Anjini Kochar

Understanding NRLM's Impact on Livelihoods and Social Outcomes
A Unifying Framework

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Anjini Kochar
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Contents

1. Introduction

India's National Rural Livelihoods Mission (NRLM) represents an innovative approach to improving rural livelihoods, particularly for women. It operates through a federation of community institutions, with Self Help Groups (SHGs) of approximately 10-12 women from the same residential neighborhood of the village as the basic unit. SHGs are federated at the level of the village into Village Organizations (VOs) which are in turn federated into Cluster Level Federations (CLFs). In a second stage of implementation (commencing around 2016-17), the programme increased its emphasis on enhancing incomes and women's participation in economic activities. Learning from this experience and formulating more effective policies going forward requires a research agenda, based on theories of economic growth that identifies pathways for the program's impact on incomes. This note takes up this objective, drawing on the economics literature on growth and poverty to identify determinants that are particularly relevant for NRLM.

More importantly, it develops a unifying framework for understanding NRLM's impact on livelihoods and social outcomes. This framework derives from a key insight we draw from the literature on economic growth: the importance of institutional arrangements that aggregate households into groups and the understanding that how households are aggregated matters. Correspondingly, a unifying framework for evaluating the impact of the multitude of projects that fall under NRLM's umbrella views each project as an institutional arrangement that aggregates households in a particular way to achieve a certain objective. NRLM's success will depend on whether aggregation is done to address the constraints on achieving the objective in question.

This suggests a multi-step research agenda. A first step involves grouping NRLM programmes under different heads (by level and objectives of aggregation) and evaluating the impact of sample programmes under each head to better understand which arrangements are best able to facilitate income growth and social change. This research agenda asks how a given type of aggregation affects outcomes. A second step would address the *nature* of aggregation and supported interactions. As Schelling (2006) notes, this question is of far greater importance for policy. Would a different combination of individual households have resulted in a different outcome? What factors determine the formation of groups and their characteristics? This set of studies, rather than evaluate the project as a whole, would consider the impact of the attributes of the groups in question, allowing for their endogeneity.[1]

This note starts by discussing the literature on the determinants of economic growth, commencing with the neo-classical model and then turning to a consideration of market imperfections, increasing returns to scale and externalities or spillovers. In this context, we discuss the role of aggregation, specialization, market size, coordination and the role of institutional arrangements. We then turn to a discussion of social goods and social norms.

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[1] The exact methodology of each study will be spelt out in detailed proposals for each research paper under the project.

2. New growth theories

A starting point for much of the growth literature is the neoclassical benchmark with "complete markets," free entry and exit of firms, negligible transaction costs and technologies that are convex at an efficient scale relative to the market. Despite the abundant evidence that refutes critical assumptions underlying this model, this starting point provides a means of understanding the importance of each assumption for income growth.

Under these assumptions, individual production functions, assumed to be a function of capital and labour, can be summed up to an "aggregate" production function that displays decreasing returns to scale in capital, even if individual firm-level production functions are characterized by increasing returns to scale. In this model, income growth stems from growth in capital and labour, suggesting the potential for improvements in income from programme's that increase access to credit. However, the rate of growth of income falls over time and eventually equals zero. Because the rate of return to capital is high when capital is scarce but falls with investment, the economy converges to a long-run "steady state" level of per capita income.

Thus, long-run income growth can only stem from technological growth, externalities or technologies that exhibit increasing returns to scale. New growth models endogenize technological growth, relating it to the stock of human capital in the economy. These models are therefore similar to models with human capital externalities. In what follows, we first discuss growth from increasing returns to scale technologies and then turn to a discussion of externalities and complementarities.

3. Market Imperfections and Increasing returns to scale

A first set of models explains income growth and persistent poverty or "poverty traps" as a consequence of technologies that display increasing returns to scale. Amongst the most salient features of modern industrial production are large costs of entry as a consequence of high research and development costs, and costs of infrastructure and machinery. These fixed costs in turn cause average costs to decline with output. Consequently, unless output exceeds the minimum level required for financial viability, the business will operate at a loss. Because increasing returns to scale suggests impediments to the entry of new firms, it is incompatible with perfectly competitive markets. Thus, theories that relate income growth to increasing returns to scale combine this technological assumption with deviations from perfect competition such as monopolistic competition or credit market constraints.

The literature that relates to income growth in developing economies focuses on imperfections in credit and insurance markets. If credit markets functioned perfectly, all profitable investments would be funded regardless of fixed costs. Credit markets will function imperfectly if lenders are unable to fully discern the attributes of borrowers that affect loan repayment (adverse selection) or if borrowers are unable to commit to actions and efforts that ensure repayment (moral hazard). In such cases, adherence to contractual terms improves if the borrower can commit his or her own wealth to the project.

Because of the commitment power of wealth, the opportunity to invest depends not only on the technological viability of the investment but also on the borrower's wealth. The poor, facing higher interest rates, invest less and have lower income growth. In particular, they are shut out of investments that require significant fixed costs. Thus, fixed costs in conjunction with credit market imperfections generate poverty traps and persistence in poverty.[2] Households that lack the wealth to achieve the minimum viable level of output and cannot access the credit required for this investment remain mired in poverty (Banerjee and Newman 1993; Galor and Zeira 1993).[3]

Imperfect access to insurance in environments characterized by significant risks has similar effects. In these environments, precautionary borrowers will be unwilling to borrow, preferring to accumulate savings against downfalls in income or other idiosyncratic shocks to income and preferences, most notably episodes of ill-health. The results are similar to models of credit constraints, with investment and hence income growth strongly correlated with a household's wealth and hence its ability to self-insure against such shocks.

4. Externalities and Complementarities

4.1 Human Capital Externalities

A second source of persistent income growth and poverty traps are production or technological externalities. These externalities exist when the actions of one party affect the output of others in ways that are not mediated by the market (prices). Much of the growth literature focuses on human capital externalities, allowing technological change to be a function of aggregate levels of human capital in the economy. The non-rival nature of human capital, that is, the ability of all firms to simultaneously use existing knowledge without incurring additional costs, lends itself to the creation of externalities (Lucas 1988; Romer 1983).[4]

A related set of models combines human capital externalities with increasing returns to scale in the production of research and development. Romer (1986) builds on Young's (1928) seminal work that relates increased specialization to the size of the market. Income growth enables an increase in the variety of goods produced in the economy and the development of intermediate sectors, such as a sector that produces research. This sector is monopolistically competitive and characterized by increasing returns to scale in the production of research outputs. Monopoly rents cover the fixed costs of investing in knowledge and provide the incentive to invest in knowledge despite its non-rival nature. Thus, the social returns to investment in human capital do not automatically arise; they are supported by an institutional arrangement that provides the incentives for research activity and capacity development.

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[2] Similar predictions arise from the seasonality of agricultural production; a long time lag between investment and sales imply the need for credit (or wealth) to sustain the household in the interim. Poor households will therefore invest in low-cost methods of production with low-yielding seeds and minimum pre-harvest expenditure, generating poverty traps.

[3] Aghion and Bolton (1997) and Piketty (1997) present models without fixed costs, with increasing returns to scale arising from imperfectly functioning credit markets alone.

[4] A competitive economy with externalities can exist, despite the presence of aggregate increasing returns to scale, even though increasing returns to scale at the level of the firm is incompatible with competitive conditions (Arrow 1962).

4.2 Vertical and Horizontal Complementarities

Complementarities across firms also generate externalities and can significantly multiply the effects of increasing returns to scale in production (Milgrom and Roberts 1990; Milgrom, Qian and Roberts 1990). Complementarities exist when the actions of two firms reinforce each other as, for example, when the growth of one sector results in the growth of another sector. Assume a monopolistically competitive sector in which production is characterized by increasing returns to scale.[5] An exogenous shock in production to this sector generates large increases in its income. The effects of this shock are, however, significantly multiplied if firms are complementary. This sets in place a cumulative process of mutual interaction, paving the way for large increases in the aggregate income of the economy (Matsuyama 1995).

These externalities can take the form of a vertical complementarity as in the case of an exogenous improvement in output for a leading sector with strong backward and forward linkages to other sectors. Alternatively, it can take the form of a horizontal complementarity in the form of a sector-specific shock that benefits all other sectors in the economy through aggregate demand spillovers. In this case, the externalities are pecuniary rather than technological. Increases in income from the growth of one sector raise the demand for goods produced in other sectors, and hence benefit all sectors of the economy.

These ideas are closely related to those developed by Rosenstein-Rodan (1943), Hirschman (1958) and others. They suggest the value of government intervention in the form of support for the *coordinated* growth of a set of firms or sectors connected through backward and forward linkages or through support for a leading sector with strong forward and backward linkages to other sectors. Murphy, Shleifer and Vishny (1989b) develop these ideas theoretically.

5. Market size, complementarities and increasing returns to scale

In considering the importance of markets, an important distinction exists between goods that are sold in global markets or that are procured by the government at minimum (fixed) prices and those that are exchanged in local markets. For the former, barring transportation costs to market outlets for product sales or input purchases, prices are independent of socio-economic conditions in the local village economy. This applies particularly to the relatively large villages that have market outlets within their boundaries.

For goods traded in local markets, demand reflects income levels, with expenditure on non-agricultural products and for high-value agricultural products such as fruits, vegetables, meats and horticultural products existing only at relatively high incomes. This ties the ability to adopt increasing returns to scale technologies in non-agricultural enterprises and hence the pace of structural transformation to the size of the local

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[5] While many models assume the existence of a monopolistically competitive sector that uses an increasing returns to scale technologies, a competitive economy with externalities can exist, even though increasing returns to scale at the level of the firm is incompatible with competitive conditions (Arrow 1962). Thus, it is possible to relate aggregate income growth to externalities and complementarities, without relying on increasing returns to scale technologies within sectors or monopolistic competition.

market. Developing these ideas, Murphy, Shleifer and Vishny (1989a) note the importance of a large "local" market and, in particular, the existence of a sufficiently large middle class for the shift from "cottage" production of non-agricultural products to more productive enterprises that entail significant fixed costs.

In contrast to models which take market size as fixed, those that focus on complementarities and pecuniary externalities assume that market size is endogenous and can be increased by (positive) exogenous shocks in the presence of complementarities. This is an important benefit to coordinated approaches: through promoting other sectors, such a policy increases market size and hence demand, paving the way for large multiplier effects.

Even here, however, numbers may restrict the size of the market and hence the extent of pecuniary externalities; despite improvements in local incomes, the size of the economy may be insufficient to support enterprises in several (complementary) sectors.

Allowing the fixed costs of production to reflect transportation costs incurred in accessing output and input markets provides a theory for the geographic location of economic activities and the size of local markets (Krugman 1991). Economic activities will locate in "core" villages with relatively high incomes and large populations, and hence with sufficient demand for non-agricultural and high-value agricultural products. "Peripheral" villages will serve core villages, with spillover effects arising through the movement of factors such as labour.[6] The local economy then comprises the core village and the set of peripheral villages that surround it.

6. Aggregation

The discussion in the preceding sections suggests the importance of aggregative arrangements. Aggregating producers provides a means of addressing both market imperfections and limited market size, enabling growth even in the presence of high-fixed-cost investments and transportation costs.

Credit market imperfections, for example, can be addressed if households can be aggregated into groups that help ensure contractual commitment, eliminating the need to use wealth as a commitment device. This hypothesis (Stiglitz 1990; Varian 1990) provides the basis for microfinance and Self Help groups comprising members with strong social ties who can use social norms and penalties to ensure adherence to contractual terms. Thus, a particular type of aggregation – aggregation across closely linked households – helps overcome credit constraints.

While the extent of internal lending will be limited by the group's resources, a different institutional arrangement that links small homogenous groups into a more expansive village-level network can significantly increase incomes (Ambrus, Mobius and Szeidl

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[6] Social norms and other factors that affect the substitutability between women's engagement in home production and in market activities will, however, dictate whether opportunities in core villages apply only to men or also extend to women. We consider the determination of social norms in detail in later sections.

2014). For example, hierarchical arrangements by which village-level intermediaries monitor the actions of aggregated groups of households can significantly reduce the monitoring costs external lenders bear in providing financial services to many village households (Diamond 1984).

While the literature has primarily focused on credit market constraints, a more important set of constraints in economies such as rural India stem from imperfectly functioning markets for land that restrict land transactions including leasing. Consequently, the agricultural sector is characterized by very small and fragmented farms. With land market imperfections, access to large amounts of credit may not result in significant increases in farm size. In turn, small farm size makes investment in capital-intensive technology and the fixed costs of accessing distant markets unprofitable, even if credit markets function well. Land market imperfections can, however, be addressed through the aggregation of producers, suggesting that policies that combine aggregation with improved access to credit are likely to have the largest impact on the rural economy.

Aggregation for the purposes of overcoming fixed costs, including fixed transportation costs, may also require specialization in production at the level of the village due to the difficulty in aggregating across producers of different crops. This difficulty stems from differences in synchronizing harvest periods (even for crops grown in the same season), and differences in the markets in which crops are sold, seed and fertilizer requirements, etc. In such cases, aggregation is only possible if (sufficient number of households in) the village economy specializes in production with, for example, all farm households growing the same crop. Village-level specialization, however, entails risk. If all farms are growing the same crop, the village economy becomes more susceptible to fluctuations in the price of this crop or to other crop-specific shocks. This implies a familiar trade-off between risk and returns (specialization), reducing the benefits of aggregation.

This need for economy-wide specialization in a few products to help overcome transportation and other fixed production costs conflicts with the need for within-economy specialization in different sectors or goods to enable horizontal and vertical linkages and hence externalities. It reinforces the constraints of market size for approaches that aggregate producers of specific crops or products while simultaneously supporting the growth of complementary sectors.

Moreover, the discussion above suggests that while aggregation can help mitigate the impact of fixed costs and market imperfections, *how* producers are aggregated matters. Aggregation of producers without regard to concerns regarding risk, for example, is likely to reduce participation in the arrangement, with the reduction in scale adversely affecting the program's impact on income.

Aggregation or collective action by producers can be extremely difficult and may succeed only when the returns are clear and large (Wade 1979). The effectiveness of collective action also varies with the socio-economic characteristics of the group notably its size, socio-economic homogeneity and the geographical proximity of members. Thus, in addition to the constraints outlined earlier, aggregation is unlikely to be helpful if collective action concerns are not addressed. Differences across villages in their ability to address collective action problems will in turn result in the effectiveness of policies varying with village socio-economic conditions such as population size and average incomes.

7. Externalities and Incentives

Externalities imply a difference between social and private returns, raising the possibility that individual investments may be far less than optimal from a societal point of view. This suggests the importance of government intervention to ensure optimal levels of investment. However, an additional concern is that the existence and prevalence of externalities is likely to reflect existing institutional or aggregating arrangements that link individuals and firms. Changes in methods of aggregation, in the form of the creation of networks, can then have large payoffs.

Evidence of the importance of the ways in which individuals are aggregated comes from studies that test for social learning in environments where one would expect such learning to be widely prevalent. Many such studies, however, find social learning to be limited. For example, Duflo et al (2011)'s study of fertilizer adoption finds little evidence of social learning. Foster and Rosenzweig (1995) provide evidence that the diffusion of High-yield Varieties (HYVs) of grains associated with the Green Revolution was aided by such learning, with farmers benefitting from the experience of their neighbours. Their results, however, also confirm that the opportunities to learn vary with the characteristics of individuals you interact with. Thus, a poor farmer with richer neighbours was more likely to adopt HYVs early, relative to a poor farmer with equally poor neighbours. Relatedly, Munshi (2004) finds more social learning for wheat, for which cultivation practices are far more uniform, than for rice. Conley and Udry (2003) similarly find that social learning occurs in some contexts (periods with positive shocks), but not others.

This body of research suggests the importance of treating spillovers as endogenous, with interactions between individuals and the nature of these interactions reflecting their returns and costs. As previously noted, monopolistic completion provides incentives for spillovers in the form of monopoly profits. Durlauf (1993) develops a model in which the investment choices of a firm generates externalities, affecting the productivity of others. These externalities reflect a market failure, specifically the absence of a mechanism to internalize social returns from the choice of high-productivity technologies or to coordinate the actions of firms to ensure optimal technology choices. Durlauf argues, however, that production decision in a firm only affect the productivity of firms in industries that use similar technologies. The strength of spillovers is endogenous, determined by the probability that firms choose higher-productivity technologies.

The endogeneity of interactions and networks is emphasized in a theoretical literature on geographical segregation (Benabou 1993). Human capital externalities, for example, imply that individuals benefit from the aggregate level of human capital of others in the community. This provides strong incentives for high-educated individuals may have strong incentives to segregate themselves from low-educated individuals to increase the mean human capital of the group and maximize income. In India, patterns of extensive residential segregation by caste within a village suggests the difficulty of optimally constructing groups; such patterns of segregation may limit options. This reinforces the importance of paying attention to incentives.

Thus, for growth emanating from human capital externalities, aggregation helps if it is done in such a way as to bring together those with varying degrees of knowledge and experience of the technology in question. While the advantages of aggregation for those

with limited knowledge are evident, the participation of those with more knowledge in this arrangement will vary with the returns that they receive from it.

8. Summary of determinants of income growth

The figure below summarizes the discussion of the preceding sections, emphasizing the different determinants of income growth in the long and short run. It notes noting the dependency of increasing returns to scale and externalities on market size and on incentives, and the effect of aggregating arrangements on these.
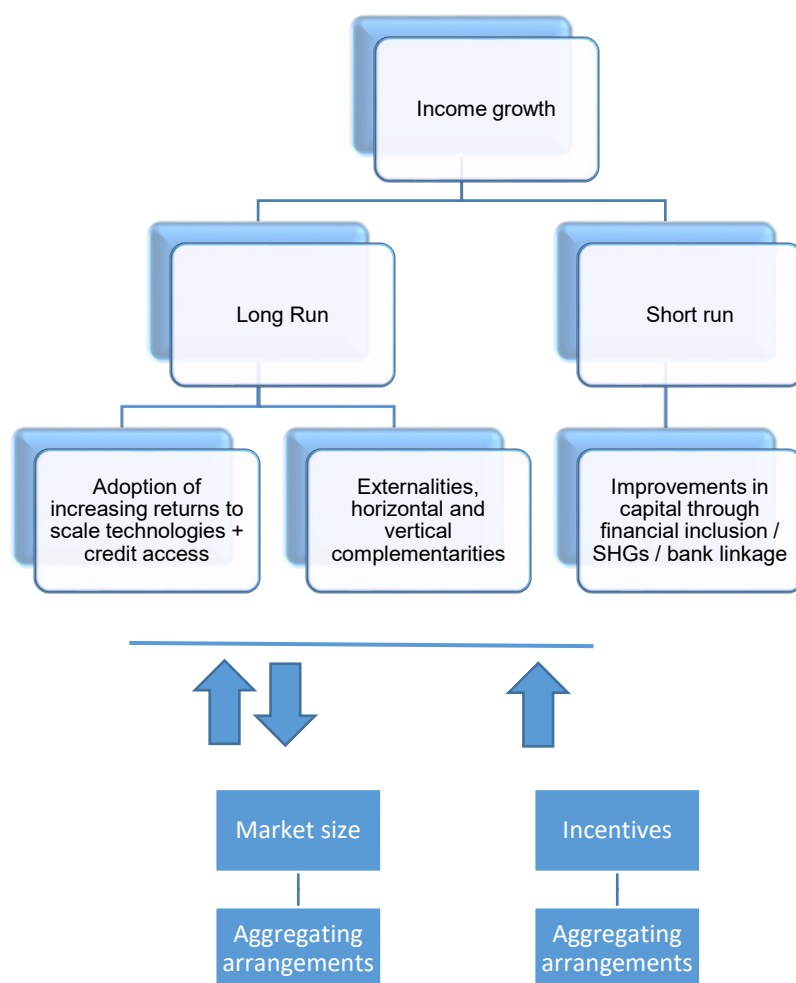
9. Social norms, social learning and institutional arrangements

9.1 Social goods

The discussion above focuses on production and production externalities. The same principles apply to social goods and norms and to externalities in preferences that shape these norms. Social goods are those whose value to an individual reflects the preferences and beliefs of others in the same social group defined on the basis of ethnicity, religion, caste or kinship ties. Consumption of social goods thus reflect shared beliefs and changes in these beliefs over time. For example, a woman's preference for work, in addition to her own beliefs regarding its desirability, may reflect a common norm relating to the desirability of women working shared by members of her ethnic group or

social network. The set of social goods is broad and includes fertility behaviour, nutrition and dietary intake, women's labour force participation and occupational choice, women's intra-household decision-making ability, sanitation and behaviours that affect health.

Given that social goods are those whose value to any given individual is shaped by his or her interactions with others, they can change either with changes in the experiences (beliefs) of others or through changes in the networks to which an individual belongs. Support for the importance of the preferences of others comes from recent empirical work that examines the impact of husbands' beliefs or norms on the labour market choices of their wives (Bursztyn, Gonzalez and Yanagizawa-Drott 2020; Bernhardt et al 2018).

9.2 Macro aggregates and changing social norms

The social norms that dictate consumption of social goods, however, reflect an individual's interactions with society, not just interactions amongst family members. The role of the aggregative behaviour of others is emphasized in the literature on female labour force participation rates and its dependence on the work choices of older cohorts and other members of the current cohort (Fernandez 2013; Hazan and Maoz 2002). These aggregates provide a signal of the costs and returns to increased labour force participation. There is little learning, however, when labour force participation in the older generation is limited; the signal becomes more informative as aggregate labour force participation increases. Thus, changes in labour force participation rates over time follow a "S" shape diffusion curve, similar to those generated in production activities through learning-from-others.

The same ideas apply to the diffusion of new nutritional patterns, norms regarding the care of newborns and infants and fertility choices (Munshi and Myaux 2006). Just as with increasing returns to scale in production, this implies a "tipping" point that divides periods of low adoption and change and those in which the pace of change is fast. This tipping point occurs when the number of adopters has reached a "critical mass" (Schelling 2006).

9.3 Social networks and social learning

While the literature on aggregative influences cited above is suggestive of a role for social learning, its "macro" orientation does not accommodate network effects. As previously noted, the fact that social norms emanate from interactions with others suggests an important role for social networks in influencing their persistence through social learning. Further, it suggests that change in the membership of networks and hence in their characteristics can potentially cause large changes in outcomes.

This topic has been most extensively explored in the context of norms relating to fertility and contraception (Munshi and Myaux 2006; Kohler, Behrman and Watkins 2001; Kohler 2000). Kohler et al (2001) examine the extent of social learning regarding fertility choices within small networks emphasizing the importance of attributes of the network for this process. Specifically, they note that learning is lower in dense networks where all members share close ties and hence the same information and set of experiences.

This suggests that changing network membership to make it either more or less diverse can significantly affect social learning and hence norms. The effect on outcomes, however, depends on the beliefs of new members. For example, suppose a woman's

membership in a SHG expands her social network to include women with more diverse beliefs regarding work. This could either increase or decrease her labour force participation rates, depending on the beliefs held by others in the group. Thus, once again, how women are aggregated into groups matters.

Second, reinforcing the importance of how groups are constructed, groups that enable complementary action may speed diffusion, as suggested by the literature on complementarities and the multiplier effect of production externalities. Thus, suppose the existence of a set of women whose behaviour causes complementary changes in that of others. Building groups of women to include one such leader thus speeds the process of cultural change. More generally, working in groups allows coordinated change, of the form suggested by the literature on production externalities. This in turn makes more likely the "big jumps" required big "S" shaped diffusion curves.

Finally, an important role for aggregative arrangements comes from the recognition that economic factors that improve women's labour force participation rates (as one example of a social good) affect the updating of social beliefs and hence the process of norm diffusion. Using women's labour force participation as a running example, the extent to which social norms constrain a woman's choices depends on the distance between her beliefs regarding the marginal returns from work (affected by social norms) and the existing market wage. Improvements in market wages, then, may complement policies such as gender-training programs that discuss social norms regarding work behaviour, yielding larger changes.

This suggests that policy efforts to change social norms through group discussions, information sessions and other methods may be far more successful if they use the groups or aggregative arrangements used to enhance production rather than "affinity" based groups of women from the same neighbourhood or ethnic group. Producer groups, or groups of women who are combined to overcome production constraints, for example, may offer a more effective arrangement for discussions on social change than neighborhood groups created to promote savings or groups of young mothers.

Aggregative arrangements devised to improve production may also play a critical role in addressing constraints that affect hours of work, rather than just participation choices. Suppose, for example, that women's labour force participation rates are shaped by the norm that prioritizes her child-care and other "home" responsibilities. She may, for example, be expected to ensure cooked meals for all family members requiring her presence at home when children return from school or her husband returns from work. Additionally, ill-health of family members may affect her ability to work outside the house. Both factors prevent her from committing to market work that requires her continuous work effort for 8 hours a day in each work day. However, suppose that women are aggregated into groups that jointly produce an output and that this allows the pooling of their labour. This in turn allows adjusting hours of work to idiosyncratic shocks, while maintaining aggregate labour constant. In turn, women's improved labour force participation promotes changes in norms regarding the desirability of such work.

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