India Exim Bank

INDIA EXIM BANK
International Economic Research
Annual Citation

ESSAYS ON MISALLOCATION

Occasional Paper No.: 226

Export-Import Bank of India

Occasional Paper No. 226

Essays on Misallocation

This study is based on the doctoral dissertation titled "*Essays on Misallocation*" selected as the citation-winning entry for the India Exim Bank International Economic Research Citation 2023. This dissertation was written by Dr. Rahul Rao. Dr. Rao received his Ph.D. degree in Economics from the Indian Institute of Management, Bangalore, in 2023, under the supervision of Prof. Chetan Subramanian; Prof. Kunal Dasgupta; Prof. Ashok Thampy and Prof. Murali Srinivasan, Indian Institute of Management, Bangalore.

Contents

List of Figures

List of Tables

Executive Summary

One of the key questions in economics is, "Why are some countries richer than others?" The extant research in development literature suggests that the main reason for differences in income levels is a country's total factor productivity (TFP), which reflects how efficiently it uses its resources. This leads to the crucial question: why does TFP vary between countries? Researchers have identified different reasons for low TFP in poorer countries. These include slower adoption of new technologies or businesses not using available technology effectively. Such factors explain why companies in poorer countries are less efficient compared to those in richer countries, which lowers overall TFP. However, even if two countries have similar distribution of firm-level productivity, their TFP may still differ based on how resources are allocated across firms.

For this, TFP can be seen as the weighted average productivity of individual firms. It can be low either because the firms themselves are less productive, or because weights are not optimally allocated amongst them. Misallocation refers to the latter case which occurs when more efficient firms get fewer resources, while less efficient ones get more. This allocative inefficiency can be caused by financial barriers, trade limitations and policy regulations, among others. Studies have found that these distortions negatively impact overall productivity and economic output of a nation.

Over time, the role of micro-level heterogeneity in economic growth has gained more attention, particularly in the context of resource misallocation. Seminal works by Restuccia and Rogerson (2008) and Hsieh and Klenow (2009) highlight how the suboptimal allocation of inputs across different production units contributes to a reduction in total factor productivity (TFP).

This study examines two distinct aspects of such resource misallocation across three chapters.

The first chapter addresses how much agricultural land could be freed for non-agricultural use in India if it were allocated more efficiently. This is significant because agriculture uses about 60% of India's land, yet crop yields remain below the global average. The chapter suggests that Indian farmers often grow unsuitable crops, requiring more land to produce the same output, leading to lower yields per hectare. By using a novel agronomic dataset called Global Agro-Ecological Zones (GAEZ), the analysis calculates the minimum land required to achieve current crop outputs if agricultural land were optimally allocated. The results show that up to 13 million hectares, or 20% of agricultural land during the Kharif season, could be released in a conservative baseline scenario. With more advanced inputs and access to finer land heterogeneity, a social planner could potentially free up as much as 70% of agricultural land.

The second chapter examines the welfare effects of the above increased agricultural productivity due to better land allocation. Using a two-sector model (agriculture and manufacturing), the chapter explores how land and labor shift between these sectors, given certain barriers to movement of both factors. The findings show that with improved agricultural productivity: (i) land and labor move from agriculture to manufacturing, (ii) land prices fall while wages rise, (iii) output in both sectors increases, (iv) agricultural prices decrease, and (v) real income in the economy rises by 11.69%. Additionally, welfare gains from factor reallocation diminish if mobility barriers increase, and conversely, the effects are amplified if these barriers are reduced. This indicates that not only is optimal land use necessary for improving productivity, but reducing the barriers to resource movement is equally crucial for enhancing overall welfare.

These findings reinforce the notion that India's crop-land mismatch leads to inefficient use of agricultural land and lower crop yields. The analysis provides valuable insights into how land acquisition challenges hinder the country's economic development, and it offers a framework for policymakers to explore ways to improve crop yields and release agricultural land for other uses.

The third chapter shifts focus to borrowing constraints in the U.S. credit market, examining their micro and macro-level implications. At the micro-level, the chapter compares Earnings-based Borrowing Constraints (EBC) with Collateral-based Constraints (CBC) to explain the empirical characteristics of U.S. manufacturing firms. Debt-constrained firms are found to (i) have a higher debt-to-earnings ratio, (ii) have a lower debt-to-asset ratio, (iii) be more productive, (iv) not necessarily be small, and (v) have lower net worth. The chapter also reveals that the size of a firm is not strongly correlated with its marginal revenue product of capital.

Using a static input choice model, the analysis shows that EBC better captures these observations than CBC. Under CBC, borrowing is primarily determined by firm size, leaving small firms credit constrained and larger ones relatively unconstrained. In contrast, under EBC, borrowing depends on both size and productivity, allowing small but highly productive firms access to financial capital while potentially constraining larger firms. As a result, larger firms may face constraints under EBC, while smaller firms may not.

At the macro level, the chapter links capital misallocation to the type of borrowing constraint, finding that TFP losses are about 40% lower under EBC compared to CBC. This is because, under EBC, credit access is tied to a firm's productivity, reducing the dispersion of marginal revenue products across firms and leading to higher aggregate productivity. In contrast, CBC allows larger firms to borrow more, regardless of productivity, leading to greater dispersion and lower TFP. The chapter empirically confirms that during the 1997-2015 period, U.S. manufacturing firms faced more earnings-based borrowing constraints, meaning prior literature may have overestimated TFP losses by focusing on collateral-based constraints.

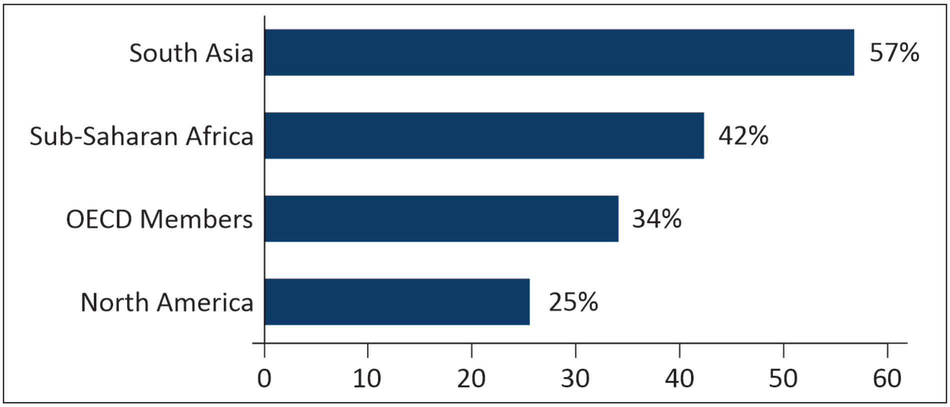
Overall, this chapter highlights how different borrowing constraints affect firms' capital allocation and demonstrates that earnings-based constraints were more relevant for U.S. firms, potentially leading to lower-than-expected productivity losses due to credit frictions.

The different chapters in the study offer various perspectives on misallocation. First, in terms of the type of misallocated input, the first chapter focuses solely on land misallocation, while the second chapter expands to include both land and labor misallocation. In contrast, the third chapter deals with the misallocation of physical capital. Secondly, the first two chapters examine sectoral-level misallocation, specifically between different sectors of the Indian economy. The third chapter, however, looks at capital misallocation between firms within the U.S. manufacturing sector. Thirdly, both direct and indirect methods are used to calculate misallocation. In the first chapter, an indirect approach is employed to measure the overall extent of land misallocation between the agricultural and non-agricultural sectors in India, without focusing on specific causes. In the third chapter, the focus shifts to the misallocation of physical capital due to two types of credit market distortions: collateral-based and earnings-based borrowing constraints.

1. Extent of Land Misallocation in Indian Agriculture

In densely populated and underdeveloped regions of the world, much of the land is used for agriculture, as shown in **Figure 1.1**. This makes it difficult to allocate land for other purposes, such as industrial development or urban growth, as seen in countries like India. In India, the difficulty in acquiring land for infrastructure projects is a well-known challenge. According to Mohanty et al. (2009), land acquisition issues account for 70% of infrastructure and development project delays in India. Similarly, according to an estimate by ASSOCHAM (The Associated Chamber of Commerce and Industry of India), the country's leading business association, projects worth US$ 100 billion are at stake due to land acquisition. Many of them are critical infrastructure projects linked to railways, national highways, ports, and power plants.

Figure 1.1: Percent of Land under Agriculture in Different Regions of the World



Note: The data is average for the period 2014-18.

Source: World Bank

According to the World Bank, in 2018, about 60% of India's available land was dedicated to farming. Many Indian policymakers argue that only non-cultivated land should be used for industrialization. However, this overlooks the fact that much of the land used for farming in India is not very productive, leading to low yields compared to other countries of similar size and development, as shown in **Table 1.1**.

Table 1.1: Average Yields of Rice and Wheat in BRICS countries

	Rice	Wheat
China	5.27	5.39
Brazil	4.58	2.50
South Africa	4.57	3.45
Russia	2.61	2.69
India	2.50	3.10

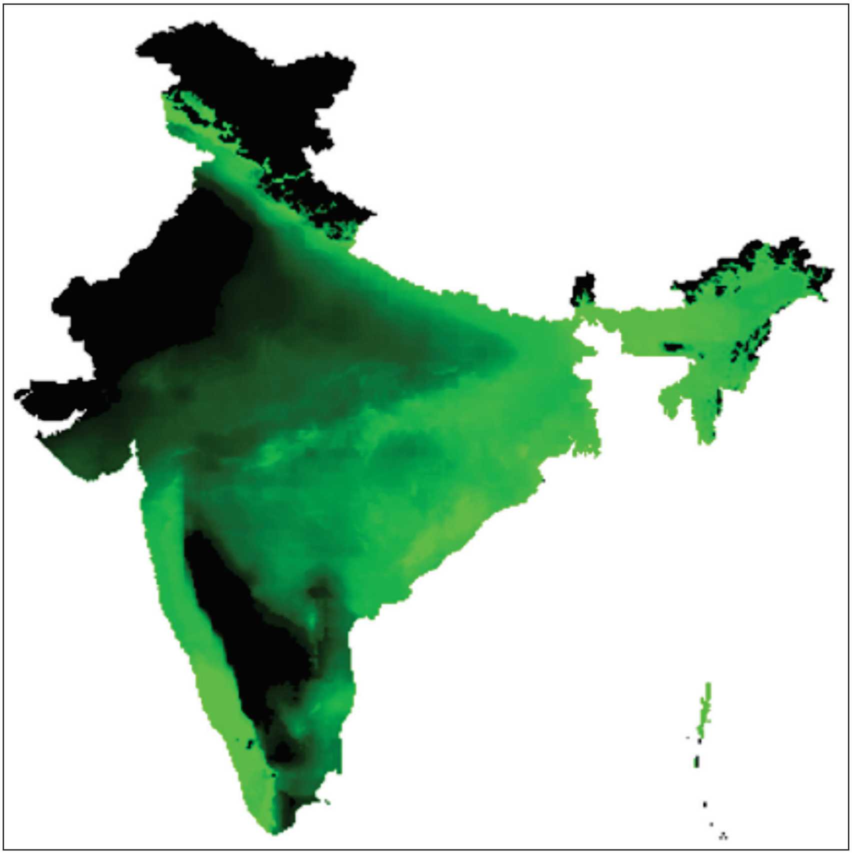
Note: Yields are measured as tonnes per hectare and are averages for the period 2014-18. BRICS consists of Brazil, Russia, India, China and South Africa.

Source: UN Food and Agriculture Organization (FAO)

The main question explored in this chapter is how much land in India could be freed up for non-agricultural use if farming land were used more efficiently. To investigate this, data on potential crop yields from the Global Agro-Ecological Zones (GAEZ) project, which was created by the Food and Agricultural Organization (FAO) in collaboration with the International Institute for Applied Systems Analysis (IIASA), was analyzed. The GAEZ dataset breaks land down into small grid cells, each measuring about 9 kilometers by 9 kilometers at the equator. These cells, or "fields," capture important geographical factors that affect farming, including (1) soil quality, which encompasses things like depth, fertility, and drainage; (2) climate factors, such as temperature, rainfall, and wind speed; and (3) terrain, like elevation and slope.

These natural factors, combined with assumptions about human inputs like fertilizers, irrigation, and farming methods, are then run through an advanced crop-specific model. This model is designed to simulate how different growing conditions affect the yield of each crop based on its biological needs. It estimates the potential yield (in kilograms per hectare) for each crop in each field—not just for the crops actually being grown there. This potential yield represents the maximum amount of crop that could be produced in each field, given the local conditions and the assumptions about farming practices.

Figure 1.2: Potential Yield of Rice



Note: Potential yields, measured in tonnes per hectare, correspond to those under rain-fed water supply and low-level agricultural inputs. Brighter shades correspond to higher yield. GAEZ does not report the potential yield data on Lakshadweep Islands, therefore Lakshadweep Islands is not part of the above map.

Source: GAEZ dataset

The GAEZ data reports potential yields under two main human input categories: (i) water supply (either irrigated or rain-fed) and (ii) level of complementary inputs (either low or high). Importantly, because the human inputs and crop model parameters are the same for all fields, the variation in potential yield for a crop comes solely from the differences in the geographic features of each field. For example, **Figure 1.2** illustrates the potential yield for rice across India's GAEZ fields. Areas in brighter green represent regions with higher potential yields, while black areas show where growing rice under the given input levels is not feasible. The above map highlights the considerable variation in rice yields across different regions of the country. A more detailed explanation of this data can be found in the work by Adamopoulos and Restuccia (2018).

To determine the minimum amount of land needed to produce the same crop output, assuming the land was used in an optimal way, a social planner's problem is devised. The planner's goal is to reduce the amount of land needed to produce the current crop output within a given area, such as a district, state, or the entire country. This can be seen as a two-step process. First, the planner determines how much of each crop needs to be produced. Second, the planner decides how much land should be used to achieve those production targets. The focus here is on the second step, assuming the first step has already been completed.

In the main analysis of the study, the planner's problem is solved at the district administrative level for all crops that were grown during the primarily Kharif season of crop production (March-September)[1]. Each district has several GAEZ fields which have the potential to grow different crops, under specific input and water conditions. The planner decides what portion of each field will be allocated to a specific crop. Assuming that not every field will be used to grow every crop, and that some parts of a field may not be used for farming at all, allowing for other non-agricultural uses, the solution involves determining the best allocation of land across the different fields for each crop. This requires solving a large-scale optimization problem. The result gives the minimum amount of land needed to meet the current crop production levels in each district. The inefficiency index for a district is then calculated as the percentage of farmland that could be freed up if the crops were optimally distributed across the available fields. This inefficiency indicates how much land could be released from agriculture without reducing overall crop production.

[1] Analysis includes crops grown only once during March to September (average of 2006-10), so these include summer, kharif and whole year crops.

For the planner to successfully reduce the total land used in a district, there must be differences in potential crop yields across the fields in that district. To lower the amount of land needed to grow a specific crop, the planner would need to shift production from fields with lower yields to those with higher yields. **Table 1.2** shows that this variation in potential yields exists for the five most commonly grown crops during the Kharif season in India, depending on the inputs used. For instance, under rain-fed conditions with low input levels, moving from a field in the 25th percentile to one in the 75th percentile leads to about a 10% increase in yield. The yield increase is even greater—between 20% and 30%—when shifting from a field in the 10th percentile to one in the 90th percentile.

Table 1.2: Variation in Potential Yields across Fields in a District

Crops	# of Districts (1)	(Rainfed + Low)		(Rainfed + High)		(Irrigated + Low)		(Irrigated + High)	
		75th/ 25th (2)	90th/ 10th (3)	75th/ 25th (4)	90th/ 10th (5)	75th/ 25th (6)	90th/ 10th (7)	75th/ 25th (8)	90th/ 10th (9)
Rice	532	1.17	1.34	1.16	1.33	1.03	1.06	1.02	1.04
Cotton	251	1.09	1.18	1.15	1.28	1.07	1.14	1.08	1.15
Pearl Millet	258	1.08	1.15	1.09	1.17	1.09	1.14	1.08	1.14
Soybean	210	1.10	1.19	1.09	1.18	1.05	1.11	1.04	1.07
Maize	522	1.12	1.24	1.12	1.25	1.07	1.14	1.06	1.13

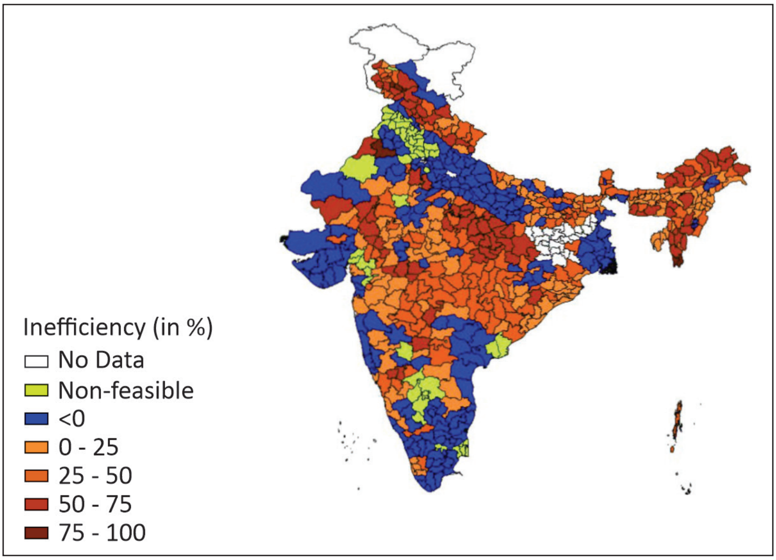
Note: The table reports the mean value for the ratio of 75th to 25th percentile potential yields (columns 2, 4, 6 and 8) and the ratio of 90th to 10th percentile potential yields (columns 3, 5, 7 and 9) under different human input combinations within a district. Column 1 reports the number of districts in which the corresponding crop is actually grown.

Source: GAEZ dataset

In a baseline scenario, as shown in **Figure 1.3**, where only rain-fed water and low input levels are used by the planner, it was found that up to 13 million hectares, or 20% of agricultural land in India, could potentially be freed up for other purposes. Although most districts are inefficient—meaning they use more land for agriculture than a planner would ideally allocate—there are two notable exceptions. First, there are some districts where the planner cannot find a solution to the land allocation problem, labeled as non-feasible (shown in green in **Figure 1.3**). Even when all cultivable land with positive potential yields is utilized, these districts still fall short of producing the actual crop output needed. Next, around 29% of the districts are considered efficient (shown in blue in **Figure 1.3**), meaning they use less land than is optimal for their crop production.

The existence of both non-feasible and efficient districts raises questions, especially since the planner's solution is expected to be optimal. Two possible explanations for these anomalies are suggested. First, the higher actual yields in some districts may be due to the use of better-quality inputs than those assumed in the baseline scenario. Alternatively, higher yields might result from only specific areas within a field being used for agriculture. The potential yield of a GAEZ field is an average taken across several different plots, and it's possible that only the most productive plots are used for farming. If the highest-yielding 25% of the land is used, for instance, less land would be required to produce the same crop output. The next step is to explore these possibilities further.

Figure 1.3: Inefficiency across Districts for the Kharif Season



Note: Potential yields correspond to those under rain-fed water supply and low-level agricultural inputs.

Source: Authors' calculation using GAEZ and actual production data.

The GAEZ dataset reports the percentage of each field equipped for full irrigation control using various administrative datasets. Using this information, now the planner is assumed to also have access to irrigation water supply in addition to rainfed, and, as before, the planner has access only to low levels of agricultural inputs throughout the country. Compared to the baseline case, there is a noticeable decline in both the number of non-feasible and efficient districts. However, inefficiency has increased in the remaining districts, causing the overall inefficiency distribution to shift to the right. As expected, granting the planner the same irrigation facilities as farmers leads to a reduction in optimal land usage across districts.

In addition to differences in water supply, now variable input intensity is introduced across fields. Since field-level data on input usage isn't available, district-level data from the Agricultural Input Survey 2011-12 is used. Specifically, an index is created based on tractor usage within each district by examining the share of holdings that use tractors. In this scenario, the planner assumes low input levels in districts where tractor usage is below the median and high input levels in districts where tractor usage exceeds the median. There is a further decrease in both non-feasible and efficient districts. As potential yields increase across districts, the inefficiency distribution shifts even further to the right. This demonstrates that providing the planner with similar inputs and irrigation access as the farmers can lead to a significant reduction in land use.

Next, the possibility of both positive and negative selection is considered—positive meaning farmers use the best land, and negative meaning some plots are unavailable for farming. The potential yield of a GAEZ field is calculated as an average over the yields of 100 sub-fields contained within it. To account for this, the positive selection process is modelled by treating each GAEZ field as comprising a continuum of land parcels. Following the approach of Sotelo (2020), the productivity of these parcels is assumed to follow an independent and identically distributed (i.i.d) Fréchet distribution. To calculate parcel-level potential yields, each GAEZ field is divided into equal-sized discrete parcels (10 hectares each), and then a vector of crop productivity is constructed for each parcel by averaging over 500 independent draws.

Now, the planner's problem is solved at the parcel level with both variable water supply and variable inputs as before. That is, now the planner determines how much of each parcel to grow a specific crop in order to meet the actual district-level output of each crop. Allowing for positive selection further: (i) decreases the number of efficient districts, and (ii) reduces the total land required by the planner. This intuitively arises because, by optimizing at the parcel level rather than the field level, the planner can choose to cultivate only the most productive parcels within a field.

Up until now, it's been assumed that all the land is available for farming, but that's not always the case. From a policy standpoint, it's important to consider areas that aren't suitable for agriculture. This is the issue being addressed here. In reality, certain parts of GAEZ land can't be used for farming because they might be occupied by residential or commercial buildings, forests, water bodies, or other non-agricultural uses. To account for this, the spatial data of areas that fall into these categories is removed from GAEZ, which reduces the total available farmland by about 25%.

The next step is to solve the planner's problem at a smaller, parcel level, considering changes in water supply and other inputs, while also factoring in that some areas may not be usable for agriculture. In this scenario, 51 million hectares of farmland can still be utilized, which is only slightly less than before. This suggests that the areas excluded from farming likely weren't very productive to begin with. A summary of the results is presented in **Table 1.3**, which shows how land allocation improves as the planner's constraints are gradually loosened. In the most realistic scenario for Indian farming conditions, up to 70% of currently used agricultural land could be freed up for more efficient use.

Table 1.3: Results Summary

	Baseline (1)	Variable water (2)	Variable input (3)	Positive Selection (4)	Negative Selection (5)
Feasible districts	551	582	590	590	585
Inefficient districts (%)	64.07	86.25	94.74	98.14	97.61
Land released (mm ha)	13.07	23.78	43.79	52.58	50.96
Land (released) (%) of total actual area)	20.02	33.28	59.72	71.88	70.33
Inefficiency index					
25th percentile	17.93	23.45	43.93	68.84	64.71
50th percentile	31.26	37.67	67.64	84.82	82.74
90th percentile	60.02	65.84	84.46	96.82	96.25

Note: 1. Feasible districts are those for which there exists a planner's solution. 2. Inefficient districts are those feasible districts which have positive inefficiency index. 3. Land released is the total area (in million hectares) saved by planner in case of inefficient districts. 4. Percentiles computed considering inefficient districts only.

This chapter explores how much agricultural land in India could be repurposed for non-agricultural use if it were used in the most efficient way possible. For a largely agricultural country like India, this question is especially important for policymakers. The findings suggest that it is indeed possible to free up agricultural land while still meeting the country's crop production needs. The research also highlights differences in the efficiency of agricultural practices across various regions of India.

2. Impact of Agriculture Productivity Increase on Industrial Development in India

The current chapter focuses on two key aspects: improving agricultural productivity by reallocating crops to more suitable areas and shifting land and labor from agriculture to manufacturing. Traditionally, development theories have suggested that agricultural productivity can only increase through advanced technology (Schultz, 1964; Hayami et al., 1971; Huffman et al., 1993). However, these views overlook the role of geography in productivity. When crops are grown in areas that aren't suited for them, overall productivity suffers. Using data from the GAEZ dataset, Adamopoulos and Restuccia (2018) found that misallocating crops to land with varying productivity significantly affects agricultural output, especially in poorer countries.

The chapter explores how freeing up agricultural land—similar to an increase in land productivity—impacts both agriculture and manufacturing. To assess the effects on economic welfare, a model with two sectors (agriculture and manufacturing) is developed. Unlike earlier models that treat land as a fixed input only for agriculture, this model considers the broader impact of land use on overall productivity and welfare, particularly in India, where land scarcity hinders industrial growth. The significance of land as a factor in non-agricultural production in India is highlighted by Duranton et al. (2015). Their research demonstrates how land misallocation can impact other production decisions, as the location of a business plays a crucial role in determining its access to labor, financial resources, and physical capital.

In the model economy, there are two production sectors: agriculture and manufacturing, both of which rely on land and labor as inputs. A typical household consumes goods from both sectors, rents out land, and supplies labor to agriculture and manufacturing. However, mobility barriers exist for both land and labor, leading to differences in wages and land prices between the two sectors. In the labor market, the wage gap between the agricultural and manufacturing sectors in India can largely be explained by the rural-urban divide. According to the National Sample Survey Organization (NSSO) data from 2011-12, 56 out of 1,000 male workers in urban areas are employed in agriculture, compared to 594 out of 1,000 in rural areas. Even after accounting for differences in living costs, studies like Munshi and Rosenzweig (2016) show that the rural-urban wage gap has been over 25% for decades. This gap persists due to the limited ability of workers to move to urban areas, where factors like caste-based informal insurance networks in rural communities play a crucial role. Households with higher rural income risks are less likely to migrate because they benefit from these local support systems.

In the land market, legal restrictions contribute to these barriers. Indian states have imposed ceilings on the amount of agricultural land a person or entity can purchase, following land redistribution reforms introduced after Independence. For instance, states like Maharashtra, Gujarat, and Karnataka only allow agriculturists to buy agricultural land. Government interventions, such as the Land Acquisition, Rehabilitation and Resettlement (LARR) Act of 2011, are often required to pool agricultural land for industrial or public purposes, which significantly increases transaction costs and hinders industrial development.

The competitive equilibrium of the economy is achieved when:

1. Producers in both sectors maximize their net profits by choosing optimal factor inputs.

2. Households maximize their utility by choosing the optimal consumption of both sector goods and labor allocations.

3. All market clearing conditions are satisfied, ensuring that supply equals demand for goods, labor, and land.

The analysis looks at the impact of reallocating agricultural land to the manufacturing sector, to measure the overall effects on the economy at a national level. By reallocating agricultural land more efficiently, it is equivalent to increasing land productivity. To free up 70.33% agricultural land while keeping agricultural output per worker steady, a 426% increase in agricultural productivity is needed. **Table 2.1** shows the percentage changes in key variables when agricultural productivity is raised in the economic model.

Table 2.1: Percent Change in Key Economic Variables going from Old to New Equilibrium

Variable	Agricultural Productivity	Land-share in agriculture	Labor-share in agriculture	Agricultural Price	Labor wage	Land rental price	GDP	Real Income
% change	426.62	-15.01	-19.70	-20.87	1.03	-4.54	7.48	11.69

With the productivity boost, the agriculture sector uses less land, labor, and intermediate inputs, while the manufacturing sector absorbs a larger share of both land and labor, particularly more labor. This reallocation of resources results in more land being available per worker in agriculture, raising agricultural output per worker and increasing wages. At the same time, the land price drops due to the relative oversupply of land. With improved productivity, agricultural output increases, but its price declines. Real income rises because of higher wages and a lower overall price index. Though agricultural GDP decreases due to lower output prices, overall GDP increases as more resources are shifted to manufacturing, boosting production.

Next, the chapter examines how changes in barriers to land and labor movement between agriculture and manufacturing sectors impact economic outcomes when agricultural productivity increases. Basically, it tests how the economic variables respond to the same productivity shock in the agriculture sector as above, with varying levels of barriers (vary one-by-one for land and for labor). First, the labor barrier is kept constant, and only the land barrier changes. In case of a lower land barrier, it allows for more land to shift from agriculture to manufacturing, surpassing the rate at which labor moves. As a result, land prices rise, wages slightly decrease due to lower agricultural output per worker, but overall GDP and real income improve compared to the calibrated case in **Table 2.1** above. While, in the case of a higher land barrier, it slows land movement, causing an excess of land per worker and driving land prices down. However, labor moves more freely, increasing wages more. Despite this, both GDP and real income fall relative to the calibrated case.

Second, the land barrier remains constant, while the labor barrier is altered. The case of a lower labor barrier enables more labor movement, slightly reducing land reallocation. This leads to a rise in wages, a decrease in land prices, and a modest improvement in GDP and real income. In case where labor faces more restrictions, it leads to higher land reallocation. This results in less land per worker in agriculture, driving up land prices, while wages decrease as more labor remains in the less productive agricultural sector. Consequently, the increase in GDP and real income is lower.

The key takeaways from this analysis are:

1. The positive effect of reallocating land and labor to the manufacturing sector diminishes if barriers are increased and improves if barriers are reduced.
2. If one factor faces higher barriers, the other factor compensates by moving more freely.
3. Relative factor movement determines price changes, whichever factor moves more benefits in terms of its price, while the other experiences a decline.

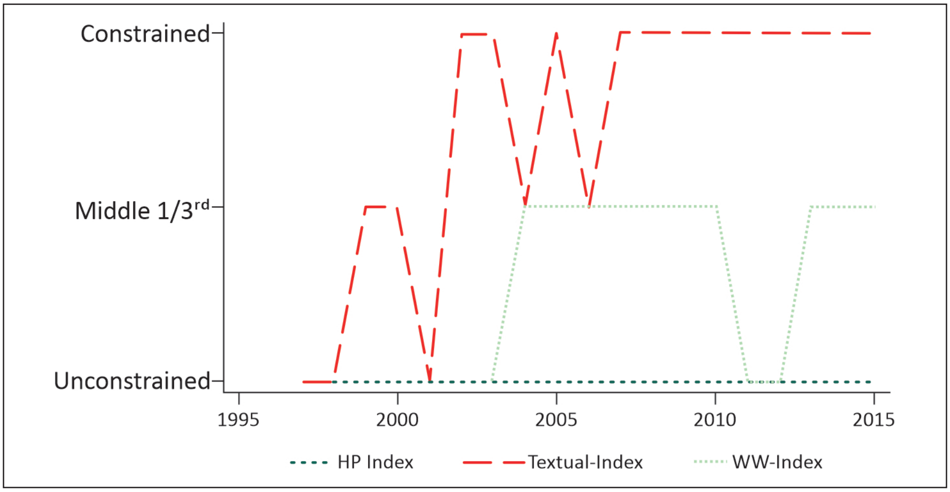
The chapter highlights the need for both improved agricultural productivity and reduced barriers to land and labor movement to maximize welfare and economic gains. It explores the economic and welfare impacts of an increase in land-augmenting productivity within India's agricultural sector, achieved through more efficient allocation of land across different crops. The resulting productivity gains lead to the reallocation of both land and labor from agriculture to manufacturing, producing significant improvements in overall output and real income. By quantifying the welfare benefits of reallocating surplus agricultural land to the manufacturing sector, this analysis underscores the potential for enhanced agricultural productivity to contribute to broader economic growth and increased welfare in India.

3. Credit Market Frictions: Collateral-Based vs. Earnings-Based Borrowing Constraints

The interaction between credit constraints and economic activity is a topic of interest in both finance and macroeconomics. This chapter looks at how two types of borrowing restrictions—earnings-based constraints (EBC) and collateral-based constraints (CBC)—impact key characteristics of firms in the U.S. manufacturing sector. The chapter's goals are threefold: first, to categorize U.S. manufacturing firms as either financially constrained or unconstrained based on debt constraints using a textual analysis method developed by Hoberg and Maksimovic (2015); second, to compare the effectiveness of EBC and CBC in explaining these firms' characteristics; and finally, to explore how these constraints influence capital misallocation in a dynamic framework.

Credit market frictions, through higher cost of borrowing or inefficient allocation of capital, can negatively impact economic efficiency. Since the well-known Modigliani-Miller theorem, a wide body of research has examined the reasons behind these frictions, attributing them to factors like information asymmetry, moral hazard, and enforcement costs. While theory has deepened our understanding of these constraints, measuring them empirically remains a challenge. Many past studies have relied on financial characteristics like firm size or leverage to assess credit constraints, but recent research has pointed out the flaws in these methods. For example, Farre-Mensa and Ljungqvist (2016) show that firms classified as credit-constrained by traditional measures actually have no trouble securing loans when needed. Instead, this study uses a more direct measure based on textual analysis of US firms' 10-K filings, which separately assesses debt and equity constraints. A key benefit of using this textual analysis method is that it avoids potential measurement errors, as the source of the constraints can be identified directly from the firms' own descriptions of issues. For example, Hoberg and Maksimovic (2015), highlight that many debt constraints arise from firms violating loan covenants.

Figure 3.1: Classification of a Firm Based on Different Constraint Measures



Note: HP-Index follows (Hadlock and Pierce, 2010) and WW-Index follows (Whited and Wu, 2006). In the case of these measures, firms are sorted in a given year based on their previous year's index values. Textual-Index refers to the debt-delay constraint as measured by (Hoberg and Maksimovic, 2015).

To show how different constraint measures compare, **Figure 3.1** ranks a specific airline firm across several constraint metrics over time. Constrained firms are those in the top third, while unconstrained firms are in the bottom third. The WW (Whited and Wu, 2006), and HP (Hadlock and Pierce, 2010) indices, which are based on accounting data like size, age, and leverage, classify the firm as unconstrained during all years. However, the firm's own reports reveal that it was indeed constrained in raising debt for most of these years. Additionally, the textual index offers a more dynamic classification because it's not based on accounting data, which tends to be less responsive to real-time changes.

The empirical analysis shows that debt-constrained firms, as per the textual index, tend to have higher debt-to-earnings ratios, lower debt-to-asset ratios, higher productivity, smaller net worth, and are not necessarily small in size. It also finds that the relationship between firm size and the marginal revenue product of capital (MRPK) is nearly zero.

The chapter then examines how the two types of borrowing constraints impact a company's ability to choose the right amount of capital for its operations. To do this, a simple static input choice model is developed, inspired by previous studies (like one by Midrigan and Xu, 2014), where companies decide how much capital to use based on their current productivity, without worrying about risks related to building up capital over time. The amount a company can borrow is limited by the type of borrowing it uses. For example, with collateral-based borrowing, the loan amount depends on the assets a company can offer as security, while earnings-based borrowing depends on how much operating profits the company makes.

Under CBC, a firm's constrained capital choice is primarily a function of its net worth. Constrained capital choice by a firm grows based on net worth, and firms need to save more to grow. This saving is linear under homogeneous collateral-based borrowing constraints but convex under heterogeneous ones (the more common form of CBC), where capital growth accelerates with increasing net worth, thus a firm requiring less savings as its net worth rises. In contrast, under EBC, constrained capital choice depends on both net worth and productivity, adding complexity to capital growth. Higher productivity increases capital demand, but higher net worth decreases the need for savings, creating a distinct dynamic from collateral-based constraints.

As productivity increases, under CBC, capital choice remains unchanged, but constraints worsen as desired capital increases with productivity. Whereas, under EBC, capital growth may or may not keep pace with productivity, leading to varied constraint effects. A firm can become more or less constrained based on the interaction of productivity growth and desired capital growth. As a result, small firms with high productivity are more constrained under collateral constraints, while large firms with high productivity may face more constraints under EBC.

Under EBC, the relationship between capital, productivity, and net worth is distinct. Firms with lower net worth but higher productivity are more likely to be constrained, while firms with higher net worth but lower productivity may be less constrained, highlighting how similar sized firms (a result of the net-worth and productivity combination) can face different levels of credit constraints. This brings home the important point that the Marginal Revenue Product of Capital (MRPK) behaves differently under each constraint. Under CBC, larger firms are unconstrained, and thus MRPK is negatively correlated with size. Whereas, under EBC, MRPK can vary based on the firm's size and constraint level, showing no clear pattern. This leads to a non-monotonic relationship between size and MRPK leading to the possibility of a near zero correlation.

Finally, the study explores how different borrowing constraints affect capital misallocation, which can hinder overall productivity. It uses a straightforward dynamic investment model to compare how two different types of borrowing limits—Collateral-based (CBC) and Earnings-based (EBC)—impact overall productivity losses. Unlike the previous setup, where borrowing limits were examined without any risk, this model introduces uncertainty because firms make investment decisions that affect future periods. Additionally, debt for the following period is decided dynamically, meaning it changes based on current conditions.

The main goal for the firm is to maximize the long-term satisfaction (utility) from consuming tradeable goods over time. This is done while considering both the company's investments and debts. The investment made is the difference between the capital it needs for the future and the depreciated value of its current capital. The firm also faces a borrowing limit, which is based either on the value of its capital (in the case of collateral-based borrowing) or its earnings (in the case of earnings-based borrowing). These constraints define how much the company can borrow in the next period, depending on whether it's using its assets as collateral or relying on its future income to secure loans.

The differences in productivity across firms lead to varying outcomes for each firm. To model this, a firm's productivity is assumed to follow an AR(1) process over time. The model is simulated for 10,000 firms each period. To make sure the model reflects reality, following data points are used as targets for calibration using a method called the Simulated Method of Moments (SMM).

1. How much a firm's output over time stays consistent (autocorrelation),
2. How much the growth rate of output changes, and
3. The average ratio of debt to earnings or assets.

The key takeaway of the simulation exercise is that for large firms, collateral-based borrowing tends to be less restrictive, as predicted by earlier models. However, under earnings-based borrowing, large firms might experience both credit constraints and freedoms, depending on its net-worth and productivity levels. The chapter then calculates the total loss in aggregate productivity (TFP) for the simulated economy, focusing on how different types of borrowing constraints affect allocation efficiency. The method follows the approach of Hsieh and Klenow (2009). The overall output in the economy comes from combining the output of individual firms. Capital and labor for the economy are the sum of what each firm uses. Without any credit limitations, all firms would have the same return on capital, making the economy perfectly efficient. The most efficient level of productivity (TFPe) happens when capital is distributed based only on firm productivity. Any loss in TFP, due to differences in how capital is allocated because of credit issues, is measured by comparing the efficient TFP to the actual TFP.

The TFP loss under Collateral-based Borrowing constraints (CBC) is higher than under Earnings-based Constraints (EBC). Specifically, the productivity loss is 40% less with earnings-based constraints. This makes sense because, under collateral-based constraints, capital allocation depends only on firm size, whereas, under earnings-based constraints, a firm's productivity also plays a role, leading to a more efficient distribution of capital. Therefore, EBC allows more productive firms to borrow more, reducing the gap in capital returns between firms, whereas CBC tends to favor larger firms regardless of their productivity.

This chapter explores how credit constraints impact the inefficient use of capital among U.S. manufacturing firms. It first identifies which type of borrowing constraint is most relevant based on real-world data. It turns out that earnings-based borrowing constraints align more closely with the patterns observed among debt-limited firms than collateral-based constraints. Then, using a dynamic model, the paper examines how these constraints affect overall productivity. The findings suggest that much of the existing research, which focuses on collateral-based constraints, may be overstating the negative effects of borrowing limits on the economy's aggregate productivity.

4. Conclusion

In conclusion, this study explored the profound impact that resource misallocation has on a nation's economic growth, productivity, and welfare. One of the most significant findings in development economics is that differences in income levels between countries are closely tied to differences in Total Factor Productivity (TFP), which measures how efficiently a country uses its available resources. Understanding why some nations are able to use their resources more effectively than others is crucial for addressing global economic disparities. Through a detailed investigation of land, labor, and capital allocation across various sectors and regions, this study provides fresh insights into how resource misallocation occurs and what can be done to improve efficiency.

The first chapter examines resource misallocation in India's agricultural sector. Agriculture accounts for approximately 60% of the country's land use, yet crop yields are significantly lower than global averages. This chapter identifies a mismatch between the types of crops being cultivated and the suitability of the land on which they are grown, leading to inefficient use of agricultural land. By using a novel dataset, the Global Agro-Ecological Zones (GAEZ), the study quantifies the potential for freeing up agricultural land if it were better allocated. The findings are striking: in a conservative scenario, up to 20% of agricultural land could be repurposed for non-agricultural use, and with further improvements in technology and inputs, this number could rise as high as 70%. These results highlight the significant opportunity for India to improve its agricultural productivity while freeing up land for other sectors, which could foster economic diversification and development.

The second chapter builds on this by assessing the broader economic and welfare effects of such improvements in agricultural productivity. By using a two-sector model that examines the interaction between agriculture and manufacturing, the study shows how better land allocation can lead to significant shifts in labor and capital between these two critical sectors. With improved agricultural efficiency, labor and land move out of agriculture and into manufacturing, which in turn leads to higher wages, lower agricultural prices, and increased overall output. Real income in the economy rises by nearly 12%, underscoring the powerful role that land reallocation could play in improving living standards. The chapter also highlights that the full benefits of these productivity gains are contingent on minimizing barriers to the movement of labor and capital. If these barriers are not addressed, the positive effects of improved agricultural productivity may be muted. This finding emphasizes that it is not only the optimization of resource use within sectors that matters, but also the ability to move resources freely between sectors as economic conditions change.

While the first two chapters focus on land and labor misallocation within India's agricultural and manufacturing sectors, the third chapter shifts the focus to capital misallocation in the U.S. manufacturing sector, specifically analyzing how different types of borrowing constraints affect firms' access to credit. This chapter explores the differences between Earnings-based Constraints (EBC) and Collateral-based Constraints (CBC) and how they shape firms' borrowing behavior, capital accumulation, and the overall economy. The analysis shows that firms constrained by earnings rather than collateral tend to be more productive, smaller in size, and have a higher debt-to-earnings ratio. In contrast, under collateral-based borrowing, larger firms are able to access more credit, irrespective of their productivity levels, leading to greater inefficiencies in capital allocation.

At a macroeconomic level, this misallocation of capital can have profound consequences for overall productivity. The chapter's findings indicate that TFP losses are around 40% lower under earnings-based constraints compared to collateral-based constraints, as the former allows for a more efficient distribution of credit based on firms' productivity rather than their size. The empirical analysis confirms that during the 1997-2015 period, U.S. manufacturing firms were more often subject to earnings-based borrowing constraints, suggesting that previous literature may have overstated the productivity losses associated with credit frictions by focusing too heavily on collateral-based constraints.

The third chapter offers valuable policy insights, especially for countries and sectors where access to credit is a significant bottleneck for growth. By focusing on how financial systems allocate capital, policymakers can help ensure that credit flows to the most productive firms, rather than those that merely have the most assets. This can lead to higher overall productivity and economic growth, as resources are channeled to firms that are better equipped to generate output and innovation.

In sum, this study contributes to the ongoing dialogue on how nations can bridge the gap between their current productivity levels and their potential. By identifying key areas of resource misallocation and offering evidence-based solutions, it provides a roadmap for policymakers seeking to enhance economic performance and raise living standards in both developing and developed economies. The path to greater prosperity lies not only in producing more but in ensuring that the resources we have are used as efficiently as possible.

Bibliography

Adamopoulos, T. and Restuccia, D. (2014). The size distribution of farms and international productivity differences. *American Economic Review, 104(6):1667–97*.

Adamopoulos, T. and Restuccia, D. (2018). Geography and agricultural productivity: Cross-country evidence from micro plot-level data. Technical report, *National Bureau of Economic Research*.

Amaral, P. S. and Quintin, E. (2010). Limited enforcement, financial intermediation, and economic development: a quantitative assessment. *International Economic Review*, 51(3):785–811.

Baily, M. N., Hulten, C., Campbell, D., Bresnahan, T., and Caves, R. E. (1992). Productivity dynamics in manufacturing plants. *Brookings papers on economic activity. Microeconomics*, 1992:187–267.

Banerjee, A. V. and Duflo, E. (2005). Growth theory through the lens of development economics. *Handbook of economic growth*, 1:473–552.

Bernanke, B. S., Gertler, M., and Gilchrist, S. (1999). The financial accelerator in a quantitative business cycle framework. *Handbook of macroeconomics*, 1:1341–1393.

Bolhuis, M. A., Rachapalli, S. R., and Restuccia, D. (2021). Misallocation in Indian agriculture. Technical report, *National Bureau of Economic Research*.

Buera, F. J., Kaboski, J. P., and Shin, Y. (2011). Finance and development: A tale of two sectors. *American economic review*, 101(5):1964–2002.

Caselli, F. (2005). Accounting for cross-country income differences. *Handbook of economic growth*, 1:679–741.

Costinot, A. and Donaldson, D. (2016). How large are the gains from economic integration? Theory and evidence from US agriculture, 1880-1997. Technical report, *National Bureau of Economic Research*.

Costinot, A., Donaldson, D., and Smith, C. (2016). Evolving comparative advantage and the impact of climate change in agricultural markets: Evidence from 1.7 million fields around the world. *Journal of Political Economy*, 124(1):205–248.

Drechsel, T. (2022). Earnings-based borrowing constraints and macroeconomic fluctuations. *DP16975*.

Duranton, G., Ghani, S. E., Goswami, A. G., Kerr, W., and Kerr, W. R. (2015). The misallocation of land and other factors of production in India. *World Bank Policy Research Working Paper*, (7221).

Farre-Mensa, J. and Ljungqvist, A. (2016). Do measures of financial constraints measure financial constraints? *The review of financial studies*, 29(2):271–308.

Frolking, S., Yeluripati, J. B., and Douglas, E. (2006). New district-level maps of rice cropping in India: a foundation for scientific input into policy assessment. *Field Crops Research*, 98(2-3):164–177.

Gilchrist, S., Sim, J. W., and Zakrajšek, E. (2013). Misallocation and financial market frictions: Some direct evidence from the dispersion in borrowing costs. *Review of Economic Dynamics*, 16(1):159–176.

Gollin, D., Parente, S., and Rogerson, R. (2002). The role of agriculture in development. *American economic review*, 92(2):160–164.

Gollin, D., Parente, S. L., and Rogerson, R. (2004). Farm work, home work and international productivity differences. *Review of Economic dynamics*, 7(4):827–850.

Gollin, D., Parente, S. L., and Rogerson, R. (2007). The food problem and the evolution of international income levels. *Journal of Monetary Economics*, 54(4):1230–1255.

Gopinath, G., Kalemli-Özcan, Ş., Karabarbounis, L., and Villegas-Sanchez, C. (2017). Capital allocation and productivity in south europe. *The Quarterly Journal of Economics*, 132(4):1915–1967.

Greenwood, J., Sanchez, J. M., and Wang, C. (2013). Quantifying the impact of financial development on economic development. *Review of Economic Dynamics*, 16(1):194–215.

Hadlock, C. J. and Pierce, J. R. (2010). New evidence on measuring financial constraints: Moving beyond the kz index. *The Review of Financial Studies*, 23(5):1909–1940.

Hall, R. E. and Jones, C. I. (1999). Why do some countries produce so much more output per worker than others? *The Quarterly Journal of Economics*, 114(1):83–116.

Harberger, A. C. (1998). A vision of the growth process. *The American Economic Review*, 88(1):1–32.

Hart, O. and Moore, J. (1994). A theory of debt based on the inalienability of human capital. *The Quarterly Journal of Economics*, 109(4):841–879.

Hayami, Y., Ruttan, V. W., et al. (1971). *Agricultural development: an international perspective*. Baltimore, Md/London: The Johns Hopkins Press.

Hennessy, C. A. and Whited, T. M. (2007). How costly is external financing? Evidence from a structural estimation. *The Journal of Finance*, 62(4):1705–1745.

Hoberg, G. and Maksimovic, V. (2015). Redefining financial constraints: A text-based analysis. *The Review of Financial Studies*, 28(5):1312–1352.

Hopenhayn, H. A. (2011). Firm microstructure and aggregate productivity. *Journal of Money, Credit and Banking*, 43:111–145.

Hsieh, C.-T. and Klenow, P. J. (2009). Misallocation and manufacturing tfp in china and India. *The Quarterly Journal of Economics*, 124(4):1403–1448.

Huffman, W. E., Evenson, R. E., et al. (1993). Science for agriculture: a long term perspective. Technical report, Iowa State University, Department of Economics.

Jones, C. I. (2011). Misallocation, economic growth, and input-output economics. Working Paper 16742, *National Bureau of Economic Research*.

Kaplan, S. N. and Zingales, L. (1997). Do investment-cash flow sensitivities provide useful measures of financing constraints? *The Quarterly Journal of Economics*, 112(1):169–215.

Kiyotaki, N. and Moore, J. (1997). Credit cycles. *Journal of Political Economy*, 105(2):211–248.

Klenow, P. J. and Rodriguez-Clare, A. (1997). The neoclassical revival in growth economics: Has it gone too far? *NBER macroeconomics annual*, 12:73–103.

Lian, C. and Ma, Y. (2021). Anatomy of corporate borrowing constraints. *The Quarterly Journal of Economics*, 136(1):229–291.

Midrigan, V. and Xu, D. Y. (2014). Finance and misallocation: Evidence from plant-level data. *American Economic Review*, 104(2):422–58.

Mohanty, N., Sarkar, R., and Pandey, A. (2009). India Infrastructure Report 2009: Land – a critical resource for infrastructure.

Munshi, K. and Rosenzweig, M. (2016). Networks and misallocation: Insurance, migration, and the rural-urban wage gap. *American Economic Review*, 106(1):46–98.

Nelson, R. R. and Phelps, E. S. (1966). Investment in humans, technological diffusion, and economic growth. *The American Economic Review*, 56(1/2):69–75.

Parente, S. L. and Prescott, E. C. (1994). Barriers to technology adoption and development. *Journal of Political Economy*, 102(2):298–321.

Parente, S. L. and Prescott, E. C. (1999). Monopoly rights: A barrier to riches. *American Economic Review*, 89(5):1216–1233.

Prescott, E. C. (1998). Lawrence r. klein lecture 1997: Needed: A theory of total factor productivity. *International economic review*, pages 525–551.

Ranganathan, V. (2010). Challenges of land acquisition.

Restuccia, D. and Rogerson, R. (2008). Policy distortions and aggregate productivity with heterogeneous establishments. *Review of Economic dynamics*, 11(4):707–720.

Restuccia, D. and Rogerson, R. (2013). Misallocation and productivity.

Restuccia, D., Yang, D. T., and Zhu, X. (2008). Agriculture and aggregate productivity: A quantitative cross-country analysis. *Journal of Monetary Economics*, 55(2):234–250.

Schmitz Jr, J. A. (2005). What determines productivity? lessons from the dramatic recovery of the us and Canadian iron ore industries following their early 1980s crisis. *Journal of Political Economy*, 113(3):582–625.

Schultz, T. W. (1964). Transforming traditional agriculture. Yale University Press. *New Haven*, 212.

Sotelo, S. (2020). Domestic trade frictions and agriculture. *Journal of Political Economy*, 128(7):2690–2738.

Whited, T. M. and Wu, G. (2006). Financial constraints risk. *The Review of Financial Studies*, 19(2):531–559.

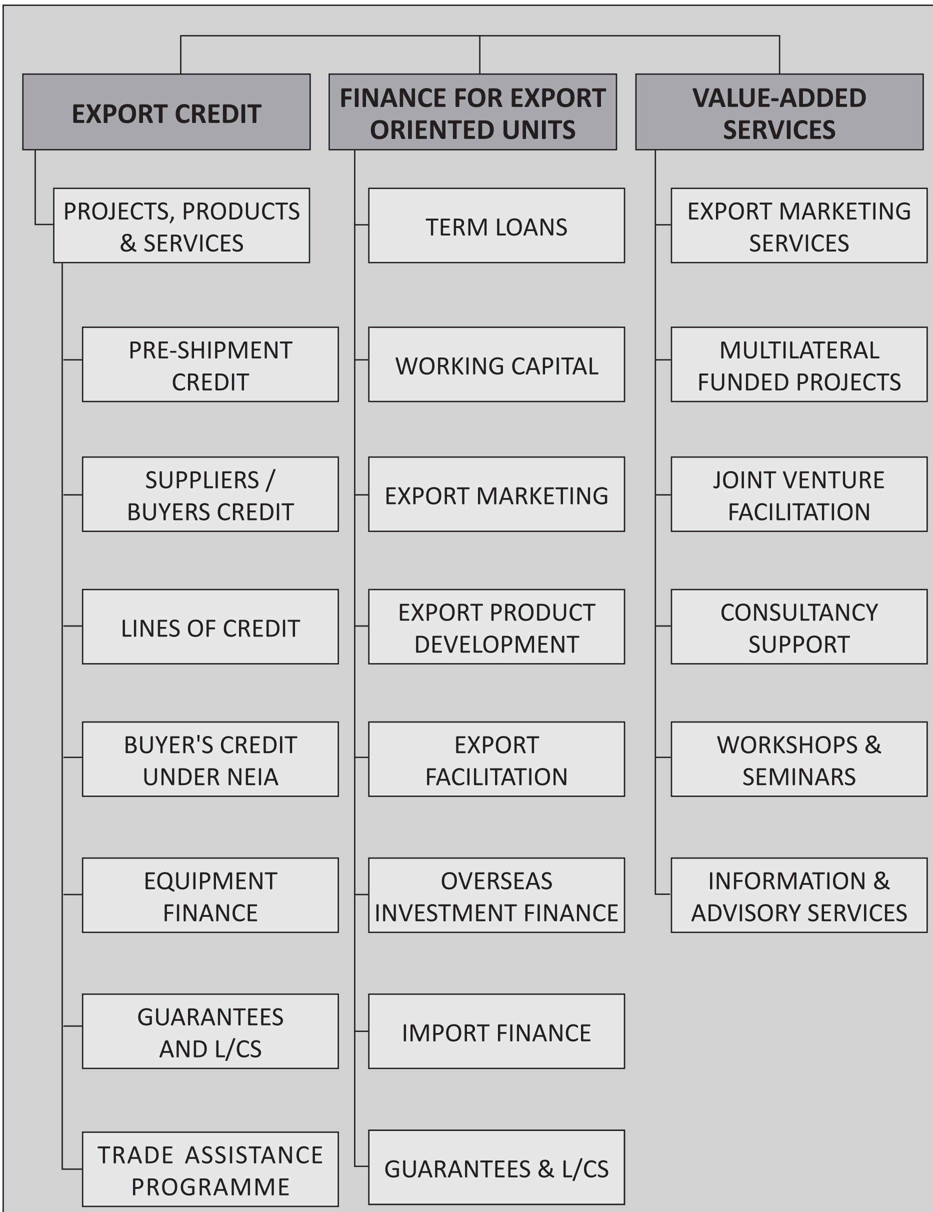
Zhu, X. (2020). Size-dependent financial frictions, capital misallocation and aggregate productivity.

RECENT OCCASIONAL PAPERS	
OP No.	**Title**
156.	Exports of Services and Offshore Outsourcing: An Empirical Investigation in the Indian Context
157.	Indian Ocean Rim Association for Regional Co-operation (IOR-ARC): A Study of India's Trade and Investment Potential
158.	West Africa: A Study of India's Trade and Investment Potential
159.	The Effects of Financial Openness: An Assessment of the Indian Experience
160.	Comparison of Labour Laws: Select Countries
161.	India's Trade and Investment Relations with Cambodia, Lao PDR, Myanmar, Vietnam (CLMV): Enhancing Economic Cooperation
162.	Indian Horticulture-Imperatives to Enhance Trade from India
163.	India's Trade and Investment Relations with Gulf Cooperation Council (GCC): Strengthening Economic Ties
164.	India's Hi-Tech Exports: Potential Markets and Key Policy Interventions
165.	Outward Direct Investment from India: Trends, Objectives and Policy Perspectives
166.	East African Community (EAC): A Study of India's Trade and Investment Potential
167.	Trade Liberalization, Product Variety and Growth
168.	Research & Development in BRICS: An Insight
169.	Indian Capital Goods Industry: A Sector Study
170.	Bangladesh: A Study of India's Trade and Investment Potential
171.	Indian Electronic Goods Industry: Neutralizing Trade Deficit with China
172.	Indian Steel Industry: Export Prospects
173.	Value Addition Chains and Trade in Manufactured Commodities in South-East Asia
174.	Potential for Trade of Organic Products from India
175.	Multilateral Development Bank- Funded Project: Trends and Opportunities for Indian Exports
176.	Indian Pharmaceutical Industry: Challenges and Prospects
177.	Migration and Remittances in India
178.	Technical Progress and Structural Change: The Roles of Demand and Supply in Economic Growth
179.	Inter-linkages between Exports and Employment in India
180.	India's Engagements with CLMV: Gateway to ASEAN Markets
181.	Export Promotion From Rajasthan: Key Insights And Policy Suggestions
182.	Potential for Enhancing Exports from Andhra Pradesh
183.	The Internationalisation of Indian firms through outbound Foreign Direct Investment: Nature, determinants and developmental consequences
184.	Financialization and its Implications on the Determination of Exchange rate of Emerging Market Economies
185.	Export from Uttar Pradesh: Trends, Opportunities and Policy Perspectives

186. Essays on International Trade, Welfare and Inequality
187. Essays in Indian Trade Policy
188. Exchange Rate Dynamics and its Impact on India's Exports to USA and EU: An Assessment
189. Liberalisation, Wages and Sector Growth : General Equilibrium Analysis for India
190. Manufacturing in SADC: Moving Up the Value Chain
191. North Africa: Unlocking India's Trade and Investment Potential
192. Essays on Education and Institutions in Developing Countries
193. Project Exports From India: Strategy for Reenergizing and Reorienting
194. Packaging Sector: Potential And Way Forward
195. Realizing India's Trade & Investment Potential with South Korea
196. India & Central Asia: Reinitalizing Trade & Investment Relations
197. AfCFTA: Opportunities for India in Africa's Economic Integration
198. India-CLMV: Building Supply Chains in Asia
199. Self-Reliant India- Approach and Strategic Sectors to Focus
200. Essays in Trade and Development Economics
201. The Political Origin and Firm-level Consequences of Bank Proliferation in China
202. Building Infrastructure in CLMV: Opportunities for India
203. Building Value Chain: Opportunities for India and ASEAN
204. Essays in International Trade in Post Liberalization India
205. Indian Apparels - A Sector Study
206. India Engagements in FTAs: Looking Ahead
207. Indian Dairy Sector : Recent Trends and Prospects for Greater Export Orientation
208. Export Potential of India's Shrimps and Prawns
209. Empirical Studies in International Trade
210. Project Exports from India: Tapping Potential Amid Changing Dynamics
211. Essays on Finance and Development
212. Economic Impact of Russia-Ukraine Conflict An Indian Perspective
213. Inverted Duty Structure and Effective Rate of Protection: Theoretical and Empirical Analyses
214. Enhancing Exports From Andhra Pradesh
215. Iron and Steel Industry: Changing Trends
216. Himachal Pradesh: A Possible Export Strategy
217. Sugar and Ethanol Industry in India: Changing Dynamics
218. Strengthening Collaborations to Bridge the Trade Finance Gap: Insights for G20 Countries
219. Essays on Risk, Insurance and Welfare
220. Essays on Immigrants and their Impact on the Local Labour Market
221. Unleashing India's e-Commerce Export Potential
222. Indian Toy Industry: Vocal for Local
223. Trade as a Tool for Economic Empowerment of Women: An Indian Perspective
224. Indian Steel Industry: Trends and Insights
225. Essays on Exchange Rate and Economic Performance

INDIA EXIM BANK'S MAJOR PROGRAMMES

Bank's Major Programmes



EXPORT-IMPORT BANK OF INDIA

HEAD OFFICE

Centre One Building, 21st Floor, World Trade Centre Complex, Cuffe Parade, Mumbai 400 005.
Phone: (91 22) 22172600 Fax : (91 22) 22182572
E-mail : ccg@eximbankindia.in Website: www.eximbankindia.in

LONDON BRANCH

5th Floor, 35 King Street, London EC2V 888 United Kingdom
Phone : (0044) 20 77969040 Fax : (0044) 20 76000936 E-Mail :eximlondon@eximbankindia.in

DOMESTIC OFFICES

Ahmedabad
Sakar II, 1st Floor,
Next to Ellisbridge Shopping Centre,
Ellisbridge P. O., Ahmedabad 380 006
Phone : (91 79) 26576843
Fax : (91 79) 26577696
E-mail : eximahro@eximbankindia.in

Bengaluru
Ramanashree Arcade, 4th Floor,
18, M. G. Road, Bengaluru 560 001
Phone : (91 80) 25585755
Fax : (91 80) 25589107
E-mail : eximbro@eximbankindia.in

Chandigarh
C- 213, Elante offices, Plot No. 178-178A,
Industrial Area phase 1,
Chandigarh 160 002
Phone : (91 172) 4629171
Fax : (91 172) 4629175
E-mail : eximcro@eximbankindia.in

Chennai
Overseas Towers, 4th and 5th Floor,
756-L, Anna Salai, Chennai 600 002
Phone : (91 44) 28522830/31
Fax : (91 44) 28522832
E-mail : eximchro@eximbankindia.in

Guwahati
NEDFi House, 4th Floor, GS Road,
Dispur, Guwahati 781 006
Phone : (91 361) 2237607 /609
Fax : (91 361) 2237701
E-mail : eximgro@eximbankindia.in

Hyderabad
Golden Edifice, 2nd Floor,
6-3-639/640, Raj Bhavan Road,
Khairatabad Circle, Hyderabad 500 004
Phone : (91 40) 23307816
Fax : (91 40) 23317843
E-mail : eximhro@eximbankindia.in

Kolkata
Vanijya Bhawan, 4th Floor,
(International Trade Facilitation Centre),
1/1 Wood Street, Kolkata 700 016
Phone : (91 33) 68261301
Fax : (91 33) 68261302
E-mail : eximkro@eximbankindia.in

Lucknow
Unit No. 101, 102 and 103, 1st Floor,
Shalimar Iridium Vibhuti Khand,
Gomti Nagar, Lucknow 226010
Phone: (91 522) 6188035
Email: LRO@eximbankindia.in

Mumbai
8th Floor, Maker Chamber IV,
Nariman Point,
Mumbai 400 021
Phone : (91 22) 22861300
Fax : (91 22) 22182572
E-mail : eximmro@eximbankindia.in

New Delhi
Office Block, Tower 1, 7th Floor,
Adjacent Ring Road,
Kidwai Nagar (E)
New Delhi - 110 023
Phone : (91 11) 61242600 / 24607700
Fax : (91 11) 20815029
E-mail : eximndo@eximbankindia.in

Pune
No. 402 & 402(B), 4th floor,
Signature Building,
Bhamburda,
Bhandarkar Rd.,
Shivajinagar,
Pune - 411 004
Phone : (91 20) 26403000
Fax : (91 20) 25648846
E-mail : eximpro@eximbankindia.in

OVERSEAS OFFICES

Abidjan
5th Floor, Azur Building,
18-Docteur Crozet Road,
Plateau,Abidjan, Côte d'Ivoire
Phone : (225) 2720242951
Fax : (225) 2720242950
Email : eximabidjan@eximbankindia.in

Dhaka
Madhumita Plaza, 12th Floor,
Plot No. 11, Road No. 11, Block G,
Banani, Dhaka, Bangladesh - 1213.
Phone : (88) 01708520444
E-mail : eximdhaka@eximbankindia.in

Dubai
Level 5, Tenancy lB,
Gate Precinct Building No. 3,
Dubai International Financial Centre,
PO Box No. 506541, Dubai, UAE.
Phone : (971) 43637462
Fax : (971) 43637461
E-mail : eximdubai@eximbankindia.in

Johannesburg
2nd Floor, Sandton City Twin Towers East,
Sandhurst Ext. 3, Sandton 2196,
Johannesburg, South Africa.
Phone : (27) 113265103
Fax : (27) 117844511
E-mail : eximjro@eximbankindia.in

Nairobi
Unit 1.3, The Oval,
Jalaram Road, Westlands,
Nairobi, Kenya
Phone : (254) 741757567
E-mail : eximnairobi@eximbankindia.in

Singapore
20, Collyer Quay, #10-02,
Tung Centre,
Singapore 049319.
Phone : (65) 65326464
Fax : (65) 65352131
E-mail : eximsingapore@eximbankindia.in

Washington D.C.
1750 Pennsylvania Avenue NW, Suite 1202,
Washington D.C. 20006,
United States of America.
Phone : (1) 2022233238
Fax : (1) 2027858487
E-mail : eximwashington@eximbankindia.in

Yangon
House No. 54/A, Ground Floor,
Boyarnyunt Street, Dagon Township,
Yangon, Myanmar
Phone : (95) 1389520
E-mail : eximyangon@eximbankindia.in

India Exim Bank

Centre One Building, 21st Floor, World Trade Centre Complex, Cuffe Parade,
Mumbai - 400005 | Ph.: (91 22) 22172600
E-mail: ccg@eximbankindia.in | Website: www.eximbankindia.in
Follow us on