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DO ECONOMIC REFORMS INFLUENCE HOME-BASED WORK? EVIDENCE FROM INDIA

Uma Rani and Jeemol Unni[1]

ABSTRACT

This paper analyzes the factors that influence the conditions under which a woman in India participates as a home-based worker using secondary level data at the micro level. At the macro level, the paper analyzes whether trade and industrial liberalization in India led to an increase in subcontracted work, of the home-based variety. The results show a historically high share of women in home-based work, which implies that female participation in such work was more likely to be determined by their cultural milieu than by the recent liberalization process. Further, while the micro model of social determinants appears to fit the female home-based work equation, the macro model is found to be insignificant. The lower but increasing share of male home-based work and the statistical significance of the macro model as a determinant of such work lead us to conclude that the economic reforms in India had a statistically significant impact on this form of production organization among men.

KEYWORDS

Data-gathering techniques, economic reform, flexible labor, gender inequality, home-based workers, labor process

JEL Codes: J4, J7, J8

HOME-BASED WORK: A CONCEPTUAL OVERVIEW

Recent decades have seen particularly dynamic changes in the Indian economy due to economic reforms. Some of these changes have been largely a result of the changing global economic environment, which has led to increased competition, the introduction of new forms of technology, global production chains, a reorganization of work, and some restricted labor mobility. The efforts of multinational corporations (MNCs) and governments worldwide that are undergoing restructuring have led to the proliferation of irregular forms of employment and increased outsourcing to the informal sector. While MNCs have contributed to this process by quickening the relocation of labor-intensive production processes to low-wage sites in developing economies, at the macro level, governments especially in developing countries have implemented a drive to deregulate

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labor markets. This has led to a decrease in the size and proportion of core formal-sector jobs with job security, opportunities to advance, and social security. Besides increasing flexibility in wage jobs, the new form of work organization includes subcontracting to smaller informal enterprises and home-based producers.

These new forms of work opportunities that are created could be a major source of income inequality in developing countries as wage differentials widen between formal- and informal-sector workers. Income inequalities arise either due to structural changes in the labor market or access to certain segments of the labor market. Structural change could be a shift from manufacturing to services or a move to more flexible forms of paid work. Increase in precarious, irregular work, particularly for women, might have an impact on household income inequalities. Further, only a few jobs of good quality are created. The majority of the workforce with low human capital endowments is sorted into informal low-paid work without social protection, due to rationing of good jobs. In the absence of unemployment benefits, these changes could lead to labor-market segmentation and rising inequalities in income.

The economic reforms in India occurred in phases. The industrial policies of the early 1990s intended to remove the shackles on industry through abolishing investment licensing, simplifying rules, and reducing the exclusive monopolies of the public sector. The trade liberalization policies dismantled quantitative restriction and reduced tariff and non-tariff barriers (NTBs) (Deb Kusum Das 2003). All these early policies appeared to have helped the growth of the organized/formal sector in India. The rapid reforms of the mid-1990s, such as the de-reservation of products and raising the limits of investment in plant and machinery, allowed India's small-scale industries to expand. The trade liberalization measures also allowed technology inflow (often secondhand technology) into the small-scale industries, which encouraged productivity growth. The period after the mid-1990s saw rapid growth in the unorganized/informal sector in India (Uma Rani and Jeemol Unni 2004). Through the adoption of flexible production processes, large firms subcontracted to small firms, leading to the high growth of the informal segment in output, employment, and capital (Jeemol Unni and Uma Rani 2008). The early empirical literature on India argued that the subcontracting inter-firm linkages were exploitative: the workers were paid low wages, did not receive any benefits, and the nature of work did not allow them to organize themselves, thus reducing their bargaining power (Amitav N. Bose 1978; John Harriss 1982; Nirmala Banerjee 1988). However, the more recent literature on subcontracting in India argues that this is an efficient form of production organization, though there is an implicit mention of the attendant exploitation of labor (Rakesh Basant and Pankaj Chandra 2002; Sebastian Morris and Rakesh Basant 2004). The exploitative nature of work within the

subcontracting chain is more likely to occur in informal enterprises and home-based situations.

There are a number of empirical studies on home-based work from both definitional and analytical angles. This paper makes a contribution to the existing literature at two levels. At the micro level, much of the empirical work consists of case studies and focuses on one or more occupational categories, providing valuable insights on the working conditions, nature of work, and production relations. This paper analyzes the factors that influence the conditions under which a woman in India participates as a home-based worker using secondary level data. Further, it differs from earlier empirical work as it adopts a much more comprehensive definition of home-based work and takes into consideration all the industrial groups in India's manufacturing sector. At the macro level, India has witnessed dynamic changes due to economic reforms – trade and industrial liberalization. This paper adds to the macro debate with regard to whether trade and industrial liberalization lead to an increase in subcontracted home-based work and analyzes the factors that might lead to the growth of such work.

In this context, the paper analyzes the growth of home-based workers in the new policy environment in India where the economy has been opened to the forces of globalization. We adopt a micro perspective to understand why women undertake home-based work or what characteristics determine home-based work. To examine this, we consider the individual or micro decision to participate and the macroeconomic factors that might have led to the increase in such work. Finally, we test the "efficiency" argument to see whether the easing of licenses and trade liberalization in India (through proxy variables) led to the growth of home-based work, as large firms sought to reduce the transaction costs of coordination. There seems to be a thin line between "efficiency" and "exploitation" as the firms that adopt cost-cutting strategies actually cut labor costs by subcontracting out, thus exploiting labor.

Theoretical framework

The process of liberalization underway has led to changes in the way production is organized in India. The production process has been decentralized most in the industrial sector, with a wide range of activities subcontracted to small firms and home-based workers, in an attempt to increase profits and marketability. Firms in India are pushed into outsourcing or subcontracting because of increasing economic costs, heavy competition, and efforts to circumvent labor legislation. Some economic literature argues that subcontracting is the most "efficient" form of production organization (Ronald H. Coase 1937; Oliver E. Williamson 1975), while empirical studies have very clearly shown such relationships to be exploitative (Bose 1978; Harriss 1982; Emmanuel Romatet 1983;

Banerjee 1988).[2] Women as home workers become one of the main targets in the restructuring of production, as they get low wages and remain outside the realm of unions, social security, labor standards, and other state guarantees. Outsourced work is actually the least skill intensive and involves minimal capital, and the labor process is generally repetitive and monotonous.

Arguing from a micro efficiency point of view, the neoclassical model puts forward two reasons to explain the existence of home-based work. First, there are fixed costs of working on-site such as the time and financial costs of travel and providing alternative arrangements for caring for the young and sick. These are greatly reduced by home-based work. Second, with home-based work it is possible to engage in the joint production of income and household commodities, such as cooking and looking after children. The flexibility of home-based work enables women to better integrate their family and work roles (Linda N. Edwards and Elizabeth Field-Hendrey 2002).

From a Marxist perspective, home-based work is seen as part of a global capitalist system of exploitation and dependent relations (Isa Baud 1987). Karl Marx (1977) referred to home workers as an invisible thread and an outside department of the factory, the manufactory or the warehouse, who were part and parcel of the production of consumer goods during the industrial revolution of Western economies. Marx argued that, "piece wage is a form of wage in harmony with the capitalist mode of production" and is most favorable for its own development (1977: 521). The piece rate system reduces the need for supervision, reduces monitoring costs, and improves the workers' "self-control." Such a hierarchically organized system of exploitation facilitates the intensification of exploitation and the extension of the working day (as discussed in Peter Custers [1997]). Romatet argued: "The daily working time is regulated by the owner and by the product, that is, the time required to complete a piece" ([1983], as quoted in Custers 1997: 126).

Claudia von Werlhof analyzes the position of home workers differently by taking "the present-day reality in terms of the dichotomy between the 'free wage labor' on the one hand, and the 'housewife' on the other" ([1988], quoted in Custers 1997: 127). She argues that the ever-increasing expansion of the informal sector leads to the abolition of the first type of worker. The conditions of the increasing number of home workers approximate those of the housewife, the individualized, atomized worker whose labor is not regulated by a wage. Maria Mies (1982) refers to home workers as "semi-domesticated," which means that in their social appearances they are housewives. But in reality, they are wage laborers fully integrated into a world market-oriented production system (Custers 1997: 186). The social definition of home workers as housewives has economic consequences in the sense that it facilitates the ruthless exploitation of labor in terms of the

underpayment of wages and denial of any benefits that a factory worker (salaried or casual) might receive.

Martha A. Chen, Jennefer Sebstad, and Lesley O'Connell (1999) argue that home-based work does not emerge simply because women prefer to work at home (that is, the "housewife theory") but also because employers prefer to subcontract work to home-based workers as a cost-reducing strategy. This apart, falling male wages or employment reduces female and household welfare, forcing women's participation in paid work, especially home-based work (L. Alan Winters 2000). This is, in turn, grounded by and affected by macroeconomic and sectoral policies and regulations. Custers (1997) also points out that although the housewife theory might explain workers' sociological conditions, it fails to define the economic or production relations under which they work. Home-based work in Marxist-Feminist theory is seen as an extreme form and consequence of an unequal sexual division of labor, which manifests to a large extent in many consumer goods industries (Andrea M. Singh and Anita Keller-Viitanen 1987; Custers 1997).

There is no doubt that the exploitative elements discussed in the Marxian framework are prevalent in the present day reality of home-based work and have relevance even today. However, by emphasizing wage labor and its exploitative elements alone, the Marxian understanding of the complex reality is very narrow in scope. Marx in his analysis of home workers does not take into consideration the sexual division of labor, and thus fails to take into account the double task of self-/wage-employed work and domestic work undertaken especially by female home-based workers.

Definition

The traditional sources of data on employment, the population censuses and India's national labor force surveys, classify workers according to three international classification schemes – industry, occupation, and status – but none of them capture home-based work as a category. Empirical micro studies over the last two decades have tried to capture this set of invisible home-based workers, with each adopting a different definition depending upon the sector or region, making comparisons difficult (Mies 1982; Romatet 1983; Singh and Keller-Viitanen 1987; Banerjee 1988; Paula Kantor 2000; Jeemol Unni and Namrata Bali 2002). These studies fail to give us any reasonable estimates of such work even in a particular activity. As these studies cover a wide range of productive activities in home-based work, they have allowed researchers to explore the definitional ramifications. The definitional issue assumes importance both from a conceptual perspective and because of the need to evolve an operational definition that could be incorporated into standard national data-gathering exercises for undertaking meaningful empirical analysis and policy intervention.

The 1993 International Classification of Status in Employment (ICSE) followed a dichotomous system in which workers were classified as either self-employed or wageworkers. This classification system is unable to represent the realities of home-based workers and producers due to two reasons: First, the dichotomy is a reductionist categorization of the complex relations of production and distribution characterizing home-based work, where many producers are neither wageworkers nor self-employed but something in-between (Kantor 2000). Second, the dichotomy is based on legal definitions of the wageworker and the self-employed person, drawn from Western liberal assumptions of autonomous and self-contained individuals, which cannot be applied to home-based producers (Elisabeth Prügl and Irene Tinker 1997).

The International Labour Organization (ILO) adopted a Convention of Home Work in 1996, Number 177, which refers exclusively to home workers, a category not included in the ICSE 1993. It defined a home worker as a person who carries out work for remuneration in premises of his/her own choice, other than the workplace of the employer, resulting in a product or service as specified by the employer, irrespective of who provides the equipment, materials, or inputs used (ILO 1996). This is a subcategory of a broader category of home-based workers. Marilyn Carr, Martha Alter Chen, and Jane Tate (2000) distinguish between "home workers" and "home-based workers," the latter including own-account workers. They emphasize the broader usage of the term "home-based workers," which refers to both independent own-account producers and dependent subcontract workers in the analysis of global values chains, as they are the most dominant forms of employment in developing economies.

The Ministry of Statistics and Programme Implementation, Government of India, constituted an Independent Group on Home-Based Workers in India to suggest a definition, identify data needs, and recommend pilot data collection for filling the gap in statistics related to this group of workers (Government of India [GOI] 2008). The group submitted its report in March 2008 and recommended the following definition: home-based workers are (1) own-account workers and contributing family workers helping own-account workers involved in the production of goods and services in their homes, for the market, and (2) workers carrying out work in their homes for remuneration, resulting in a product or service as specified by the employer(s), irrespective of who provides the equipment, materials, or other inputs used, and those contributing family workers helping such workers.

In our view, home-based workers form a broader category of workers within which home workers are included. Besides home workers, home-based workers also include those own-account workers and unpaid family helpers who pursue economic activity within their homes, that is, their place of work. Wageworkers employed in the homes of employers also constitute part of the production organization of home-based work.

Home-based workers fall into a continuum of production systems with varying relationships of dependence along the following lines:

(1) Own-account worker/employer: persons working on household premises, having a relatively independent status.
(2) Home worker: outworkers who work at home, or in another home other than the employer/contractor's premises under subcontracting arrangements, having a dependent status.
(3) Wageworker: persons working for wages or salaries in enterprises located in the employer's home.

This classification is much more comprehensive and allows us to capture a larger number of home-based workers, who would otherwise be invisible. We realize that this varies from the international literature reviewed earlier, including ILO (1996), in which home work is considered synonymous with home-based work, and the definition of GOI (2006), since it includes wageworkers working in enterprises located at home. But we use this more comprehensive definition as the dependent variable in the macro model since we are attempting to understand the determinants of a form of production organization in that model. The micro model focuses only on the first two categories since it attempts to understand the individual's choice with regard to the location of her work at home.

DESCRIPTION OF DATA AND THE DEPENDENT VARIABLES

The database used in this study is obtained from the National Sample Survey Organisation (NSSO), part of the Central Statistical Organisation of India. We use two separate data-sets for the micro and macro models. The micro model is estimated on the individual level records of the NSSO's Fifty-fifth and Sixty-first Round Survey of Employment and Unemployment, 1999–2000 and 2004–5 (NSSO 2001a, 2001b, 2006a 2006b). This national labor force survey for the first time included a question on "place of work" in 1999–2000 that helped identify workers who undertook their economic activity at home (NSSO 2001a). The dependent variable in the micro model is persons undertaking home-based work in the manufacturing sector. Since this model tries to explain why individuals choose to work at their own homes as opposed to outside the home, we take into consideration own-account workers and home workers for the analysis. For the micro model, the only selection criterion is age, and we have included all persons aged 15–64 years in the sample.

The macro model was estimated on a separate survey of the NSSO, the Survey of Unorganized Manufacture, Fifty-first Round, 1994–5

(NSSO 1998a, 1998b) and the Fifty-sixth Round, 2000–1 (NSSO 2002a, 2002b, 2002c). The data on the unorganized manufacturing sector for these two years – 1994–5 and 2000–1 – have a location code that helped us to identify home-based enterprises, coded as "premises same as household's residence" in 1994–5 and "within household premises" in 2000–1 (NSSO 1998a, 2002a: 4). Data on enterprises and workers in them located in the household premises allowed us to estimate the change in this form of work organization for total workers over this period.[3]

From a macro perspective, home-based work is a particular form of work organization in which the costs of production are quite low. Hence, industries and large enterprises that engage in cost-cutting strategies could undertake production in home-based situations. Such home-based units could also hire wageworkers, and in general such employees would be paid comparatively low wages, helping in the cost-cutting strategies of the industry. The dependent variable in the macro model is the percentage point increase in the share of persons engaged in home-based enterprises and includes hired or wageworkers in enterprises that may be engaging in own-account work or subcontracted home work. Family and hired workers constitute this particular form of production organization. The model attempts to understand the phenomenon of work moving from the factory to the home from a macro perspective.

TRENDS IN HOME-BASED WORK IN INDIA

The economic reform policies of the Indian government since 1991, including the liberalization of trade and deregulation of industries (documented in Rani and Unni [2004]), affected the manufacturing sector to a large extent by, among other things, allowing the inflow of technology into the country. These measures made technology transfer easier and facilitated alliances with foreign firms and the inflow of foreign direct investment (FDI). The economic reforms were seen to have a positive impact on the unorganized (informal) manufacturing sector in the 1990s (Rani and Unni 2004), leading to growth of value added and employment.

To study the impact of trade liberalization on specific industries in the manufacturing sector in India, we have categorized the industries into trade categories: export oriented and import penetration. This is based on the value of export and import in the two years 1993–4 and 1999–2000.

Trade categories

The following five trade groups were distinguished:

Category I: Export oriented – If the value of export was greater than the value of import in both years.

Category II: Import penetrating – If the value of import was greater than the value of export in both years.

Category III: Import penetrating to export oriented – If the value of import was greater in the first year and the value of export was greater in the last year.

Category IV: Export oriented to import penetrating – If the value of export was greater in the first year and the value of import was greater in the last year.

Category V: No trade category – Neither export nor import in the industry group.

Home-based production workers

The share of home-based work among production workers in India, including family and hired workers in the unorganized manufacturing sector, is rather high. Home-based workers constituted about 81 percent of all female workers and about 46 percent of male workers in 2000–1 (Table 1). This tells us that a large part of India's unorganized manufacturing was undertaken as part of household industry and was obviously of a smaller scale and used more primitive technology.

Home-based production workers grew at a much faster rate during the phase of India's recent reforms (1994–5 to 2000–1), 6.5 percent (Table 1) compared to only 1.1 percent for all workers (Jeemol Unni and Uma Rani 2005). The gender differentials in the growth of home-based workers are rather striking and contrary to expectations. There was a sharp growth in male home-based workers, about 13 percent per year, while there was a decrease of 0.4 percent in female home-based workers. Given the high share of home-based women workers, this form of work was perhaps part of the cultural milieu and not really affected by India's new economic reform policies. Also, given the high level of female home-based work, we can expect low percentage change over time. Further, while there was a small increase in the share of male home-based workers, there was actually a decline in the share of female home-based workers (Table 1). This gender differential has important implications for the strategy adopted by Indian firms, where we expected that home-based women production workers would grow and replace the more expensive male workers. The strategy instead appeared to be one of replacing male factory workers with male home-based workers.

There were, however, major differences in the change in the share of home-based workers among India's trade categories of industries. Predominantly export-oriented industries had a decline in the share of male home-based workers, while the industries with major import

Table 1 Percentage and growth rate of production workers in enterprises located at home in select three-digit export categories[a]

		Men		Women		Total		Growth rate (1994–2001)		
		1994–5	*2000–1*	*1994–5*	*2000–1*	*1994–5*	*2000–1*	*Male*	*Female*	*Total*
CAT I: export-oriented industries										
151	Meat, fish, fruit, and vegetables	39	36	50	69	43	41	13	4	10
155	Beverages	63	63	85	69	75	65	17	-7	6
160	Tobacco products	79	85	93	94	90	91	20	12	14
171	Spinning, weaving, and finishing	62	66	84	82	73	71	7	-8	-0.4
172	Other textiles	71	69	91	91	81	78	7	1	4
181	Wearing apparel except fur	42	40	59	89	45	54	37	56	44
182	Fur products	45	29	67	63	47	36	8	25	12
191	Tanning and dressing	50	40	85	38	59	40	7	-28	0.4
192	Footwear	51	51	81	62	55	51	2	-13	0
242	Other chemical products	36	21	65	81	53	52	9	17	15
251	Rubber products	18	21	66	29	22	22	7	2	6
252	Plastic products	16	23	39	53	19	29	11	19	14
281	Structural metal products	17	17	44	80	17	20	25	66	28
289	Other fabricated metal products not elsewhere classified	33	39	73	54	38	40	9	-16	6
319	Other electric equipment	1	16	2	8	1	14	87	62	81
333	Watches and clocks	5	11	0.3	96	2	23	8	44	21
341	Motor vehicles	–	–	–	–	–	–	–	–	–
342	Bodies, coach, and other parts	49	6	68	0	49	6	-23	–	-23
359	Transport not elsewhere classified	34	27	96	71	39	28	-0.4	-30	-3
361	Furniture	48	29	94	69	57	30	0.2	-32	-5
369	Manufacturing not elsewhere classified (jewellery, sports, and music)	27	32	95	79	58	41	11	-16	-4
	Subtotal	48	47	87	87	66	60	13	4	8

(continued)

Table 1 (Continued)

		Men		Women		Total		Growth rate (1994–2001)		
		1994–5	*2000–1*	*1994–5*	*2000–1*	*1994–5*	*2000–1*	*Male*	*Female*	*Total*
CAT II: import-penetrating industries										
202	Wood products	69	66	93	92	84	72	20	-7	7
210	Paper products	51	34	93	83	68	50	4	3	3
222	Publishing and printing	17	21	42	32	20	22	12	-4	9
231	Coke oven products	18	6	17	37	18	7	-7	-13	-8
232	Refined petroleum	39	31	77	0	50	31	-14	–	-24
241	Basic chemicals	4	3	28	5	5	3	-7	-4	-7
272	Non-ferrous metal	23	22	29	38	24	23	7	-7	6
291	General purpose machinery	8	11	7	17	8	11	35	54	35
292	Special purpose machinery	23	32	69	13	24	32	15	-21	13
300	Office accounting	4	0.4	0	3	3	1	-61	–	-56
311	Electric motor, generator, transmission, and distribution	46	28	44	1	46	28	26	-66	23
312	Generators	15	5	15	7	15	5	-12	5	-7
314	Accumulators, cells, and batteries	19	21	86	36	20	22	10	27	12
321	Electric values and tubes	20	7	45	6	23	7	-9	-2	-7
322	TV/radio transmitters	48	50	82	3	54	49	39	-51	33
323	TV/radio receivers	35	44	17	19	34	41	-1	23	-0.1
332	Optical	66	13	94	7	73	13	-30	-79	-37
351	Ships and boats	21	2	–	–	21	2	-8	–	-8
352	Railways and tramway	0	0.5	50	24	1	1	–	-26	4
353	Space craft and aircraft	0	0	–	–	0	0	–	–	–
	Subtotal	48	53	91	86	69	59	18	-7	7

(continued)

Table 1 (Continued)

		Men		Women		Total		Growth rate (1994–2001)		
		1994–5	2000–1	1994–5	2000–1	1994–5	2000–1	Male	Female	Total
CAT III: import penetrating to export oriented										
153	Grain mill production	45	50	88	77	61	55	18	-3	10
154	Other food	33	34	72	58	50	39	5	-18	-6
243	Man-made fibers	100	0			100	0	–	–	–
261	Glass and glass products	60	56	60	92	60	62	-2	11	1
269	Other non-metallic	45	38	62	32	54	36	9	-18	-2
271	Basic iron and steel	35	20	24	51	35	20	-4	21	-4
313	Insulated wire and cables	17	0	0	0	16	0	-88	–	-88
343	Parts and accessories	19	9	21	16	19	10	10	-4	8
	Subtotal	41	41	71	53	54	44	11	-12	2
CAT IV: export oriented to import penetrating										
152	Dairy products	71	77	96	98	85	83	22	-0.2	12
173	Knitted and crocheted	42	29	51	70	44	47	-2	21	9
201	Saw milling of wood	16	12	38	18	16	13	-4	-3	-4
293	Domestic appliances	25	9	20	7	24	9	-2	-24	-4
315	Electric lamps	27	26	8	36	23	27	10	21	11
331	Medical instruments	19	14	15	3	19	14	14	-13	12
	Subtotal	32	42	83	83	45	51	13	4	9
CAT V: no trade industries										
273	Casting metals	15	13	64	17	23	13	5	-51	-5
All	*Total*	46	46	83	81	62	56	13	-0.4	7

Note: [a]Production workers include family and hired workers.
Source: National Sample Survey Organisation (NSSO 1994a, 1994b, 1998a, 1998b, 2002a, 2002b, 2002c).

penetration actually registered an increase in the share by nearly 5 percentage points (Table 1). The opposite was true of the share of female home-based workers, with import penetration industries showing a decline and export-oriented industries retaining their high share at 87 percent.

While it is difficult to arrive at any conclusion from such aggregate data, we hazard an explanation. With the relaxation of India's trade barriers, it is likely that the export-oriented industries were able to upgrade their technologies and adopt a productivity-increasing strategy rather than a cost-cutting strategy of engaging home-based workers. The industries that faced import competition, however, marginally increased their share of male home-based workers perhaps in an effort to remain in the market.

The opposite strategy with regard to the share of women home-based workers among India's export-oriented industries can be explained by the fast expansion of two industry groups, garment and chemical industries, which engaged a large and increasing share of women workers. Among industries with import penetration, those with an increase in the share of male home-based workers were publishing and printing, general and special purpose machinery, and TV and radio equipment. With a large number of printing and publishing houses shifting their operation to India and major import competition in the machinery industries, these industries appeared to adopt the cost-cutting strategy of engaging a larger share of male home-based workers.

MICRO DETERMINANTS OF HOME-BASED WORK

The neoclassical models of participation in the labor market assume that the workers are able to choose the status of their employment given their individual and regional characteristics. These models put forward two reasons to explain the existence of home-based work. First, the fixed costs of working on-site such as travel costs, both time and financial, are greatly reduced by home-based work. Second, it is possible to engage in joint-production of income and household commodities, such as cooking, looking after children and other household chores with home-based work. Both these reasons lead to the conclusion that women will have a lower reservation wage for home-based work than for on-site work, which would be beneficial for the employer as production costs are reduced. This is the efficiency argument of the neoclassical model, as home-based work helps to reduce production costs, while it enables women the flexibility to integrate better their family and work lives. In this context, we predict whether women in India participate in home-based work due to different wage offers and joint production possibilities.

In this section, we present a very simple model of the participation in home-based work that consists of a set of variables to determine the causes

for the rise in the reservation wage or to proxy for the fixed costs of working on-site, and to predict the wages of home-based work. The explanatory variables are exogenous factors that affect the supply of labor to all labor-market statuses, particularly home-based work. The empirical model employed here is the multinomial choice model with four choices open to the population in the 15–64 age group. The multinomial model involves one categorical dependent variable Y and a set of explanatory variables. The four choices are: to work as a home-based worker in the manufacturing sector, to work as a home-based worker in the non-manufacturing sector, to work outside the home, or to be outside the labor force. The dependent variable is the choice of undertaking home-based work or working outside the home as opposed to not working. The dependent variable takes the value 1 for undertaking home-based work in manufacturing, the value 2 for undertaking home-based work in other than manufacturing, the value 3 for working outside the home, and the value 0 for not working. Table 2 presents a list of variable names, definitions, and data sources.

Table 2 Variable names, definitions, and data sources

Variable name	*Definition*	*Data source*
Micro model		
Age	Age of the individual	Raw data from Employment Unemployment Survey CD, 2004–5, NSSO
Age squared	Square of age	
Illiterate	Dummy variable for an individual having reported being illiterate	
Literate	Dummy variable for an individual not having attended school but reporting being literate	
Primary school	Dummy variable for an individual having attended primary school	
Middle school	Dummy variable for an individual having attended middle school	
Secondary school	Dummy variable for an individual having attended secondary school	
Scheduled castes	Dummy variable for an individual belonging to a scheduled caste family	
Scheduled tribes	Dummy variable for an individual belonging to a scheduled tribe family	
Other backward castes	Dummy variable for an individual belonging to other backward caste family	
Muslim	Dummy variable for an individual belonging to a Muslim family	

(*continued*)

Table 2 (Continued)

Variable name	*Definition*	*Data source*
Christian	Dummy variable for an individual belonging to a Christian family	
Other religions	Dummy variable for an individual belonging to other religions	
Living in rural areas	Dummy variable for an individual living in rural area	
Aged 0–6 years	Number of children in the household aged 0–6 years	
Aged 7–15 years	Number of children in the household aged 7–15 years	
More than 65 years	Number of persons in the household above the age of 65 years	
Married	Status of being married	
Female	Female head of the household	
Medium-growth states	Dummy variable for medium-growth states	
Low-growth states	Dummy variable for low-growth states	
Macro model		
Gross value added	Growth of gross value added (in Rs.)	(NSSO 1994a, 1994b, 1998a, 1998b, 2002a, 2002b, 2002c)
Capital labor intensity	Growth of capital labor intensity (ratio of fixed capital to number of workers)	
Wage rate	Growth of wage earnings per worker in the unorganized sector	
Weighted applied tariff 1997	This is the import weighted average applied tariff rate applied on goods entering the country and is reported in percentage points. It takes into consideration the available data for preferential schemes.	Nicita and Olarreaga (2006) database
Non-tariff barrier (NTB) 1997	This is simple average of ad-valorem equivalent of core NTB from HS 6-digit level data. The NTB includes price-control measures, finance-control measures, and quantity-control measures.	
Share of value added in reserved industries 2001	Percentage of value added of the items that were reserved in 2001 at national industrial classification three-digit level	(NSSO 1994a, 1994b, 1998a, 1998b, 2002a, 2002b, 2002c)

Wage offer variables

The variables we use to predict the wage offers are age and square of age, dummy variables for levels of education, social groups, and residence in a

rural area. Since we are using the same predictors to estimate the two wage offers, the effect of different wage offers on the labor supply decisions cannot be distinguished. The opposite effects are more or less assumed for the wage offers at home and outside the home. Age and the square of age are expected to test for non-linearity of the relationship. For the education variable we have constructed dummies for persons who are illiterate; are literate without formal schooling; have passed primary, middle, or secondary school; and have completed higher secondary school. Education above higher secondary was considered the reference category for the education variable. We expect illiterate persons and persons with lower levels of schooling to have lower wage offers of outside work and hence to be more likely to be engaged in home-based work. The proxy constructed for social groups were dummy variables representing scheduled castes (SC), scheduled tribes (ST), and other backward castes (OBC).[4] For religion, dummy variables were constructed for Muslim, Christian, and other religious groups. We expect the lower social groups, SC, ST, and OBC, which more often have lower educational status, to also have lower wage offers both at home and outside the home. With social restriction on their mobility, poor Muslim women were also expected to be more often in home-based work. For region, dummy variables were constructed for persons residing in rural areas, and urban areas were used as a reference category. The wage offer for persons residing in rural areas was expected to be lower for both home-based and non-home-based work compared to those residing in urban areas. Living in rural areas was expected to increase commuting cost for an on-site job; hence, a positive association with home-based work is expected.

Fixed cost variables

The set of variables we use to proxy for fixed costs for working on-site is having a child below 6 years of age, children between 7 and 15 years of age, and persons over 65 years of age in the household. We expected all these variables to be positively related to the fixed costs of working outside the home and therefore to increase the probability of undertaking home-based work. The household responsibilities of being married were also proxy measures of the value of women's household productivity while being engaged in market work at home, the joint-production function. These variables reflect women's potential demand for care-taking services at home, which they would provide if working at home. They can be understood to raise the chances of home-based work, as such work would imply a joint production of household and economic goods. Female members in a female-headed household were less likely to be home-based since the need for better incomes would override the positive impact of working at home in the joint-production function.

Macro variables

In the micro model it is difficult to construct a proxy variable for the macro scenario of growing opportunities for work. So, we constructed a simple dummy variable taking the level of growth of state domestic product into consideration. High-growth states are those growing at more than 6 percent, medium-growth states are those growing between 4.5 and 6 percent, and low growth states are those growing below 4.5 percent per annum during the 2000–5 period. We have taken the high-growth states as the reference category. The economic reforms are expected to have a greater positive impact on industries in the more developed and better-performing states. We expect that home-based work would not be high in states that are growing rapidly.

The hypothesis is that there is a likelihood that women would choose home-based work in manufacturing or other sectors if the wage offer for outside work is lower than the home-based work, if the fixed costs of working outside are high, or if they are not in economically better-performing states. The first two hypotheses are individual choices, while the third hypothesis is macro determined.

EMPIRICAL RESULTS OF MICRO MODEL

We estimate the multinomial model for male and female workers separately, with the entire set of explanatory variables representing the wage offers, fixed costs, and macro variables for the four work states. We use the individual-worker-level data of the NSSO Employment Unemployment Survey for both 1999–2000 and 2004–5, but we only present results for 2004–5. To find out whether the two work states, home-based and non-home-based, are statistically distinct or not, we conducted the chi-square test, which was statistically significant. This means that the two equations are statistically distinct, and we reject the hypothesis of equality. The equations were found to be quite robust based on the log likelihood ratios. Two descriptive measures of goodness of fit, Cox and Snell and Nagelkerke, show 12.6 and 27.3 percent of the variances for women, and 58.2 and 73.0 percent for men (Tables 3 and 4). The individual ß coefficients were tested using the Wald chi-square statistic. All variables except for having children in the 7–15 age group were statistically significant predictors for women choosing home-based work. In the case of men, all variables except for being in rural areas and having children in the 7–15 age group were statistically significant predictors for choosing home-based work. The Hausman-McFadden test for the independence of irrelevance alternatives (IIRA) shows that the estimated coefficients for both male and female micro models are independent of the omitted outcomes.

Table 3 Multinomial logit regression coefficients of participation in home-based work, women aged 16–64 years in India, 2004–5

	Home-based manufacturing vs. not in labor force		*Home-based non-manufacturing vs. not in labor force*		*Not home-based vs. not in labor force*	
	Coeff (β_1)	*SE of β_1*	*Coeff (β_2)*	*SE of β_2*	*Coeff (β_2)*	*SE of β_2*
Intercept	-7.173***	0.088	-7.871***	0.131	-5.4839***	0.0556
Age	0.190***	0.005	0.198***	0.007	0.2149***	0.0032
Age squared	-0.003***	0.000	-0.002***	0.0001	-0.0026***	0.0000
Level of education (above secondary school)						
Illiterate	1.549***	0.075	0.773***	0.053	0.623***	0.021
Literate	1.288***	0.083	0.279***	0.063	0.114***	0.025
Primary school	1.223***	0.079	0.474***	0.058	-0.028	0.024
Middle school	0.839***	0.078	0.090	0.059	-0.381***	0.024
Secondary school	0.294***	0.091	-0.049	0.066	-0.607***	0.028
Caste/religion (forward castes)						
Scheduled castes	0.481***	0.052	-0.225***	0.039	0.297***	0.018
Scheduled tribes	0.170***	0.074	-0.724***	0.055	0.942***	0.021
Other backward castes	0.744***	0.038	0.055**	0.029	0.320***	0.015
Muslim	0.488***	0.040	-1.074***	0.050	-0.823***	0.021
Christian	-0.312***	0.097	0.135**	0.065	0.235***	0.024
Other religions	-0.299***	0.096	0.765***	0.045	-0.210***	0.028
Living in rural areas	0.086***	0.034	1.256***	0.034	0.958***	0.014
Number of children aged 0–6 years	-0.097***	0.012	0.011	0.009	-0.025***	0.004
Aged 7–15 years	0.004	0.010	0.020***	0.007	-0.009***	0.004
Number of persons more than 65 years	-0.112***	0.027	-0.013	0.018	-0.023***	0.009
Married	-0.778***	0.043	0.158***	0.040	-0.170***	0.017
Household head (male)						
Female	0.312***	0.047	0.534***	0.041	0.745***	0.018
Regional characteristics (high growth states)						
Medium-growth states	0.251***	-0.195	0.030***	0.015	0.117***	0.013
Low-growth states	-0.499***	-0.443	0.032***	0.016	-0.696***	0.017
Number of observations				187,074		
Likelihood ratio chi-square (df)				40,614.37 (63)		
Pseudo R^2				0.1256		
Cox and Snell				0.273		
Nagelkerke				0.363		

Notes: Text in parenthesis is reference category. ***Denotes significance at the 1 percent level; **denotes significance at the 5 percent level; *denotes significance at the 10 percent level.

Tables 3 and 5 present hypotheses with regard to the probability of participation in home-based work. The coefficients indicate the direction and strength of the relationships between the independent and dependent

Table 4 Marginal effects of participation in home-based work, women aged 16–64 years in India, 2004–5

	Home-based manufacture		*Home-based non-manufacture*		*Not-home-based*		*Out of labor force*	
	Marginal effects		*Marginal effects*		*Marginal effects*		*Marginal effects*	
Predicted outcome	0.021		0.032		0.263		0.683	
Age	0.003***	(.0002)	0.004***	(.0002)	0.039***	(0.001)	-0.046***	(0.001)
Age squared	-.00004***	(0.000)	-.0001***	(0.000)	-.0005***	(0.000)	0.001***	(0.000)
Level of education (above secondary school)								
Illiterate	0.034**	(0.002)	0.018***	(0.002)	0.105	(0.004)	-0.157	(0.005)
Literate	0.043**	(0.004)	0.007***	(0.002)	0.007	(0.005)	-0.057	(0.006)
Primary school	0.040**	(0.004)	0.016***	(0.002)	-0.021**	(0.004)	-0.035**	(0.005)
Middle school	0.027**	(0.003)	0.005***	(0.002)	-0.075	(0.004)	0.043**	(0.005)
Secondary school	0.011***	(0.003)	0.003	(0.002)	-0.105	(0.004)	0.092	(0.005)
Caste/religion (forward castes/Hindus)								
Scheduled castes	0.009**	(0.001)	-0.009***	(0.001)	0.059**	(0.004)	-0.059	(0.004)
Scheduled tribes	-0.003**	(0.001)	-0.024**	(0.001)	0.212	(0.005)	-0.186	(0.005)
Other backward castes	0.015***	(0.001)	-0.002	(0.001)	0.058**	(0.003)	-0.071	(0.003)
Muslim	0.018***	(0.001)	-0.021**	(0.001)	-0.133	(0.003)	0.136	(0.003)
Christian	-0.007***	(0.001)	0.002	(0.002)	0.048	(0.005)	-0.044**	(0.005)
Other religions	-0.005***	(0.002)	0.037**	(0.003)	-0.046**	(0.005)	0.014***	(0.005)
Living in rural areas	-0.004***	(0.001)	0.028**	(0.001)	0.163**	(0.002)	-0.187	(0.002)
Number of children aged 0–6 years	-0.002***	(.0003)	0.001**	(0.0003)	-0.004**	(0.001)	0.006	(0.001)
Aged 7–15 years	0.0001	(.0002)	0.001***	(0.0002)	-0.002**	(0.001)	0.001	(0.001)
Number of persons more than 65 years	-0.002***	(0.001)	-0.0001	(0.001)	-0.004	(0.002)	0.006***	(0.002)
Married	-0.018**	(0.001)	0.007***	(0.001)	-0.029**	(0.003)	0.041**	(0.004)
Household head (male)								
Female	0.001	(0.001)	0.010***	(0.002)	0.152	(0.004)	-0.163	(0.004)
Regional characteristics (high growth states)								
Medium-growth states	0.005***	(0.001)	-0.007***	(0.001)	0.023**	(0.003)	-0.021**	(0.003)
Low-growth states	-0.006***	(0.001)	-0.008***	(0.001)	-0.117	(0.003)	0.131	(0.003)

Notes: Text in parentheses is reference category. Figures in parentheses are standard errors. ***Denotes significance at the 1 percent level; **denotes significance at the 5 percent level; *denotes significance at the 10 percent level.

Table 5 Multinomial logit regression coefficients of participation in home-based work, men aged 16–64 years in India, 2004–5

	Home-based manufacturing vs. not in labor force		*Home-based non-manufacturing vs. not in labor force*		*Not home-based vs. not in labor force*	
	Coeff (β_1)	*SE of β_1*	*Coeff (β_2)*	*SE of β_2*	*Coeff (β_2)*	*SE of β_2*
Intercept	-15.191***	0.175	-13.063***	0.142	-10.551***	0.082
Age	0.638***	0.010	0.609***	0.008	0.633***	0.005
Age squared	-0.008***	0.0001	-0.008***	0.0001	-0.008***	0.0001
Level of education (above secondary school)						
Illiterate	3.016***	0.069	1.722***	0.050	1.990***	0.032
Literate	3.437***	0.074	2.061***	0.058	2.263***	0.038
Primary school	3.124***	0.068	1.849***	0.049	1.971***	0.030
Middle school	2.005***	0.066	1.196***	0.042	1.206***	0.024
Secondary school	1.051***	0.074	0.489***	0.045	0.468***	0.024
Caste/religion (forward castes)						
Scheduled castes	0.333***	0.055	-0.383***	0.046	-0.029	0.026
Scheduled tribes	-0.274***	0.078	-0.718***	0.060	-0.050	0.031
Other backward castes	0.670***	0.041	0.067**	0.032	0.041**	0.019
Muslim	0.519***	0.046	-0.235***	0.045	-0.034	0.025
Christian	-0.831***	0.112	-0.288***	0.071	-0.242***	0.036
Other religions	-0.700***	0.099	-0.101	0.061	-0.152***	0.036
Living in rural areas	0.373***	0.037	0.446***	0.031	0.422***	0.018
Number of children aged 0–6 years	-0.026**	0.013	0.027***	0.011	0.026***	0.007
Aged 7–15 years	-0.009	0.011	-0.017**	0.009	-0.008	0.006
Number of persons more than 65 years	-0.173***	0.028	-0.073***	0.022	-0.101***	0.013
Married	1.471***	0.054	1.401***	0.045	1.460***	0.027
Household head (male)						
Female	-0.550***	0.088	-0.169***	0.062	-0.051	0.029
Regional characteristics (high growth states)						
Medium-growth states	0.335***	0.039	0.269***	0.033	0.209***	0.019
Low-growth states	0.415***	0.043	0.402***	0.036	0.108***	0.022
Number of observations				192,125		
Likelihood ratio chi-square (df)				81,384.05		
Pseudo R^2						
Cox and Snell				0.2836		
Nagelkerke				0.582		
				0.703		

Notes: Text in parentheses is reference category. ***Denotes significance at the 1 percent level; **denotes significance at the 5 percent level; *denotes significance at the 10 percent level.

variables. The marginal effect reports the effect of a unit change in a variable on the probability of work participation holding all other variables constant at their mean values. (It is the derivative or the slope of the

prediction function.) The odds ratio is defined as the ratio of the odds of an event occurring in one group to the odds of it occurring in another group. In this paper, we present the marginal effect of variable on the probability of selecting each labor market status in Tables 4 and 6.

Marginal Effects of Wage offer variables

For women in India, we predicted a positive impact on participation in home-based work on all the variables that could have a positive impact on the wage offer for that work status, such as age, illiterate and lower levels of education, lower social status, and rural residence. Rising at first and declining later, age was found to have a non-linear relationship with the probability of labor-force participation in both statuses of work. The dummy variables for education at all levels showed a positive impact on the participation of women in home-based work but a negative effect on non-home-based work at higher levels of education, perhaps due to the income effect. These effects declined marginally in 2004–5 compared to 1999–2000. Women belonging to lower castes SC, ST, and OBC, and the Muslim community had a higher positive impact on participation in home-based manufacturing compared with other work. Women in rural areas had very low participation in home-based work compared with not home-based (Table 3).

The marginal effects for participating in home-based manufacturing work for illiterate women was 3.3 and for just literate 4.3 percent (Table 4). The marginal effect of being in such employment decreases consistently thereafter with each higher level of education, being only 1 percent for women with secondary school education. The marginal effect of women working in home-based, non-manufacturing work is lower than in manufacturing but also declines systematically with higher levels of education. The marginal effect of women working outside the home is not statistically significant with level of education. The well-known effects of income and social prestige are the declining participation of women in home-based work with increasing levels of education and not enough statistically significant impact on work outside the home. The better-educated women also belong to higher-income households, and social norms tend to reduce their participation outside the home.

The marginal effects of SC, ST, and OBC women participating in home-based manufacturing work was 1 and 1.5 percent respectively, while it was nearly 6 percent in work outside the home compared with forward castes (Table 4). These women coming from lower social, and perhaps economic, households have fewer restrictions on their participation in work outside their homes. The marginal effect of Muslim women in home-based manufacturing work was about 2 percent and had no statistically significant effect on participation in work outside the home. Due to social restrictions on their mobility outside the home, Muslim women tend to find such work

Table 6 Marginal effects of participation in home-based work, men aged 16–64 years in India, 2004–5

	Home-based manufacturing		*Home-based non-manufacture*		*Not home-based*		*Out of labor force*	
	Marginal effects		*Marginal effects*		*Marginal effects*		*Marginal effects*	
Predicted Outcome	0.023		0.046		0.874		0.057	
Age	0.001***	(0.0002)	.0006***	(0.0003)	0.032**	(.0005)	-0.034**	(0.0004)
Age squared	-.00001***	(0.000)	-.0001***	(0.000)	-0.0004	(0.000)	0.0004***	(0.000)
Level of education (above secondary school)								
Illiterate	0.036**	(0.003)	-0.009***	(0.002)	0.042**	(0.003)	-0.069**	(0.001)
Literate	0.047**	(0.004)	-0.007***	(0.002)	0.024**	(0.004)	-0.063**	(0.001)
Primary school	0.044**	(0.003)	-0.004***	(0.002)	0.024**	(0.003)	-0.064**	(0.001)
Middle school	0.025**	(0.002)	0.001	(0.002)	0.025**	(0.003)	-0.050**	(0.001)
Secondary school	0.0170***	(0.002)	0.001	(0.002)	0.004	(0.003)	-0.023**	(0.001)
Caste/religion (forward castes/Hindus)								
Scheduled castes	0.010***	(0.001)	-0.014**	(0.001)	0.003	(0.002)	0.002	(0.001)
Scheduled tribes	-0.004***	(0.001)	-0.023**	(0.001)	0.023**	(0.003)	0.004***	(0.002)
Other backward castes	0.016***	(0.001)	0.0005	(0.001)	-0.013**	(0.002)	-0.003***	(0.001)
Muslim	0.016***	(0.001)	-0.009**	(0.001)	-0.008***	(0.002)	0.001	(0.001)
Christian	-0.011***	(0.001)	-0.002	(0.003)	-0.002	(0.004)	0.015***	(0.002)
Other religions	-0.010***	(0.001)	0.002	(0.002)	-0.001	(0.003)	0.009***	(0.002)
Living in rural areas	-0.0005	(0.001)	0.002**	(0.001)	0.022**	(0.002)	-0.024**	(0.001)
Number of children aged 0–6 years	-0.001***	(0.0003)	0.0001	(0.0004)	0.002**	(0.001)	-0.001***	(0.0004)
Aged 7–15 years	-0.00002	(0.0002)	-0.0004	(0.0003)	-.00002	(.0005)	0.0004	(0.0003)
Number of persons more than 65 years	-0.002***	(0.001)	0.001	(0.001)	-0.005**	(0.001)	0.005**	(0.001)
Married	0.003***	(0.001)	0.002	(0.002)	0.0943	(0.003)	-0.099	(0.002)
Household head (male)								
Female	-0.009***	(0.001)	-0.005**	(0.002)	0.010***	(0.003)	0.004**	(0.002)
Regional characteristics (high growth states)								
Medium-growth states	0.003***	(0.001)	0.003**	(0.001)	0.005***	(0.002)	-0.011***	(0.001)
Low-growth states	0.007***	(0.001)	0.014	(0.002)	-0.014**	(0.002)	-0.007***	(0.001)

Note: Text in parentheses is reference category. Figures in parentheses are standard errors. ***Denotes significance at the 1 percent level, **denotes significance at the 5 percent level, *denotes significance at the 10 percent level.

through social networks. Micro studies also show that due to social restrictions home-based work provided an important avenue of work for Muslim women and a means for them to improve their status within the family (Zarina Bhatty 1987).

Women living in India's rural areas had a negative marginal effect of participation in home-based manufacturing work. The marginal effect of participating in non-home-based work was 16 percent, largely because women in rural areas undertake economic activities either on their own farms or others' farms (Table 4).

There was a positive and increasing impact of men participating in home-based manufacturing work at all levels of education in 2004–5 compared with 1999–2000. The effects were much higher for men than women in both years (Table 5). There was also a positive impact of men participating in home-based manufacturing among the lower caste groups (SC, ST, and OBC) and those belonging to the Muslim community.

The marginal effect of participating in home-based manufacturing work for illiterate men was 3.6 percent, and it increased to 4.7 percent with just literacy before declining with higher levels of education (Table 6). The marginal effect of men participating in home-based manufacturing was higher than women in all education groups except middle school. Further, the marginal effect of men participating in home-based work in India's non-manufacturing sectors was negative for men in the lower educational groups. The marginal effect of men participating in non-home-based work was much higher than that of women, while it was strongly negative for being outside the labor force at all levels of education, which probably simply reflects the social milieu.

The marginal effect of men participating in home-based manufacturing among India's lower caste groups was similar to that of women participating in home-manufacture, but much lower than women participating in work outside the home. This is difficult to explain, except to say that it is likely that the male participation in home-based work is mainly from these lower caste groups rather than the forward castes, who probably have better options. The marginal effects of ST participating in home-based manufacturing work was negative, indicating that such work has not yet penetrated into tribal areas (Table 6).

The marginal effect for Muslim men participating in home-based manufacturing work was 1.6 percent compared with Hindu men. The marginal effect of participating in non-home-based work for Muslim men was negative. The participation of Muslims in home-based work could be a reflection of the high proportion of self-employment among them and the traditional industries they are engaged in (Government of India [GOI] 2006). Christians and other religious groups did not participate in home-based manufacturing work (Table 6). This in some sense indicates that better education does provide access to better opportunities to work

outside the home even if certain jobs are rationed for workers belonging to certain religious groups. The marginal effect for men participating in home-based manufacturing work in rural areas was positive because of the predominance of agricultural activity undertaken outside the homes in India's rural areas (Table 6).

Marginal Effects of Fixed cost variables

All the variables related to household responsibilities that raised the fixed costs of working on site were expected to have a positive effect on working at home. These variables were the household composition in terms of children and old people. The results showed that having children below the age of 6 and elderly persons reduced the participation of women in home-based manufacturing work or made them withdraw from the labor market (Table 3). The participation of women who had children in the 7–15 age group and were married in home-based manufacturing was positive (Table 3). Women in female-headed households participated in home-based and non-home-based work as hypothesized.

The marginal effect of women with children in the 0–6 age group, women with elderly persons in the household, and married women on participating in home-based-work was negative. This could be due to their added responsibility of care for children and elderly, which would not allow them much time to engage in productive work. Having children between 7 and 15 years old marginally increased the probability of their participation in home-based manufacturing work as expected. It is possible that women begin home-based work after the children reach school-going age or are able to care for their younger siblings. The marginal effect of being married (3 percent), and having children between 0 and 15 years old (less than 1 percent) was negative for participation in work outside the home. This supports the hypothesis that as the fixed costs increase, women either participate in home-based work or withdraw from the labor market, meaning they do not participate in home-based or non-home-based work (Table 4).

The marginal effect of women belonging to households with a female head engaged in home-based non-manufacturing activity was 1 percent (Table 4). This probably reflects the need for female heads of household, who are the main earners of the household, to earn more income, as home-based manufacturing among women is one of the lowest-paid activities (Unni and Rani 2005).

Marginal Effects of Macro variables

We did not expect the high-growth states to follow a cost-cutting strategy involving engaging home-based workers, since the opportunities for growth in these states would be many-fold. The results showed that for

women, there was a positive impact of home-based manufacturing and non-manufacturing in medium-growth states. In low-growth states, the impact was negative in home-based manufacturing (Table 3). The marginal effect of being engaged in home-based manufacturing work for women was 0.5 percent in medium-growth states while it was negative in low-growth states. The marginal effect was 2.3 percent for non-home-based work in the medium-growth states (Table 4).

For men, participation in all kinds of work, home-based or non-home-based, was positive in both medium- and low-growth states (Table 5). The marginal effects were also positive though below 1 percent in all types of work except non-home-based work in low-growth states. This clearly indicated that high growth and predominantly developed regions meant more opportunities for non-home-based work for men (Table 6). High-growth states did not follow cost-cutting strategies as such, but work opportunities increased for both men and women. In some sense, these results do show a shift of work from factory to home for men in India's medium- and less-developed states.

The micro model thus provides evidence for India's increase in participation of men in the home-based manufacturing sector compared with women over the five-year period, as was observed earlier. It appeared that the probability of such participation of men was higher among the illiterate and poorly educated and in the manufacturing sector, rather than in the services sector. The probability of participation of the illiterate and women with low levels of education in home-based work was found in both the manufacturing and the non-manufacturing sectors.

It is difficult to explain this partial reversal of India's gender roles. Why would men opt for home-based work in manufacturing when it is really the women who are constrained in mobility by the social norms? We have to move out of the micro explanation of these choices and to a macro view to understand this phenomenon. As we argued earlier, home-based work is not an individual choice alone but is instead dictated by the exigencies of the market where, in the face of competition, certain industry groups are engaging in cost-cutting strategies. We observed that it was mainly the import-competing manufacturing industries that showed an increase in the share of male home-based work. Within this group, all machine-related industries – including those engaged in the manufacture of special and general machinery (increased share and growth) and the manufacture of electrical motors and television/radio transmitters (increased growth) – showed an increase in male home-based work (Table 1).

Researchers often argue that men's jobs are associated with working with certain tools and machines. The argument begins with supposed biological differences between men and women – such as women do not have the strength to operate some machines or a woman's monthly cycle is polluting and therefore she cannot work during that time – rather than any proven ability or inability (Naila Kabeer 1999). When the biological differences are

not translated into the social organization of production and labor, then the discourse shifts to "culture" based on social norms, and these are used to justify certain social sanctions. Most of India's import-competing industries noted above that engaged in the cost-cutting strategy of contracting to home-based work were manufacturing machinery. It is likely that these activities were socially and culturally more acceptable as men's work, and therefore when the opportunity arose or when the industry outsourced, they preferred male workers even when the activity was home-based.

MACRO DETERMINANTS OF SHIFT TO HOME-BASED WORK

The micro determinants of home-based work correspond to the choice of the individual, though we have tried to show (by introducing region dummies) that this choice is mediated through what is occurring in the economy at the macro level. Our argument is that home-based work in India does not emerge simply because women prefer to work at home, but because the economics of production necessitates forms of organization that are cheaper for firms to remain competitive in the new fast changing economy. In fact, as we noted earlier, there is an increase in men engaged in home-based work as well.

The Western literature presented in the conceptual framework mainly addresses the issue of home-based work as being synonymous with "home work" or subcontracted work at home. However, we have emphasized the need to broaden the definition of home-based work to include own-account work in the context of India and other developing countries. In the macro model, we consider home-based work as an organization of production and include hired and family workers participating in enterprises located at home within the definition of home-based work. The logic of such home-based work is not simply determined by the microeconomics of the worker's choice, though to a large extent women in India, dominated by the patriarchal systems, appear overwhelmingly to work at home. The micro model fits well.

India's economic reforms of the 1990s had very specific trade and industry policies that led to the growth of manufacturing industries. Given the limitations of addressing the determinants of home-based work from a purely micro perspective, we present below a simple macro model to analyze to what extent the economic policies led to a shift toward home-based work. The dependent variable in our regression equation is measured as a percentage point increase in the share of home-based workers in the unorganized manufacturing sector during the recent rapid phase of economic reforms, 1994–5 to 2000–1. The dependent variable is constructed separately for total, male, and female home-based workers. As discussed above, workers include family and hired production workers as

well as owner proprietors and managerial and supervisory staff. The analysis is undertaken for a cross-section of fifty-four industry groups at the three-digit industry level. Independent variables are constructed to proxy for the growth of value added and capital intensity of the industry, and the growth of wage rates, trade policy, and industrial policy.

Growth of value added

The growth of the industry is measured by the annual percentage growth of value added computed for each three-digit industry group. The growth of value added in an industry could lead to an increase in total employment, but the rate of growth of home-based work could be faster or slower than that of all workers. If the industry followed a cost-cutting strategy to employ home-based workers, the change in the share of home-based workers would be positively related to the growth of value added. A negative relationship would then mean that the industries do not follow cost-cutting strategies involving the use of home-based workers but rather follow a technology strategy to enhance productivity per worker.

Capital intensity

The growth of employment in India's industry and consequently home-based workers is mediated by whether the growth of the industry is labor intensive or capital intensive. We computed the growth of the ratio of fixed capital to number of workers to proxy for growth of capital intensity in an industry group. We hypothesize that a more capital-intensive industry would not increase its share of home-based workers, and hence, we expect a negative relationship between growing capital-intensity and a change in the share of home-based work.

Growth of wage rates

We have computed the growth of wage earnings per worker in the unorganized manufacturing sector. We hypothesize a positive relationship between the rise in wage earnings per worker and a change in the share of home-based work, through the substitution of the cheaper source of labor for more expensive labor.

Trade policy

A number of changes occurred in trade policy in recent years, mainly reducing the tariff barriers and also some NTBs. Ideally, we should depict trade policy through an index of reduction in such barriers. However, it is difficult to construct a variable for a reduction in trade barriers. We have

obtained proxies for the tariff barrier and NTB from the World Bank data set (Alessandro Nicita and Marcelo Olarreaga 2006). The tariff barrier for 1997 is the import-weighted, average tariff rate applied on goods entering the country, which takes into consideration the available (not complete) data for preferential schemes. In constructing the average, the applied average tariff takes the tariff rates for each partner that exports to the market country. The NTB represents the simple average of ad-valorem equivalent of core NTB for HS 6-digit-level data in 1997. The core NTB includes price-control measures, finance-control measures, and quantity-control measures.

The tariff barrier is a measure of the additional cost of importing commodities or the protection given to the industry that manufactures those products. If an industry group has a higher tariff barrier, then there are greater chances of growth of the industry. A higher tariff barrier could imply lower home-based work since the industry would be more protected from foreign competition. A higher NTB would also mean more protection for the industry and hence less need for the cost-cutting strategy of home-based work. Both trade variables can be hypothesized to have a negative effect on growth in the share of home-based work.

Industry policy

The industry policy reforms were largely geared toward relaxing controls on the manufacturing industry through licenses and the reservation of products for public-sector or small-scale industry. The policy reforms included the de-licensing of certain industries, removal of restrictions on private sector entry into specified industries, and changes in the list of industries reserved for the small-scale sector. It is difficult to construct one indicator for all these policies. We have constructed a proxy variable by taking into consideration the value added of the industries in the manufacturing sector that the government added to the reserve list in 2001.[5] We created the industry policy variable by identifying the industries that were reserved in 2001 at five-digit level. Then, we calculated the percentage share of value added in these industries at the three-digit level (for the fifty-four industry groups used in the macro model). Reservation in an industry group implies more protection to small-scale industries, and since we assume that these industries are less likely to subcontract to home-based workers, we expect a negative relationship.

EMPIRICAL RESULTS OF MACRO MODEL

We have estimated simple OLS regression equations for the change in the share of home-based workers in India among all workers separately for male, female, and total home-based workers.

Change in the share of home-based work among production workers

The regression equations for the determinants of a shift toward (or away from) home-based work in India are statistically significant for total and male workers but not for female workers (Table 7). The variables included explain about 30 percent of the variance for total home-based workers and 24 percent for male home-based workers. The significance of the independent variables was assessed based on the standard errors. As we discussed earlier, the micro model appears to explain the choice of home-based work for women, while the macro model is not statistically significant. Further, the historically high level of women home-based workers indicates that India's economic reforms did not really affect their size or their share. The macro model estimated here further confirms that the macro indicators considered, including the trade and industry policy variables, do not have a statistically significant impact on women home-based workers.

Growth in value added was not a statistically significant determinant of the shift toward home-based work in India's manufacturing industry. However, the growth in capital intensity had a significant negative impact on male and total home-based workers. A 1 percent growth of capital intensity resulted in a 7.6 and 6.6 percentage point decline in the share of total and male home-based work. This implies that the industries following a technology-intensive strategy relied on increasing productivity per worker

Table 7 Determinants of change in share of home-based work among all workers, 1994–5 to 2000–1

	Total		*Male*		*Female*	
	Coefficients	*SE*[a]	*Coefficients*	*SE*	*Coefficients*	*SE*
Intercept	-9.316**	4.662	-8.839*	4.698	-7.890	10.000
Growth of gross value added	-0.204	0.145	-0.153	0.146	-0.385	0.312
Growth of capital labor intensity	-0.761***	0.155	-0.661***	0.156	-0.556*	0.332
Growth of wage rate	1.479***	0.484	1.406***	0.488	0.810	1.038
Weighted applied tariff 1997	0.037	0.082	0.046	0.083	0.078	0.176
Non-tariff barrier 1997	-5.714	17.999	5.943	18.139	-13.376	38.609
Share of value added in reserved industries 2001	0.008	0.059	-0.042	0.059	0.015	0.127
Adjusted R square	0.308		0.243		-0.034	
F statistic	4.939		3.839		0.712	
Number of observations	54					

Notes: ***Denotes significance at the 1 percent level; **denotes significance at the 5 percent level; *denotes significance at the 10 percent level. [a]Figures in SE columns denote standard error.

and not on the cost-cutting strategy of outsourcing work to home-based workers. Further, as hypothesized, an increase in the cost of hired labor in the industry had a positive and statistically significant impact on the shift toward male and total home-based workers. A 1 percent increase in the growth of real wage rates led to a more than 14 percentage point statistically significant increase in the share of total and male home-based work. That is, the shift to home-based work was used as a cost-cutting strategy, given the capital intensity and growth of the industry in certain industry groups. The industry groups faced with a rise in the wage earnings of hired labor were substituting cheap home-based workers for expensive labor.

The proxies for trade and industry policy were not statistically significant determinants of total and male home-based workers. The industries with no protection through tariff and NTBs or the reservation policy had to maintain the quality of the products and also perhaps were more technology intensive and therefore did not resort to subcontracting to home-based workers.

As noted earlier, female home-based workers in India were not statistically significantly affected by the macro determinants, including trade and industry policy variables. It is therefore an economically statistically significant result that total and male home-based workers were more likely to be affected by the macro determinants resulting from economic reforms, while the already high proportion of female home-based work remained more or less unaffected. Even if our proxies for trade and industry policies were not statistically significant, these policies' indirect impact on growth of capital intensity may have led to the significant negative impact on total and male home-based work.

CONCLUSION

The economic reforms in India have led to an expansion of markets and the entry of globally competitive conditions. The easing of licenses and trade liberalization brought in better technology and increased capacities for production. We see the growth of home-based work within this context of changing macroeconomic policies. The organized sector output and employment grew during the late 1980s and early 1990s and tapered down in the late 1990s, largely due to recession. A number of policies that apparently did not favor small-scale industries, such as a reduction in tariff barriers and de-reservation, were introduced during the late 1990s. These policies actually enabled the inflow of technology and brought about a growth of small-scale enterprises in the informal sector, which resulted in growth of output and employment in the unorganized manufacturing sector.

India's trade policy reforms had an impact on industries, and they could be divided into export-promoting and import-penetrating industries. Overall, India's export-promoting industries showed a decline in the share

of home-based work, and the absolute number of home-based workers grew due to the overall growth in the sector. The reforms had a direct, positive impact on the apparel and chemical-products industries, which had a large share of women in general and home-based work in particular. An increase in male home-based work was observed in import-penetrating industries. Industries engaged in the manufacture of general purpose machinery, special purpose machinery, and TV and radio equipment perhaps faced severe competition from imports and engaged in the cost-cutting strategy of increasing the share of male home-based workers.

At the micro level, the decision to participate in home-based activities was determined by illiteracy and low levels of education. It was also largely influenced by the households' socioeconomic situation, such as belonging to lower castes and Muslim households. The fixed cost effects showed that the participation of women in home-based work was higher among women with children of school-going age (7–15 years), as compared with women who had younger children and were more likely to remain outside the labor force. Married women's participation in home-based work was lower perhaps due to the income effect, but women belonging to female-headed households had higher participation rates. The micro determinants of home-based work better explains women's participation in such work. Also, women's home-based work was of a very high proportion over a long period and was less affected by the macro variables capturing economic-reform measures.

A simple macro model to analyze the determinants of the increase in the share of home-based work in India showed a positive impact of growth in wage rates, implying that the shift to this form of production organization could be a cost-cutting strategy. Increase in capital intensity had the opposite or a negative impact on home-based work. The proxies for trade and industry policies did not affect total or male home-based work.

The gender differential in the determinants of home-based work in India is brought out clearly in this paper. The historically higher share of women in home-based work, which did not show much increase in the period of reforms, implies that female participation in such work was more likely to be determined by the cultural milieu than by the recent liberalization process. Further, while the micro model of social determinants appear to fit the female home-based work equation, coefficient estimates were statistically insignificant for female home-based workers in the macro model. For male home-based work the coefficient estimates of most of the determinants of such work were statistically significant in the macro model, which leads us to conclude that the economic reforms had an impact on this form of production organization among men.

The importance of the macro determinants of home-based work among men explains the paradox of why only men's home-based work increased when we expected women's home-based work to increase, given that

women were constrained by immobility. The conclusion is that while women may individually choose home-based work in India due to social compulsions, men did not choose but were chosen for home-based work by the larger economic exigencies played out at the macro and industry levels. The increase in male home-based work with rising economic growth could also be a reason for increasing income inequalities, as the incomes earned through such activities are substantially lower than in the new on-site jobs that are created in the highly productive services. This lower wage of home-based work would have an impact on household income and also on women, who would have to participate in the labor market due to low household incomes.

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NOTES

[1] The names of the authors are in alphabetical order.

[2] The relationships are argued to be exploitative as the wages paid are very low, sometimes half that of a regular wage, and they do not receive social security or any other benefits, such as sick leave, paid leave, medical insurance, old age pension, and provident funds. These workers are not well organized, which weakens their bargaining power. The wages paid to these workers are piece-rated and not on fixed time, which allows for further exploitation compared to those hired on a regular or casual basis.

[3] There is a small probability that since the codes devised in the two surveys were different, the data were not perfectly comparable. However, given the lack of any other source of data on home-based workers for more than one time point, we analyze these estimates with caution.

[4] Scheduled Castes (SC) are the former untouchable castes. They are economically the weakest and historically subjected to discrimination and deprivation. In addition to the caste system, India has been home to several tribes that have been similarly designated (Scheduled Tribes). The Other Backward Castes (OBC) are the erstwhile Sudra jatis, who were not targets of untouchability, but their social and economic position was close to that of dalits (Untouchable Castes). OBC are supposed to capture the jatis that have been described in the constitution as "socially and educationally backward classes" (Ashwini Deshpande 2005: 3). The use of the word "backward" is a hangover from the British period, when terms such as "backward classes" or "depressed classes" were used. There has been considerable debate, even during the British period, whether reservations (preferential treatment) should be extended to the OBC as they have not suffered the stigma of untouchability. In a number of states in British India, education benefits were given to OBC and in some of the major states, such as Madras, Bombay, and Mysore, preferential treatment was given to OBC that included reservations and welfare schemes (Ashwini Deshpande 2005: 11). The preferential treatment during the British period was extended to low castes as well as classes, indicating their low social and economic situation. Since independence, caste groups have been clustered in broad categories and identified in a government schedule as beneficiaries of affirmative action – Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Castes (OBC), and Others (Forward Castes) (Ashwini Deshpande 2007: 739).

[5] The products under the "reserved list" are for the exclusive production of small-scale industries, and they get complete support for raw materials and subsidized finance from the government.

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