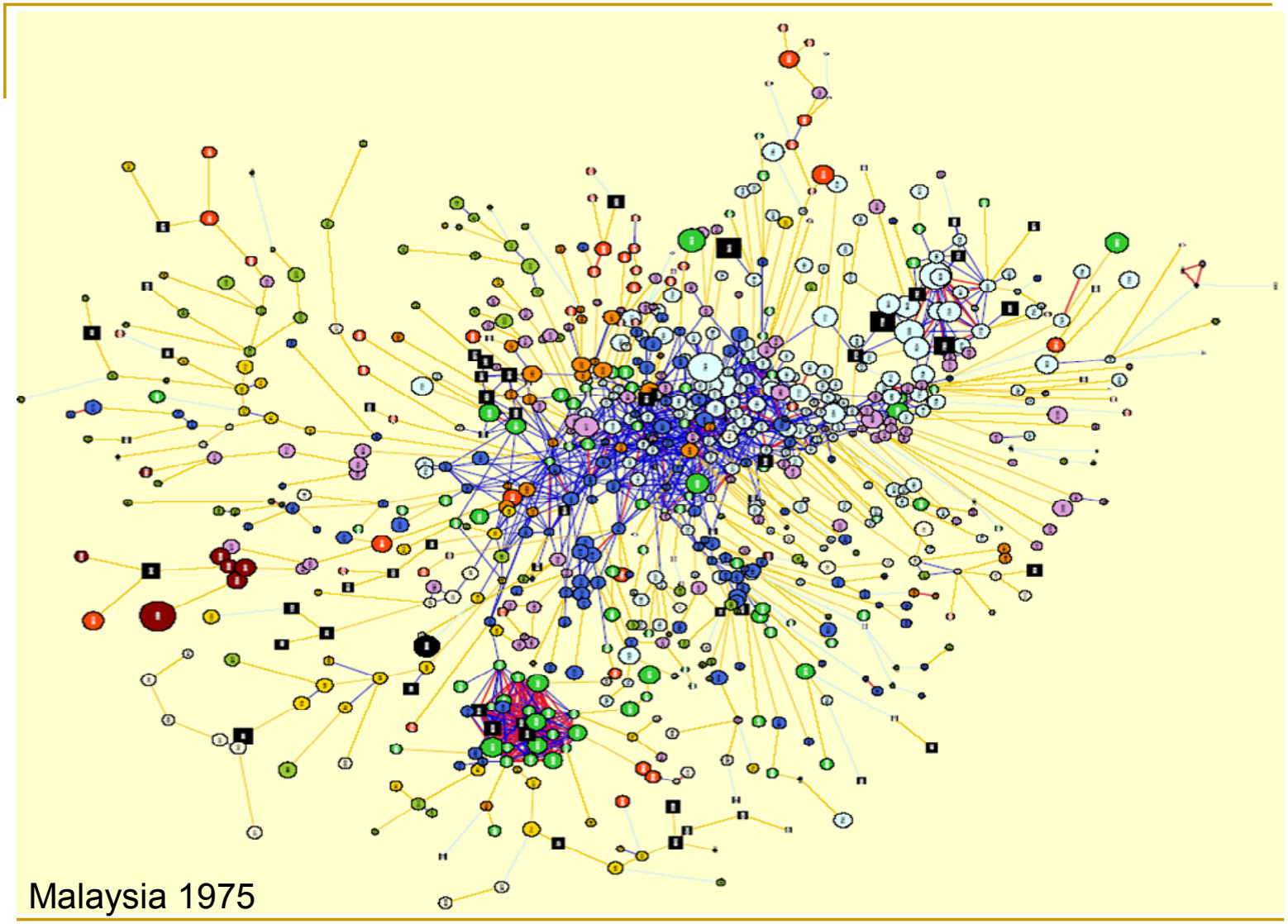
Figure 6. The Product space



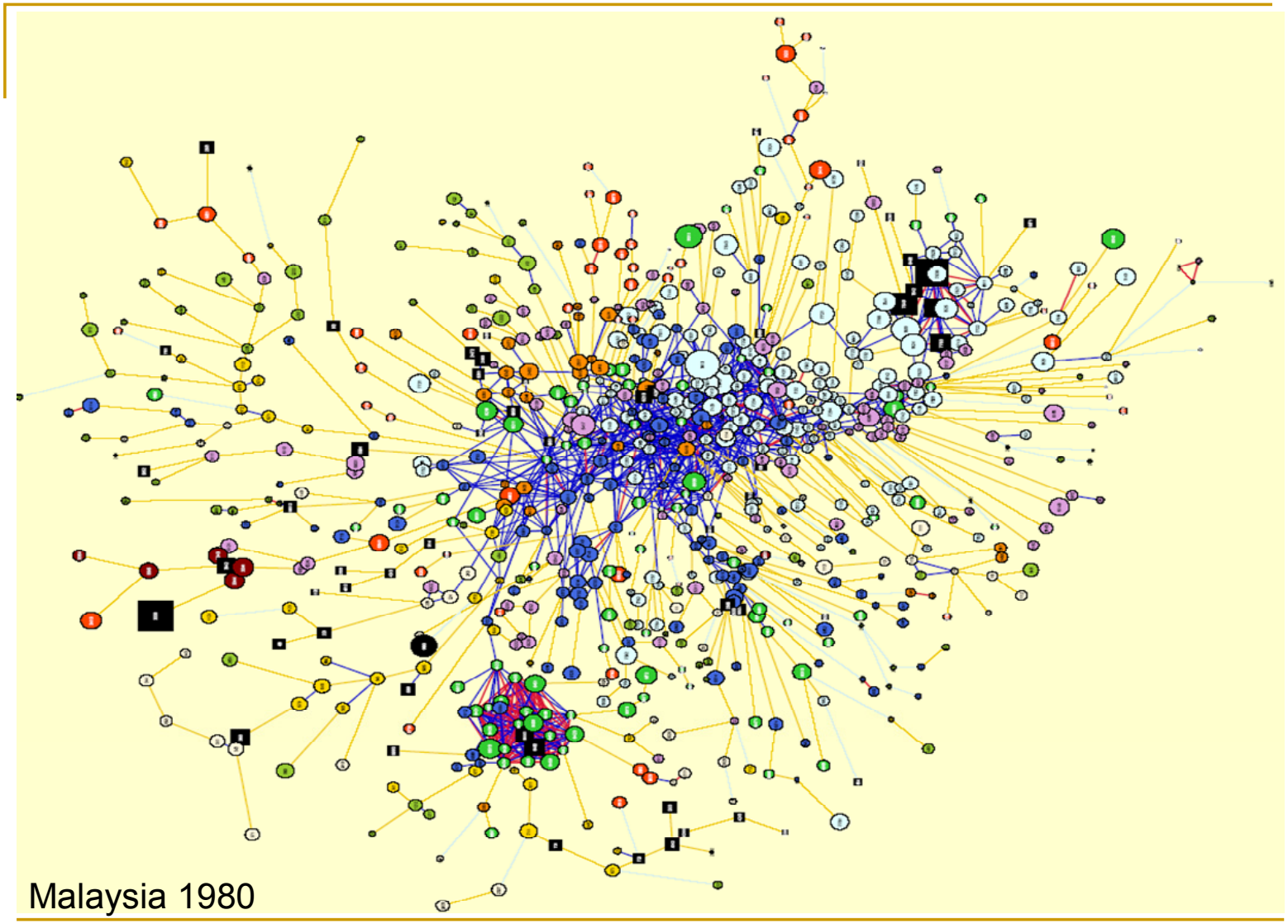


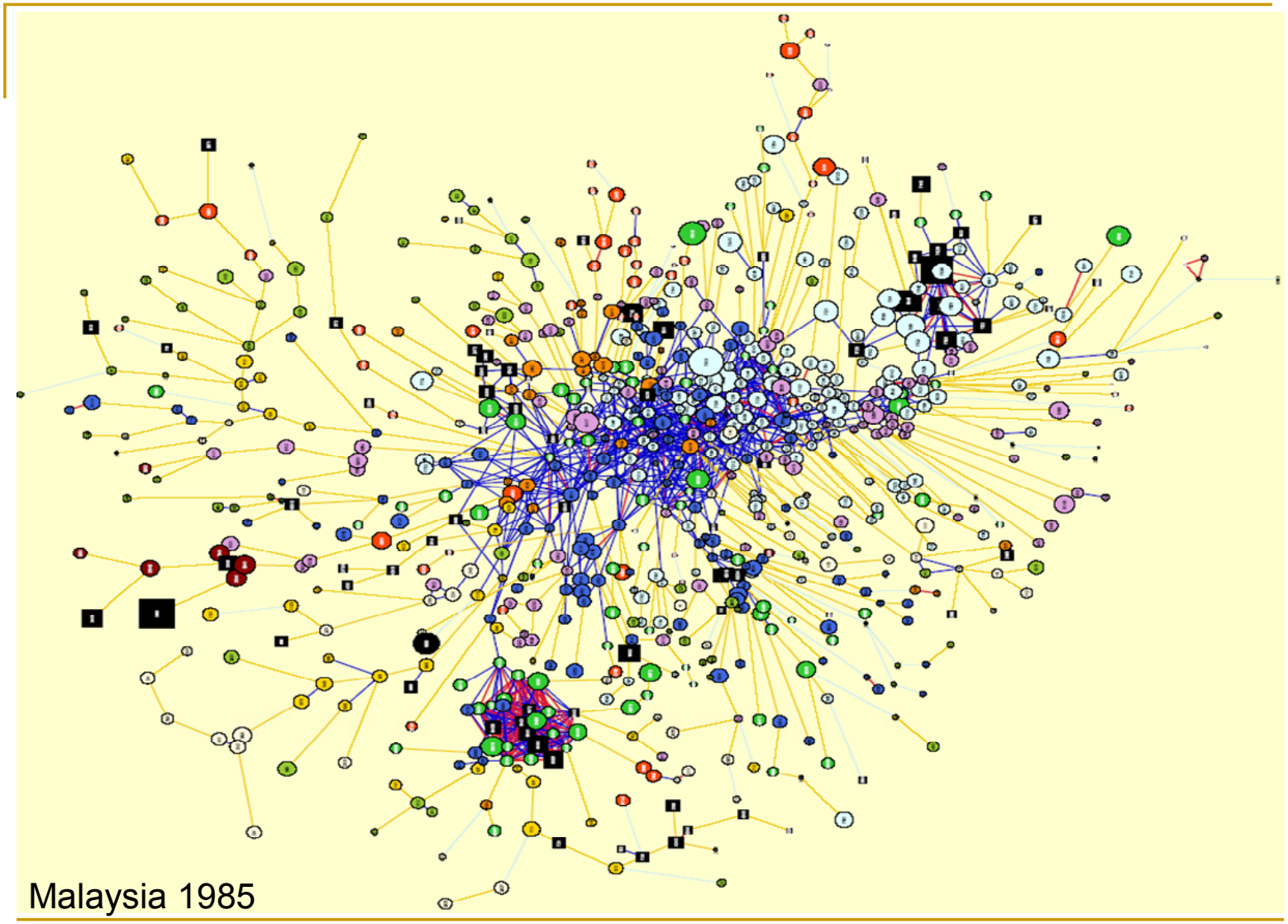
Note: each circle represents a 4-digit product category. The color of the circles represents the Leamer (1984) classification of products. This classification is based on the factor intensity of the product. The distance between the products is captured by the color of the links that connect them. Red being the closest, followed by dark blue, yellow and light blue. Each product is connected to its closest neighbor and to all other products that are at distances that correspond to either red or dark blue links. The size of the circles reflect the *PRODY*, or level of sophistication of the product.

Malaysia
1975-2000



Malaysia 1975


Malaysia 1980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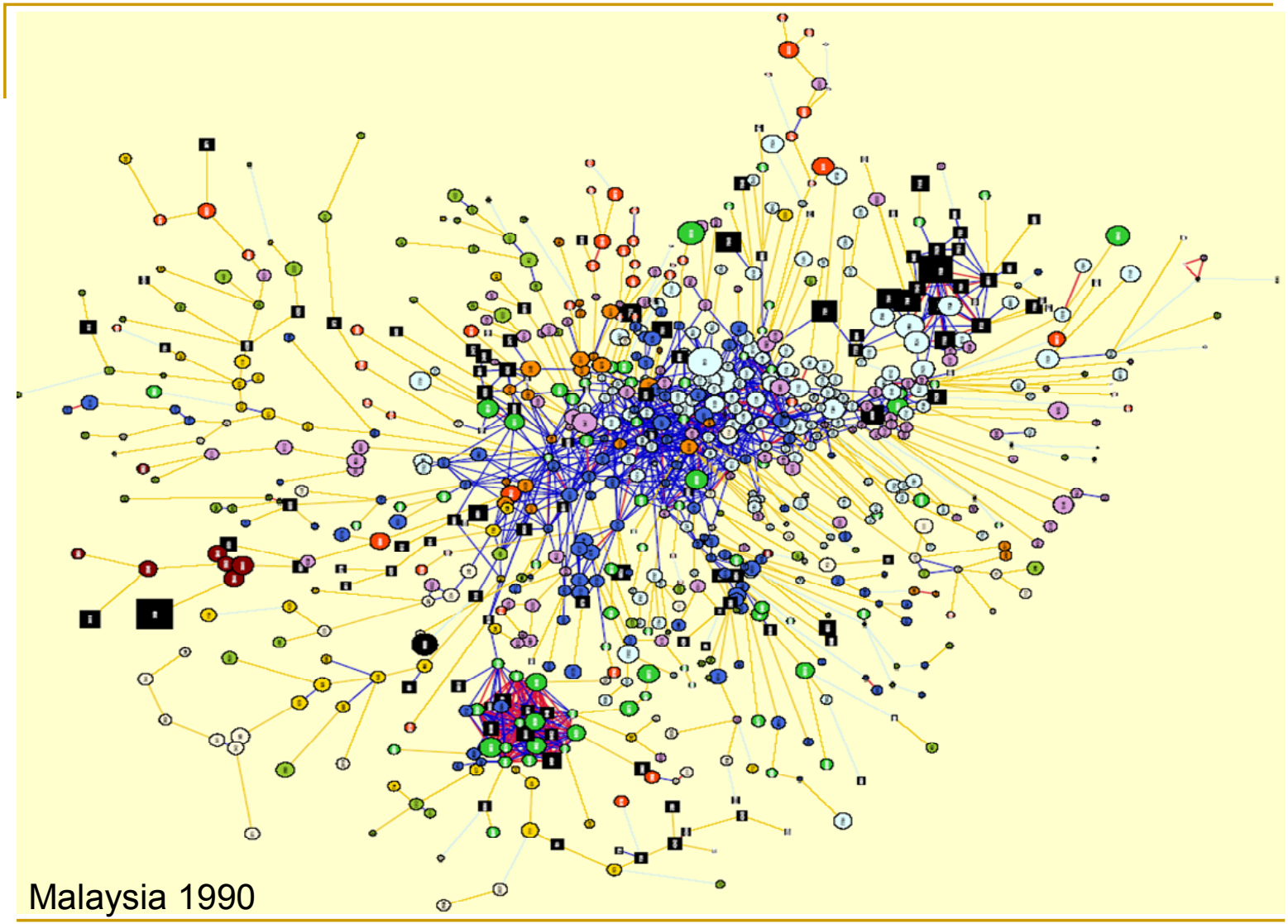
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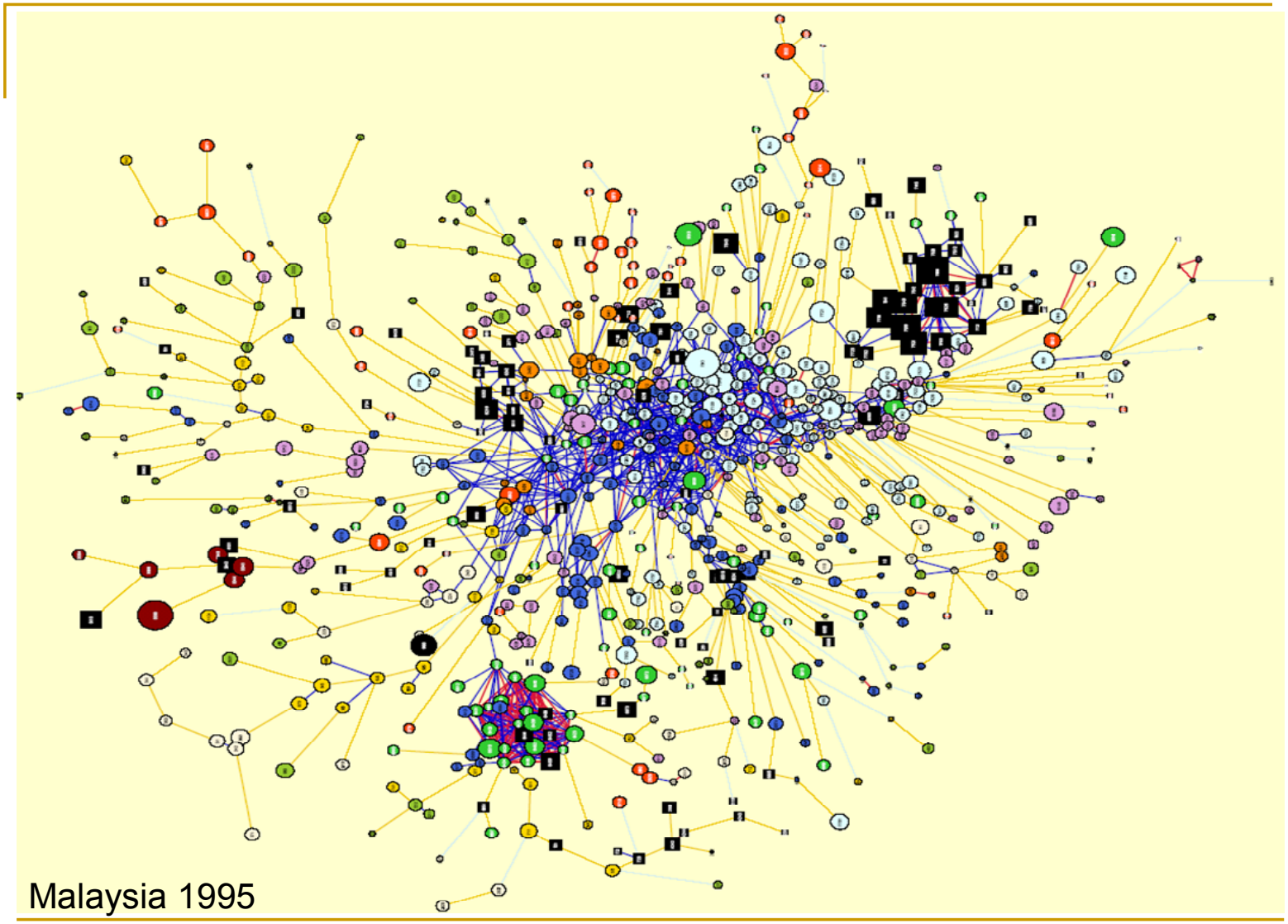
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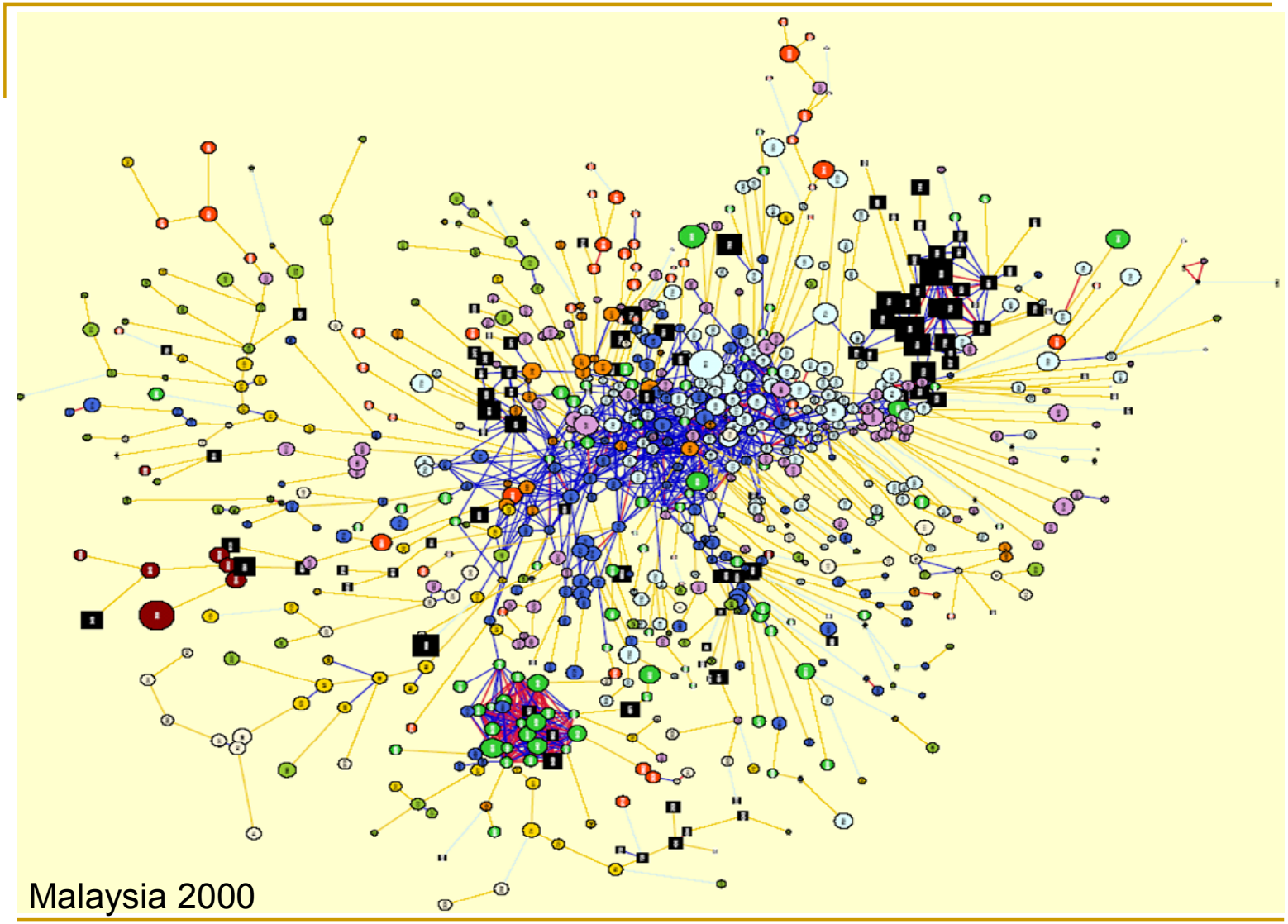
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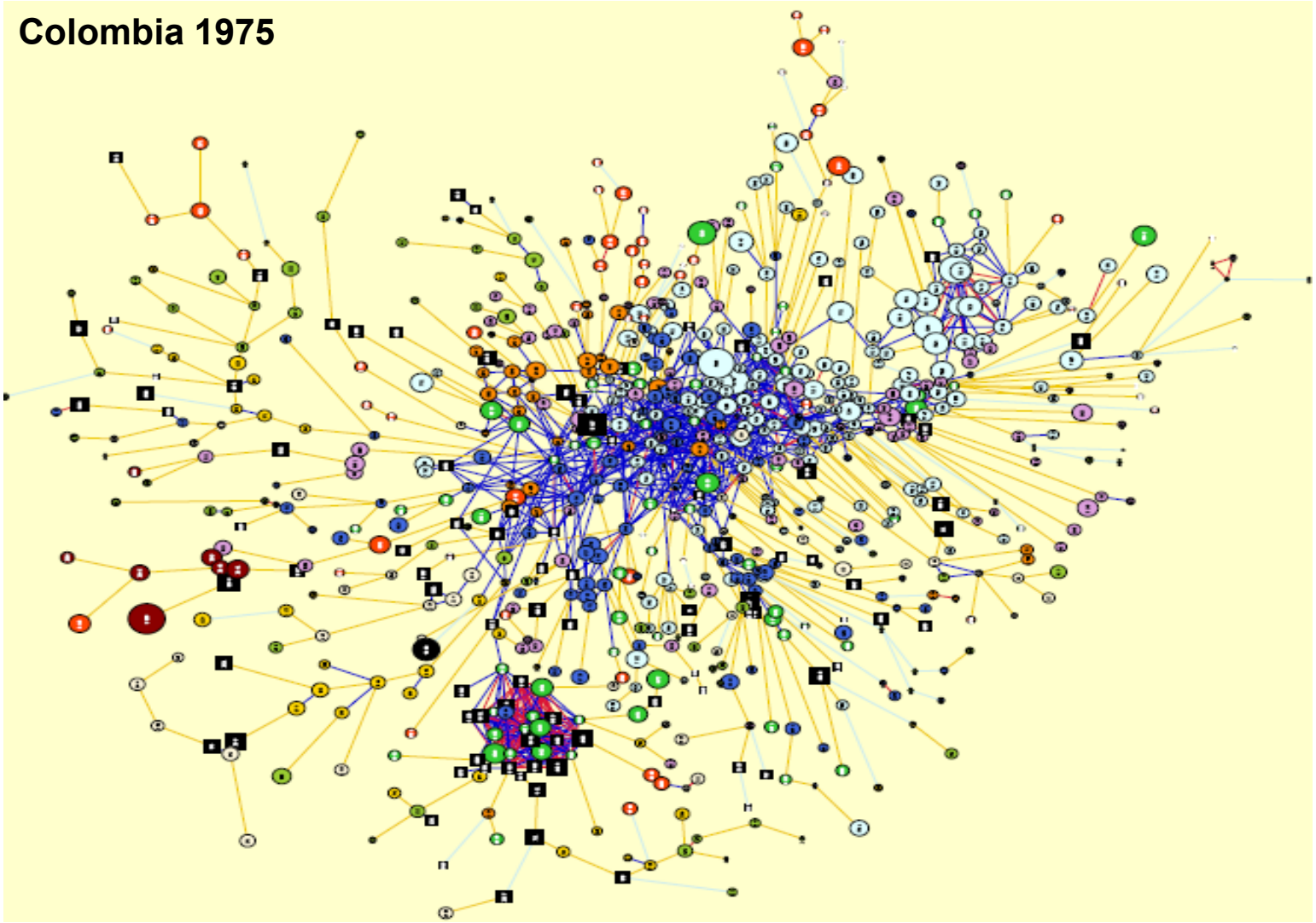
Colombia

Colombia 1975



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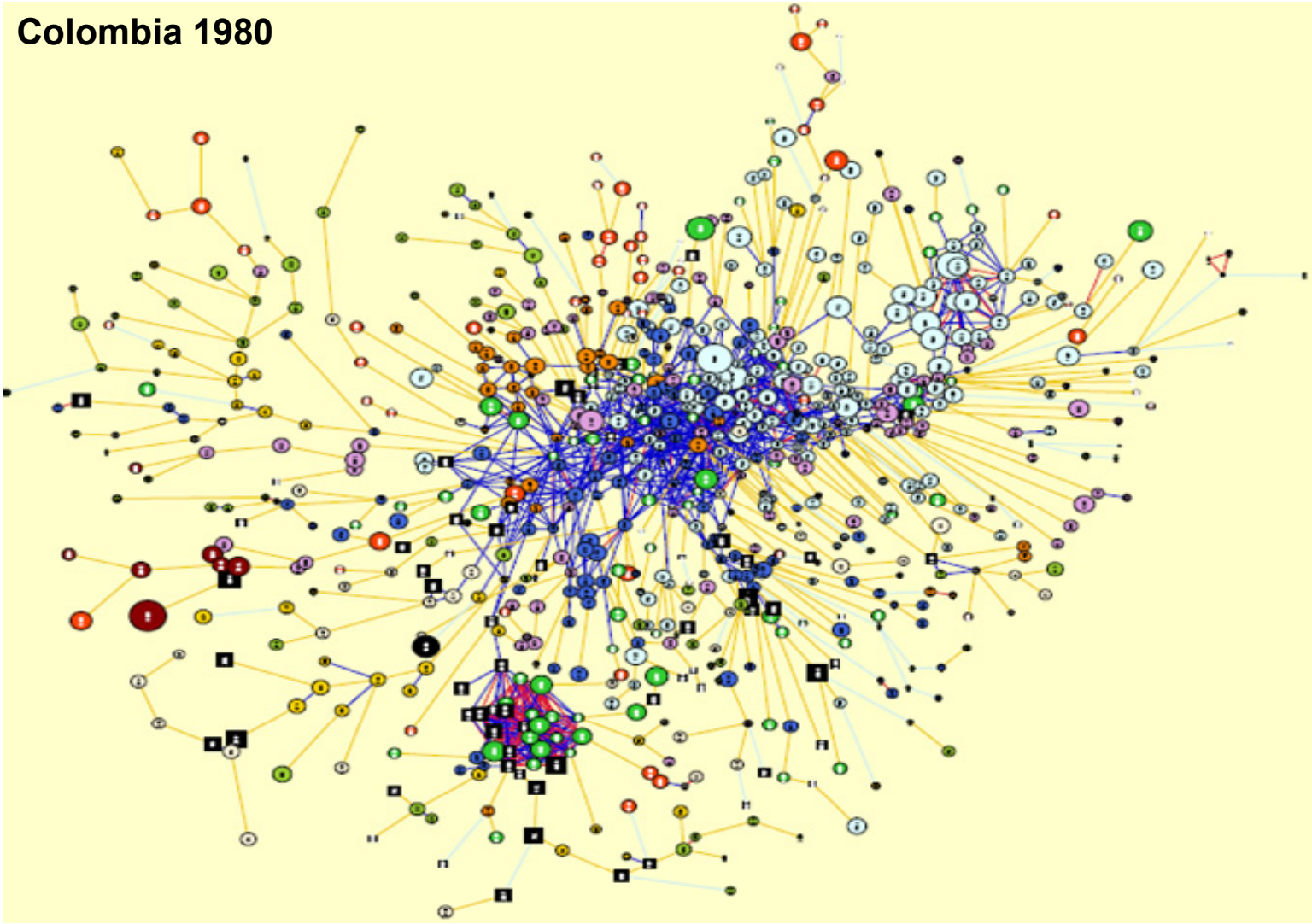

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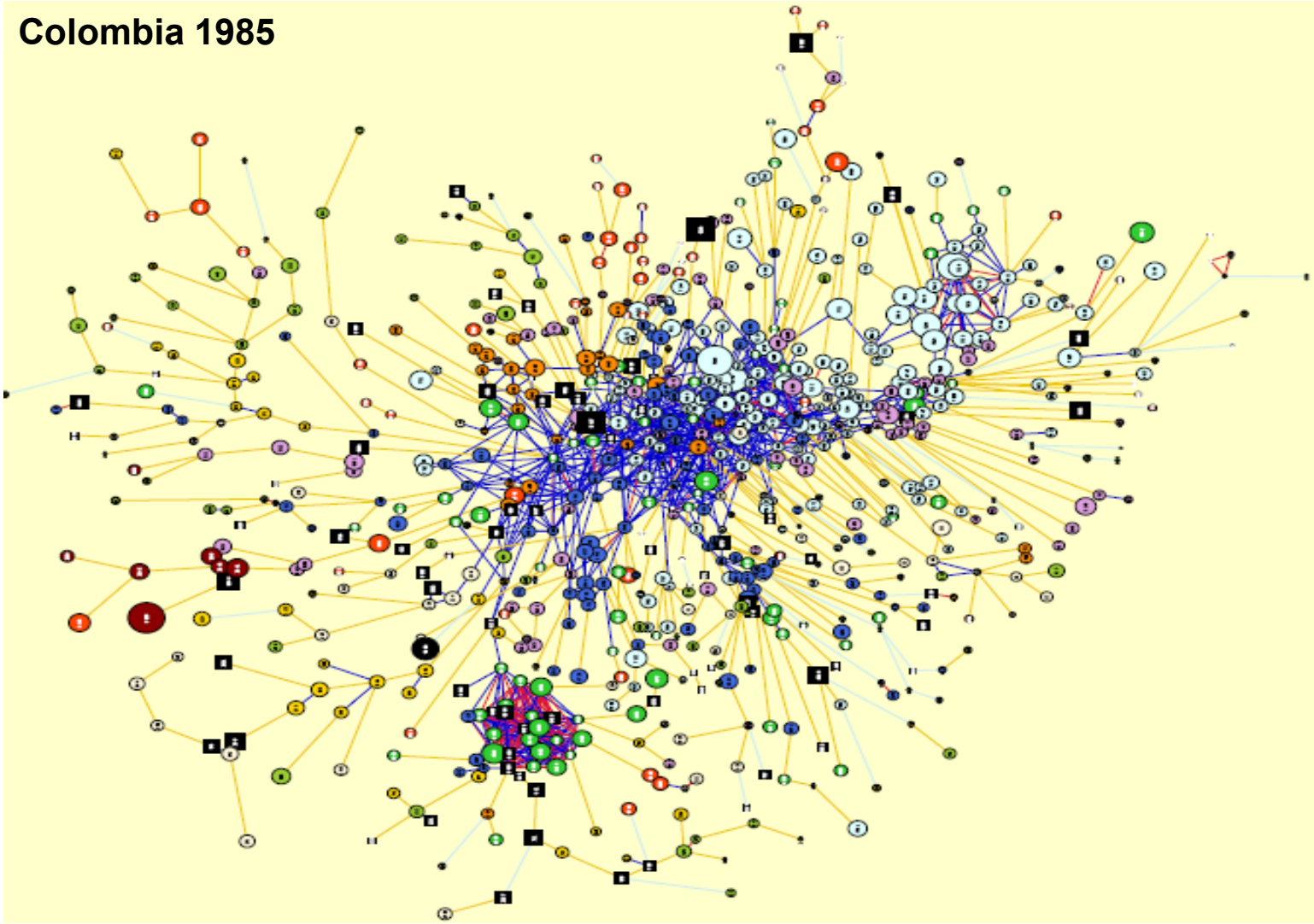

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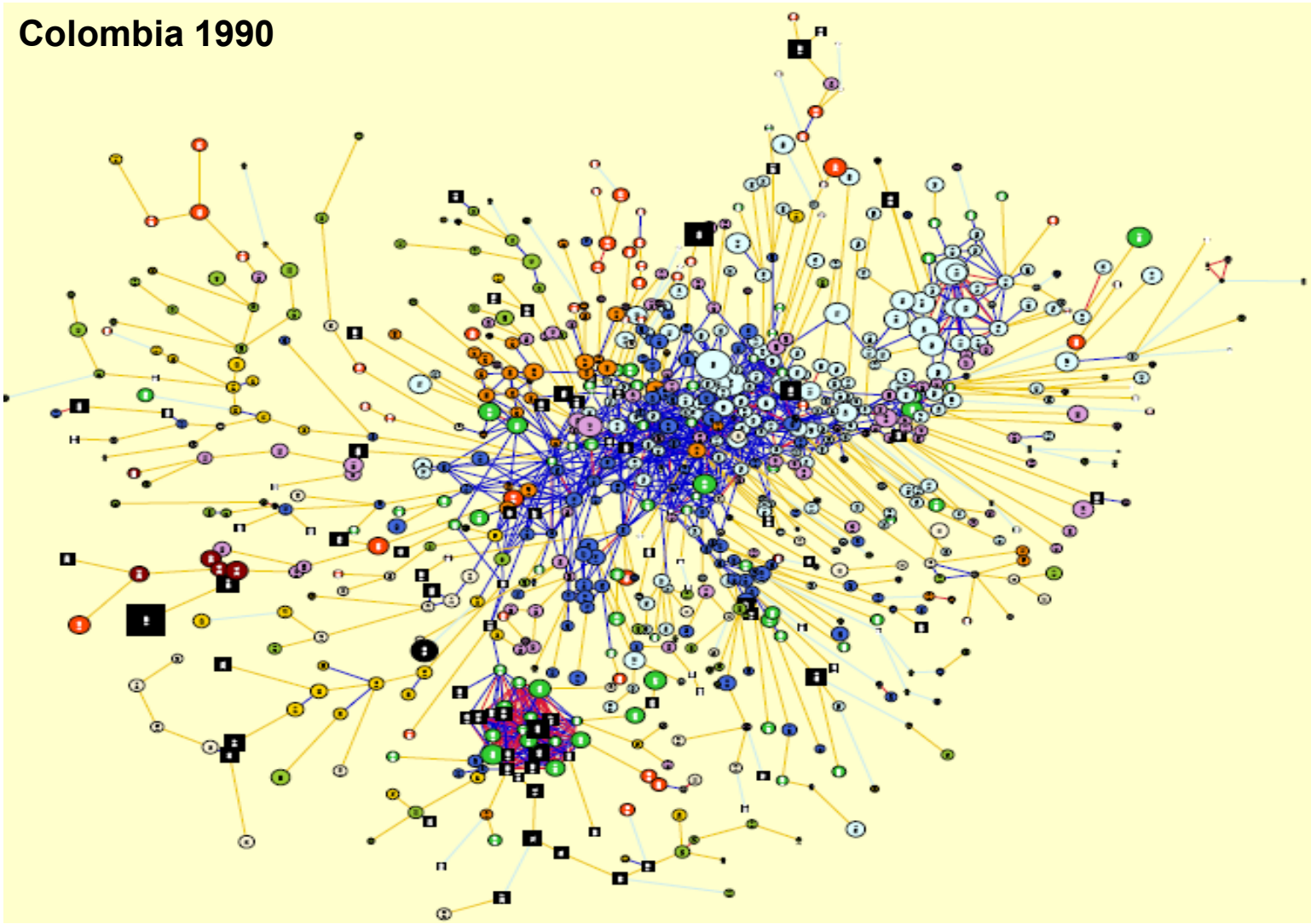

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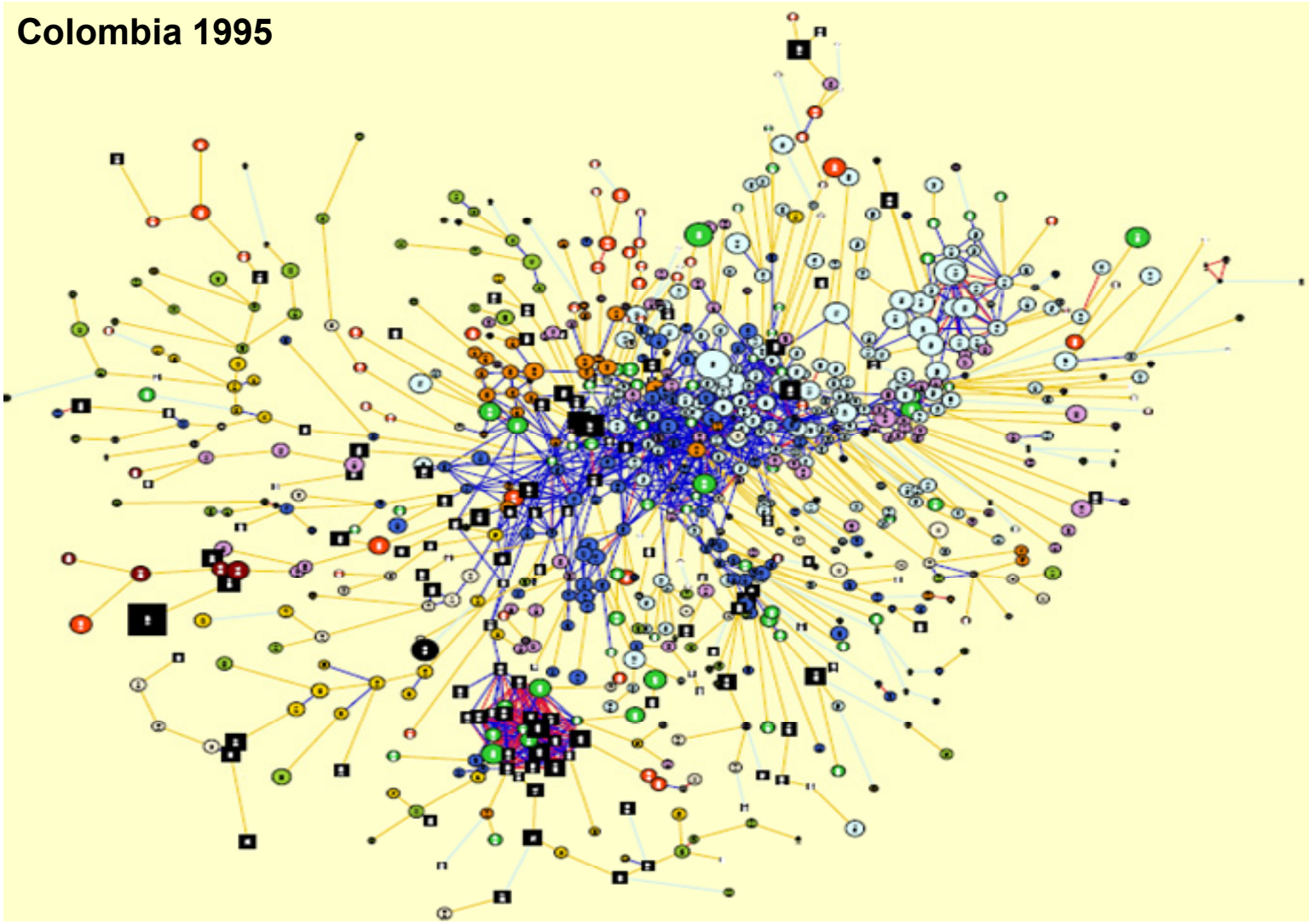

Colombia 2000