

Can Colombia learn from China's rural sector transformation? An argument for the Total Factor of Productivity transformation in the Household Responsibility System (HRS)

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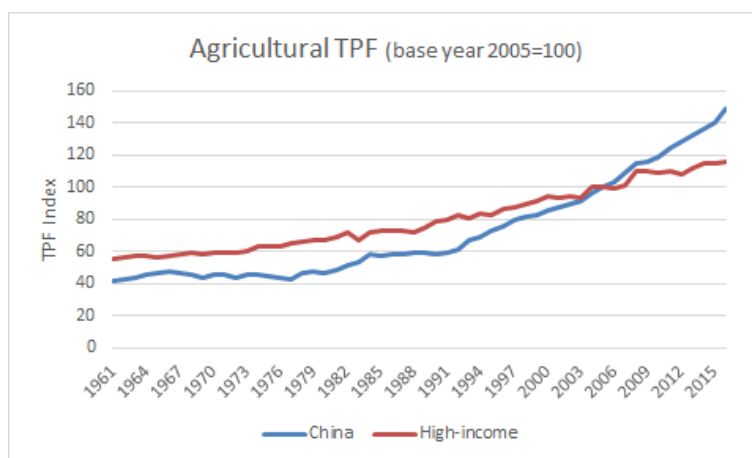
The case of Chinese offers a unique perspective for Latin America because of its success at increasing the agrarian output by implementing policies beyond modifying the economic inputs. The Household Responsibility System (HRS) of 1978 solved the free-rider problem by offering an incentive to the households to be efficient. China's case, amidst its differences with Colombia, has two key elements that might bring success for Colombia: market incentives, stability conditions, and profitable agrarian communities.

This paper offers to the reader a discerning perspective of how the elements of the Chinese Household Responsibility System contributed to explain the productivity improvement in China. Secondly, it compares what are the main lesions for the Colombian context. The three key elements, market incentives, economic stability, and profitable agrarian communities, will be explained by providing a quantitative perspective of a key period in the Chinese agrarian success and a comparative analysis of the Colombian agrarian reality.

What did China achieve?

The graph No. 1 offers a clear perspective of the reformer's success: China, a country that by the 1970s had an impoverished agrarian sector, today is the most efficient food producer in the world.

Graph No. 1



Source: [1]

In the graph No. 1, it can be observed the time series of the Total Factor Productivity of China compared to the world. The total factor productivity is the portion of the output that can not be explained by a direct change in the production factors. A simple explanation can be provided through the following expression known as the Sollow residual or accounting growth identity:

$$g_Y = \alpha * g_K + (1 - \alpha) * g_L$$

Source: [2]

The Solow measure of the growth determinants shows the variable “ g_Y ” as the growth rate of the output, “ g_L ” represents the growth rate of aggregate labor, and g_K the growth rate of aggregated capital. The TPF can be defined as the residual of subtracting the aggregate growth--that basically contains the total variation of the measure like the GDP-- and the growth rate for the rents paid to capital and the growth of the labor wages. In this sense, China by 1978 was constrained by its fiscal reality and poverty level to increase its inputs or to simply increase its GDP by modifying “ g_Y ” or “ g_K ”; this is to invest more in machines or pay higher wages to farmers to incentivize their production. As a result, the only feasible alternative was to improve the way by which the existing capacity was being used: this is by changing the institutions and the set of incentives to the economic agents, but also by using the achievements of other economic reforms like the capital accumulation during the collectivization period.

At the beginning of the 70’s decade, China was still facing the economic aftermaths created by the Great Leap Forward and the turbulent social conditions imposed by the Cultural Revolution. A perspective of a stagnant farming sector is accurately described as follows:

“Between 1952 and 1978, agricultural gross domestic product (GDP) grew at an average of 2 percent annually. The average annual growth of per capita net income (inflation adjusted) in the countryside was even lower—only 1.75 percent. Given that rural areas were mired in extreme poverty in the early 1950s, such anaemic growth meant the countryside was still impoverished when reformers took power in the late 1970s.” [2]

This situation of economic fragility and social instability was the initial scenario for reformers that started what will constitute a radical but gradual transformation of the Chinese economy. The merit of the Chinese transformation lies in recognizing the odd scenario where reformers like Deng Xiaoping or Zhao Ziyang had to choose in a path full of uncertainties. In particular, it was not clear if China was even able to provide herself with enough food sovereignty [3].

This transformation consisted in a productive transition from having the agricultural sector heavily focused on the production of crops to a more diversified production where the economic well-being of the farmer was part of the variables for increasing the land productivity. The autonomy granted to the farmers in the 1978 reform enabled the rural household to decide what agricultural product contributed more to their economic benefit. Furthermore, the possibility of working part time in the Township and village enterprises (TVEs) and part time in the farms contributed to increased farmers’ incomes overcoming the endemic rural underemployment. This allowed the economy to utilize the demographic dividend created after the famine during the Great Leap Forward increasing labor productivity. The farmer increased his wealth by having freedom to choose rent seeking opportunities: farming something different than just crops or having a second job in an industry.

In addition to the economic empowerment of the Chinese farmer, the production priorities displayed an important part in transforming the Chinese agrarian economy. In table No.1, the core of the productive transformation after 1978 is shown. The 1978 reform was able to diversify the farming production bringing agricultural products with more inherent added value. For

example, during the period after 1978 and 1984, meat and edible crops such as cotton and fruit presented significant rates of growth.

Table No.1: Percentage of average annual growth rate of agriculture and national population in China, 1952–2016

	Pre-reform	Reform period ^a					
	1952–78	1978–84	1984–2000	2000–05	2005–10	2010–16	Average
Agricultural GDP	2.2	6.9	3.8	3.9	4.5	4.0	4.5
Agricultural gross output value	3.4	5.9	5.9	5.3	4.8	4.2	5.4
Grain	2.5	5.5	0.9	1.0	2.5	2.0	2.1
Cotton	4.0	17.9	-0.6	6.4	2.0	-1.7	3.8
Edible oil crops	1.4	17.6	6.4	0.9	1.5	2.0	6.4
Sugar crops	7.8	13.6	3.7	4.8	5.3	0.5	5.3
Fruits	4.0	8.5	12.5	26.2	5.8	4.8	11.5
Vegetables ^b	n.a.	4.6	8.3	3.1	1.5	2.2	5.2
Meat	n.a.	7.8	9.1	2.9	2.7	1.3	6.0
Pork, beef and mutton	4.4	11.4	7.5	2.9	2.4	1.0	5.9
Poultry	n.a.	n.a.	14.9	2.9	4.2	2.3	8.8
Dairy	n.a.	n.a.	8.2	25.6	5.7	-0.1	9.0
Fish	4.7	4.2	12.1	3.6	4.0	4.3	7.3
Population	2.0	1.4	1.2	0.6	0.5	0.5	1.0

Source: [4]

The changes in food consumption in cities was an important factor in the agrarian diversification process. The greater mobility granted to the farmers and the competitive industrial wages increased the migration process from the rural areas to the urbanized cores. This urbanization force was responsible for reducing the cropping area by 80% a year after 1978 to 56% by 2000 [4].

How this achievement was measured: Total Factor Productivity (TPF) transformation in China in the period that matters: 1979-1984

A common approach for analyzing the agrarian TPF is understanding the causes behind the output in the production of crops for the Chinese case. The first thing to notice: crops constituted the main basis of the Chinese food sovereignty, but also constituted a mechanism for developing China through an industrialization based on trade. Having enough to feed the growing population, but also surpluses to increase the level of industrialization were the main reasons for “squeezing” the agrarian sector with strict policies like the Great Leap Forward program or the Hukou system. The decollectivization period required an executive and risky decision of providing flexibility to the rural communities by importing the required grain for achieving the procurement goals. Furthermore, it required a substantial effort from the reformers to convince the traditional political forces inside the Party to grant autonomy to the farmer in deciding the means for getting profit.

Understanding with clarity the sources of change in the Chinese farming transformation is an important factor because of the main purpose of this paper: discerning what a country like

Colombia could learn from a country with a different political orientation but with similar challenges. In this sense, differentiating the marketization from the institutional reforms over the agricultural sector in China would provide some insights about the key decisions taken from a government point of view.

The cross-sectional and the time-series analyses have been one of the main tools to differentiate the effect of different reforms that occurred during 1978-1984 period: market oriented reforms, institutional reform of the TVE's, the effect of technological accumulation during the collectivization era, and other exogenous factors like the climatic conditions. A limitation of the present study is that the analysis of the interaction between market reforms and institutional reforms is not being assessed because there is not enough secondary information to assess how China's market liberalization contributed as a beneficial or pernicious factor regarding the HRS.

An important effort to differentiate the effects of several reforms over China's agrarian productivity can be assessed through the work of Lin [5]. In Image No.1, the results of a regression analysis is summarized. The crop output growth is regressed by two types of explanatory variables: input factors and productivity factors. From a total growth of 42.23% of the crop output growth, the 45.7% (contribution to growth/total growth) was influenced by the changes in the input factors. In particular, the application of fertilizer was the most important factor within the inputs. Finally, it is clear the dominance of the institutional reform as factor (HRS) explaining an increment of the crop output. The HRS was the most important explanatory variable affecting productivity (46.89%). The other variables like the Multi-Cropping index or the Ratio of non Grain Crops measured the diversification effect as a result of giving to the farmers greater freedom to grow other crops or other products.

Image No.1

Explanatory variable	Estimated coefficient (1)	1978-1984		1984-1987	
		Change in explanatory variable (2)	Contribution to growth (percentage) (3) = (1) × (2)	Change in explanatory variable ^a (4)	Contribution to growth (percentage) (5) = (1) × (4)
Inputs			19.34 (45.79)		- 0.42 (- 9.97)
Land	0.67	- 1.1	- 0.74 (- 1.75)	- 2.4	- 1.61 (- 38.24)
Labor	0.13	14.7	1.91 (4.52)	- 22.7	- 2.95 (- 70.07)
Capital	0.07	65.3	4.57 (10.82)	26.9	1.88 (44.73)
Fertilizer	0.19	71.6	13.60 (32.20)	11.9	2.26 (53.71)
Productivity			20.54 (48.64)		2.05 (48.69)
Household-farming reform (HRS)	20.00	0.99	19.80 (46.89)	0	0
Multiple cropping (MCI)	0.20	- 4.1	- 0.82 (1.94)	4.4	0.88 (20.90)
Ratio of nongrain crops (NGCA)	0.78	2.0	1.56 (3.69)	1.5	1.17 (27.79)
Residual			2.35 (5.57)		2.58 (61.28)
Total growth:			42.23 (100.00)		4.21 (100.00)

Source: [5]

The work of Lin [5] is a relevant example of what the most of the analytical approaches have done for understanding the drivers of HRS over China's TPF. Under these studies, a common consensus is the link between productivity increment and the incentives for farmers to produce more under the new conditions established in 1978. However, these arguments may be challenged by the fact that during the pre-reform period, collectivization created a benign environment for the provision of key public goods connected to the rural sector performance. The collectives were already “exploiting returns of scale from the provision of key goods like irrigation infrastructure” or acquired machinery [5]. Furthermore, the different price regime--prices quota for procurement obligations, above quota or premium, and the prices coming from the revitalization of the farmers market--constituted an additional factor that complicates the task of separating HRS effects from marketization reforms. A priori, one of the observable interaction effects was evident in the fact that flexibilizing the agricultural sector depended on bringing more flexibility for the trade regime by increasing the possibilities for private companies to do imports and exports.

Omitted Variable Bias in the Growth account Models and the case of the level social capital

Posterior works after Lin [5] were aiming to include more variables into the functional specification. In this sense the work of Sun and Chen [6] included omitted variables that account for: cultivated land, irrigation, machinery, above quota prices, and some factors already included by Lin [5]. The result shows a possible omitted variable bias diminishing the coefficients of the HRS factor in 4.6 basic points in comparison to the OLS estimates obtained by Lin [5]. This fact provides statistical evidence to the fact that collectivization effectively provided important public goods for the forthcoming productivity increment during the period 1978-1984.

While it is valid to complete further analysis of the HRS, it is interesting how the social capital, as an explanatory variable, remains without a proper analysis for understanding the causes behind the rural transformation. The social capital was relevant considering the self coordination of communities for achieving larger goals. This acquires relevance for an economic systems because:

“Virtually all economic activity, from running a laundry to building the latest-generation microprocessor, is carried out not by individuals but by organizations that require a high degree of social cooperation. As economists argue, the ability to form organizations depends on institutions like property rights, contract, and a system of commercial law. But it also depends on a prior sense of moral community, that is, an unwritten set of ethical rules that serve as the basis of social trust. Trust can dramatically reduce what economists call transaction costs [...] and makes possible certain efficient forms of economic organization that otherwise would be encumbered by extensive rules, litigation and bureaucracy.” [8]

The possibility of cooperation among rural households was an important factor to discover in the HRS a possibility to transform the difficult rural reality of China's pre-reform period. In particular, the household transformation was an idea originated from a group of villagers contradicting the top-bottom policies of the Party. The case of Xiaogang farmers and its private contract for dividing the land by families shows the centrality of **the trust** among the community members to carry out an impressive socioeconomic transformation in China.

The social capital created as a result of the collectivization and decollectivization periods could be considered as an important variable not included into the institutional reform analysis. An additional argument to support the foregoing statement can be seen in the Two-farmland system (TFS). The high level of fractionalization of the rural property (created during the HRS) required a higher level of coordination among the farmers for dividing effectively the land between basic provision and contract land. Furthermore, to avoid the pernicious effects of excessive fragmentation over the expected utility, farmers required to achieve a general consensus of what was going to be planted in the contracted land [9]. This consensus was achieved through two institutions: the role of party members in the community and the village committee. In the case of the party members inside the rural community, they were required to adopt the party reforms earlier to instill the adoption of the top-bottom policies. In other words, the party members were catalyzers of an informal cooperation process within the community. Complementary, in the case of the village committee, this institution was presenting the formal incentives for cooperation by offering extension services, assigning efficiently the land, and receiving the payments as representative of the land owner.

Synthesis of the learnings from the HRS implementation

Based on the reviewed bibliography, a synthesis of the main factors behind the productivity success experienced by China after 1978 can be summarized as follows:

1. A clear delimitation of the rural property,
2. Capital accumulation by the community of farmers: the collectivization period provided capital at the village level. Fertilizers, irrigation, and machinery granted in the pre-reform displayed key factors in rural productivity,
3. Market incentives for production: the HRS enabled the farmer to look for rent seeking opportunities through bringing access to complementary labor opportunities like getting employment in the cities receiving higher wages or by deciding what to grow in their lands,
4. Territorial specialization: the territories were to increment their output by using farmer's knowledge to grow what yielded more in a particular geographical area,
5. Social Capital: the output increment required improving the efficiency of at the individual level (household) but also required the coordination of the communities for implementing better practices, cooperating with the central level, and by dealing with the limitations of the centralized decisions (like the land fragmentation).

In the following section, the Colombian case will be analyzed briefly from a comparative perspective. The HRS experience allowed us to synthesize some of the factors that transformed the Chinese productivity and are a guide to discern what could be implemented as part of the political agenda in Colombia.

A general perspective of the Colombian side: 1970-2000

Productive transformation

During the 70s decade, Colombia was experiencing one of the highest rates of economic growth in its history: 6.7% [10] as a direct consequence of the international prices of its main exportation product, the coffee and the positive performance of the domestic economy. At the same time, Colombia had an agricultural sector whose main producers were the family farm communities, few agroindustrial firms, and the land-owners. The main products of this agricultural sector were coffee with 30% of the total production, sugar cane with 5.97%, corn with 27%, beans (5.10%), and plantains (3.89%). Image No.2 shows how the 70s decade had several drivers of economic growth: agriculture, industry, infrastructure, and services. Both agriculture and industry were benefited by the protectionist policies implemented following the theoretical postulates of the Economic Commission for Latin America and the Caribbean: for Latin America it was diagnosed as important to be able to produce its own industrial supplies in order to stop having asymmetrical exchange conditions with the industrialized countries that produced high added value products.

In particular, the growth of the industrial sector had an important role because it allowed the rural population to be absorbed by those manufacturing roles created as a consequence of the industrial sector's expansion. This positive economic performance contributed to elevate the PIB along the declining rates of the population growth.

Image No.2

Growing real rates (Annual average)				
Concept/year	1970-1980	1980-1990	1990-2000	2000-2004
PIB	5,51	3,40	2,72	2,90
Population	2,52	2,18	1,93	1,73
PIB per capita	2,92	1,19	0,78	1,15
By productive sectors	1970-1980	1980-1990	1990-2000	2000-2004
Agriculture	4,36	3,07	1,58	1,34
Minery	-2,05	17,42	5,06	1,66
Industry	5,99	2,95	0,44	2,86
Infrastructure	5,17	1,93	-1,16	9,81
Commerce	5,70	2,42	0,79	4,20
Services	6,60	4,10	6,46	2,69

Source: [11]

Part of the industrial expansion during the 70s decade implied a declining trend of the agricultural sector. A pattern only observable in the agricultural sector growth since 1980. Four factors influenced this trend: the intensification of the Colombian internal conflict, the volatile international prices imposed by the OPEC crisis, the sluggish growth rates of OECD countries (less gains from international trade), and the fast deindustrialization during the following years. Among all these phenomena the internal conflict has been a notorious disruption for the agrarian sector because of its direct impact over the Colombia state institutions.

In the following decades, Colombia attempted to gain a space in the global economy through a radical and premature market liberalization of the economy. This implied the implementation of

an opposite model from what was applied during the import substitution period in 1970: a reduction of imported tariffs particularly in the industrial sector (Image No. 2). The main consequence was evidenced in rapid decline of the industrial sector growth rate after the 70s decade. The conditions of economic liberalization had a negative impact on the overall growth rate demonstrating that protectionist period did not result in an industrial or agroindustrial competitiveness level capable of guaranteeing the survival of the domestic industry.

The failure in developing a robust industrial sector was connected to the lack of technification in the agricultural sector for improving the productivity level. Furthermore, the reduction of the public expenditure in subsidies, credit access, technical assistance after the 70s decade and the increasing prominence of free trade made it difficult for the familiar farming to compete with the imported goods like cereals, fruits, and the oilseeds at lower prices. The farmer once again was left behind of the economic development model with an agrarian depressed economy, and with less income opportunities for the rural communities as a result of the declining level of industrial production.

Internal Conflict

Since the foundation of the Colombian Republic, the land distribution inherited from the Spanish created conflicts in the Colombian rurality. Those who were benefited under the power of the Spanish crown preserved the most fertile and rich lands. Furthermore, the absence of State institutions protecting and formalizing the land property created an interest where the farmer had to lose his land to protect his life. In general, this initial distribution of the rural property along the state failures have been created in 200 years of republican life, a continuous conflict between land-owners, farmers, illegal groups, and corporations.

During the second part of the XX century, Colombia experienced an intensification of the internal conflict whose main cause as it was mentioned was the unequal distribution of the land. In particular, this unequal distribution is considered an important factor behind the proliferation of guerrilla movements during the 60s and its constant growth along the next 60 years. The farmer had a clear incentive for joining armed groups whose main argument was the protection of the rural communities against the state institutions and other interested parties like corporations and land accumulators. Twenty years later, these factors of social instability in conjunction with the involvement of the illegal narcotics industry created an environment where several well-funded armed actors were constantly fighting over the control of the production areas leaving the farmer with two options: to join an illegal armed group or to leave his property in hands of the criminals.

Political reforms and feasibility for a present context

The 70s period was a significant period to understand the roots of the agrarian dilemma in the Colombian context. These problems are part of the persistent constraint of a sector that requires better understanding of the underlying problems and a consensus of the possible actions among the political actors.

A first solution suggested by the Chinese case would be to start enabling the access to the rural property to farmers communities. However, Colombia has been failing since 1960 at reforming the land structure where 51% of the land is concentrated in only 1.5% of the population [12]. This suggests as not feasible an agrarian reform like the HRS considering the role of the land in the current power dynamic: families, pricelings, and elites who hold government positions are the same land accumulators.

A second factor suggested by the HRS is the capital accumulation represented by granting the farmer access to essential public goods that improve the land productivity. In this sense, Colombia has been implementing several gubermental programs to build irrigation districts and improving the conditions of the rural credit by increasing the Agrarian Bank capacity. This is a more feasible strategy considering that Colombia has 30% of all its irrigation districts not operating because of the lack of maintenance. On the other hand, the access for fertilizers remains to be insufficient considering the international prices of the NPK fertilizers (given the fluctuations of the exchange rate) and how these prices affect the access for farm communities. Colombia's farmers are being affected by the constant smuggling of agricultural products that come from Ecuador or Brazil. This effect legitimizes the government to issue a matching grant to the municipalities in order to facilitate the access for fertilizer to middle and small farmers.

The third factor suggested by the HRS experience is the possibility of having farmers with autonomy for determining their production purpose inspired by rent seeking opportunities. This implies not only agricultural communities being able to decide what to grow but also the possibility of commercializing in a profitable manner. In this sense, the Colombian farmer remains in an unfair market position because of the intermediaries who take most of the operational profit. It is necessary and feasible to equip the farming community with platforms that enable the direct commercialization of the agricultural products between producers and consumers, improving the profitability of the small farmers.

However, it is illusory to compete with the international prices of imported agricultural products from Brazil or Ecuador with higher levels of industrialization and subsidies over the agricultural sector. Therefore, in order to be able to compete it is necessary to specialize the Colombian community farming in those endemic products that probably would have a high added value in the international markets: exotic fruits or agricultural products with an added valued process . In this sense, the HRS experience offers an opportunity to observe the positive effects of improving farmer's profitability: the soil started to be cultivated in function of the products that offered a comparative advantage.

Finally, the social capital had a prominent role in transforming the agrarian economy in China. For Colombia, the armed conflict can be linked to the loss of social bonds in the rural communities: when a family loses its land as a consequence of a forced displacement, the family and the community lose those social bonds of trust that make collective actions possible or reduce transaction costs in the productive systems. In this sense, recovering the social capital is equally complex as enabling the access of rural property for communitary farmers.

In conclusion, the Chinese case demonstrated an important benchmark amidst structural differences. In particular, the collectivization period and the HRS served for the Chinese economy to consolidate a critical infrastructure for producing the necessary quantities to cover their food sovereignty. China was able not only to cover their basic needs, but also to develop an

industrialization strategy by increasing the usage of fertilizers, irrigation districts, and by incorporating more machines to their farmland. In comparison, Colombia had as a main deterrent the social instability as part of its gridlock at transforming the state institutions for responding to territorial needs: security, land access, protection of the land property, and access to production factors (e.g. fertilizers, machines or credit access).

Finally, the armed conflict along with the war on drugs has displayed an important differential factor in the compared agrarian performance between China and Colombia. China has been accumulating a social capital derived from the conditions of stability and growth. On the other hand Colombia has been reinforcing a constant migration from the land to the cities not because of economic growth but rather because of the lack of guarantees for the farming communities.

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