

**LABOUR MARKET
PAPERS**

15

**Is child labour
really necessary
in India's carpet industry ?**

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Foreword

Child labour has been around since the beginning of time. As a policy issue, however, its elimination has taken on greater importance in recent years. It has also become a major priority for the ILO and the Labour Market Policies Branch. There is little question that the existence of child labour has undesirable long term effects on labour markets, poverty alleviation, welfare and economic development. This has become especially important in the information age where knowledge and skilled labour are so important.

One very important – yet neglected – area of research and action on child labour has been the role played by child labour in the economics of the industries which make extensive use of child labour. To date virtually all work on child labour research and action have focused on the child and his/her family. While this emphasis is justified, it is also clear that the demand for child labour by industries and employers also plays an important role in the perpetuation of child labour. It is for this reason that the present study is so welcome. Indeed, this study – with its use of quantitative enterprise surveys – is in many ways a path breaking piece of work.

We wish to thank Mr. William E. Myers (formerly ILO, Geneva) and Mr. M.E. Khan of the Population Council in New Delhi for their constructive comments which were taken into consideration.

This paper provides a contribution to the continuing work of the Labour Market Policies Branch on both child labour issues and enterprise behaviour.

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Abstract

There are believed to be millions of children under the age of fourteen working in India. The carpet industry alone employs many young boys who make handknotted rugs primarily for export. The use of children is often said to be necessary to produce quality carpets as well as keep manufacturing costs low in order to keep carpets at a competitively low price on the international market. There has been, however, little or no hard evidence to support or refute these beliefs. This study – which investigates these issues using a survey of 362 carpet weaving enterprises in India – differs from previous studies of child labour by considering child activities from the perspective of the industry (labour demand) rather than from the perspective of the child and his family (labour supply). The study describes how children work in the “Carpet Belt” of the northern state of Uttar Pradesh and examines the irreplaceability of child labour as well as the relative cost advantage of using child labour. The sample survey of enterprises is supplemented with in-depth case studies of employers, exporters, and U.S. importers. The economic implications for the carpet industry of enforcing the child labour laws depend on how costly replacing child workers with adults would be. This paper looks at (i) the types of enterprises and owners using child labour; (ii) the indispensability/irreplaceability of child workers by analyzing which types of carpets children and adults weave; (iii) the relative productivity of child and adult workers by analyzing the actual output of adults and children; and (iv) the possible increase in production cost which would result from eliminating child labour. It is found that (i) the incidence of child labour is positively related to the size of the looming enterprise and while quite substantial with children comprising around 20 per cent of weavers, this is a lower estimate than often cited in the media; (ii) child labourers are replaceable by adult workers in a technical sense (i.e the nimble fingers argument is rejected); (iii) that child and adults have similar productivity; and (iv) there is a competitive cost advantage to hiring child labour with its magnitude relatively small for industrialised country sellers and consumers but relatively large for poor loom enterprise owners.

1. Introduction

There are believed to be millions of children under the age of fourteen working in India. It is commonly believed that the use of children is necessary to keep manufacturing costs low and quality high, for example in order to keep carpets at a competitively low price on the international market. A U.S. case study presented below implies a high degree of competitiveness in the international market for handknotted carpets. It is also commonly believed that children are able to weave higher quality carpets than adults because their fingers are more "nimble". A study was initiated in 1993 by the International Labour Office (ILO), in collaboration with the Centre for Operations Research and Training (CORT), to determine whether children are indeed "indispensable" to the Indian carpet industry. It also has wider implications regarding appropriate methodology for analyzing the use of child labour and international trade policies.

This study differs from previous studies of child labour by considering it from the perspective of the industry rather than that of the child and his/her family. Much of the child labour literature focuses on determinants of child work and considers factors such as family size, family income, parental education levels, and access to schools. Generally labour demand factors are ignored, in spite of their theoretical importance. In contrast, our study, carried out in 1993, provides a comprehensive understanding of the economics of child labour in the "Carpet Belt" of the northern state of Uttar Pradesh. Our sample survey of employers is supplemented by in-depth discussions with weavers, employers/loom owners, and exporters in India and by a case study of U.S. importers. This information allows us to assess how far child labour can be replaced by adult labour and the impact of such a substitution on the total output, quality, and prices of new handknotted carpets.

The sample survey was fielded in over 35 villages and two districts of Uttar Pradesh, Mirzapur and Sonbhadra, in an area of India which produces almost 80 per cent of Indian carpets. Data were collected for 362 enterprises, including both household enterprises and larger commercial enterprises. In addition to enterprise information from the owner/employer, detailed information was collected for 772 looms and many more workers, since usually three to five boys and/or men work on one loom. (Very few women and girls work in this almost exclusively male industry.) Data were collected about each weaver, including the quality of the carpet on which he is working in terms of knots per square inch, type of wool used, and difficulty of the design. We also found out if the weaver fell into the category of "child" (definitely under age 14), "probably child," or "adult" (definitely age 14 or over).¹

Although workers are described as "weaving," in fact the process could be described more accurately as "knotting." It involves making many small knots very quickly. Average quality carpets in our study have about 165 knots per square inch. Carpet qualities vary considerably across employers and across looms. Our results suggest that boys are not, in fact, weaving finer quality carpets than are adults. Also, information collected during revisits to some of the enterprises allows us to estimate levels of productivity of children and adults. This unusual data will improve our understanding of the degree of substitutability between children and adult weavers.

Although the impact of enforcing India's child labour laws is of great interest to the carpet industry, as well as to those concerned about India's trade balance and its accumulation of foreign exchange, other issues are of more fundamental interest here. Study after study in the

¹ Age categorization of weavers is discussed below.

supply-side child labour literature asserts that children are used to produce various products because they have greater dexterity – and thus higher productivity – than adults. We are able to test the hypotheses that children have irreplaceable skills and/or are more productive than adults. To the extent that our findings do not support the “nimble finger” assertion in the case of carpets, doubt is thrown on the validity of the “nimble fingers” assertion for other products which children help to produce. Employers and others lose one of their favorite arguments for justifying the use of child labour. Child labour often exists side-by-side with high levels of adult unemployment and underemployment. If adults are shown to be equally or more productive than children in a given industry, Third World governments may reconsider their tolerance of the industry’s employment of children at the expense of jobs for adults.

In summary, this paper will use these unique survey and case study data to investigate (i) the types of enterprises and owners using child labour; (ii) the indispensability/irreplaceability of child workers by analyzing which types of carpets children and adults weave; (iii) the relative productivity of child and adult workers by analyzing the revisit data on production; and (iv) the cost of eliminating child labour. The organization of the paper is as follows. A description of the handknotted carpet industry is followed by a brief discussion of the multiple incentives which promote the use of child workers. The survey of enterprises from which our data derive is then described. The results are then discussed in order of the issues listed above. A section on who employs child workers addresses point (i), and a section on the types of carpets woven by children and adults addresses point (ii), as does a discussion of skill acquisition. Next, issue (iii) is addressed in a section on the relative productivity of children and adults. This is followed by our estimates of labour costs and employment levels in carpet production. The paper ends with a discussion on the cost of eliminating the use of child workers in the carpet industry and comments about the policy implications of our findings.

2. Description of the handknotted carpet industry

The production process. Most carpets begin with an agreement between an Indian exporter and a foreign importer. The contract specifies the design, colour, size, and quantity of carpets to be delivered by a specified date. The exporter, through a contractor – who might or might not be his employee – subcontracts the weaving of the carpets to small enterprises, which are primarily located in isolated rural villages. The loom owner is provided with the design on graph paper and the required wool and cotton, which are already dyed.² At this point, the loom owner usually receives an advance of between 50 and 100 per cent of the payment for the weaving. Of the total weaving charges, 75 per cent goes to the weavers and 25 per cent is kept by the loom owner. It should be noted that it is typical for the loom owner to weave as well as provide the loom and supervise the other weavers.

The wool used to make carpets is primarily imported from New Zealand and Australia. Local distribution of wool and cotton is done from depots set up near villages where weaving takes place; according to our data, about half of the weaving enterprises are within 3 kilometers of a depot. The “depot-in-charge” runs the depot and checks on the progress of the carpet approximately every 15 days in order to ensure adequate quality and on-time completion of the carpet. For his services, the depot-in-charge typically receives a payment equivalent to 5 to 15 per cent of the weaving charges. Because it can take 15 to 40 days to weave one square yard of a

² Dying is either done by the exporter or subcontracted to a big wool-dying firm, or already-dyed wool is purchased by the exporter.

carpet (depending on its quality), and because of the generally large size of Indian carpets (78 square feet on average in this study), one loom may only produce 2 or 3 carpets per year. When the carpet has been woven, the depot-in-charge delivers it to the exporter, who takes on the responsibility for the finishing work. Finishing includes cutting ("shearing") to make the carpet level or smooth; "poking" or "cotton-picking" to remove cotton threads which are visible; stitching the carpet's sides ("fringe-binding"); washing the carpet with caustic sodas and other chemicals to set the colours and add sheen; stretching the wet carpet into shape; and putting glue on the carpet's back to harden it. In addition, for better-quality carpets any defaults in the regularity of the woven design are straightened, line-by-line, with a hammer and chisel.

Throughout the production process, males dominate the handknotted carpet industry's labour force. From weaving to finishing to exporting, men and boys perform each task; women are almost completely excluded from employment in this industry. The few observed exceptions were girls from Nepal, brought to India to weave Nepalese-style carpets, and Indian women working in one-loom family enterprises.

Capital inputs to production. There is very little capital investment in this industry; labour is a high proportion of total production costs. Production of handknotted carpets would appear to be an ideal industry for a country rich in unskilled labour relative to capital. Looms are usually purchased for Rs. 3000 to 8000 (depending on the loom size) with a loan from an exporter.³ Looms last for many years, perhaps 50 years, and do not require much maintenance. The only other equipment required is a metal knife costing Rs. 8 to 10 for each weaver (to cut the knots) and a metal claw costing Rs. 50 to 60 (less than US \$2) for each loom (to pack down the completed line of knots). The only other significant capital investment arises if it is necessary to construct an additional structure to house looms which do not fit in the small family dwelling. These structures are typically made of mud and wood and thatching; they are estimated to cost Rs. 1400 to 4000, depending on how much of the labour and materials are provided without cost by family members.

Land must be available for such a structure; land costs in the study area range from Rs. 500 to 2000 per square foot, with 200 to 300 square feet required for a structure.

Characteristics of the region. Uttar Pradesh is a very large state which stretches along India's northern border with Nepal and Tibet. It approaches Kathmandu in the east and reaches Delhi in its western end. It includes many extremely poor districts as well as relatively prosperous districts around Delhi. The area in which the carpet industry is located is in the southeastern corner of Uttar Pradesh, one of the poorer regions of the state. The heart of the Carpet Belt is in the Bhadohi-Mirzapur area and surrounding districts. This study includes the district of Mirzapur, with its well-established tradition of carpet weaving, and Sonbhadra district, which has been a target of carpet industry expansion in recent years. We estimate that the Indian carpet industry employs around 600,000 workers, of whom the majority live and work in the Carpet Belt in Uttar Pradesh. This implies that approximately one per cent of the state's labour force works in the carpet industry.

Characteristics of weaving enterprises. Although we refer to weaving "enterprises" in this discussion, in fact many small enterprises are no more than a household with a loom in its one-room cottage, and possibly a second loom in an attached veranda or a shed. Male family members, including children, often provide much of the labour in these very small enterprises.

³ 91 per cent of loom owners surveyed had taken out loans from an exporter to buy their looms.

The use of child family members as weavers in a family business is, in fact, legitimate, as is the use of children in cottage industries as defined by the Factories Act of 1911. The Factories Act influenced the current structure of the carpet industry: the costly health, safety and labour regulations to which large enterprises are subject do not apply to the cottage system of production. Only a small proportion of enterprises – 7 per cent of all enterprises in our sample, or 4 per cent of the weighted sample – have five or more looms. The “employers” (or heads of the households) are typically poor men who never attended school (77 per cent) and who themselves began weaving before the age of 14 (55 per cent). Sixty-six per cent of them also cultivate their own land. Although weaving used to be a primarily Muslim occupation, only 20 per cent of employers in our sample are Muslim; almost all of the 80 per cent who are Hindu belong to a low caste, scheduled caste, or scheduled tribe. All the employers are male, without exception.

3. Incentives for using child labour

Families, employers, exporters, and the government have a number of mutually compatible incentives to use child labour and to resist its abolition. Because these motivations have been discussed at length in the child labour literature, we will present them very briefly here.⁴

Poverty of families. Poor families are said to rely upon the earnings of children to help provide food and other necessities. Weiner (1991) documents what he portrays as a near-universal belief among educated Indians that child labour is a “harsh reality” of life among the poor, where children must work to support themselves and their families. However, this argument is circular to some extent. Especially in a context where the concept of childhood is not a familiar one⁵, poor men and women may prefer to have many children because of the economic security they provide to their parents. Many contributors to the “value of children” literature argue that developing country parents have many children in part because children – at least male children – provide a net economic benefit to the family.⁶

Training. Carpet weaving takes a certain amount of skill. Training as a weaver might be considered to be an apprenticeship for a lifelong occupation. This argument is sometimes taken further, when it is argued that this training *must* be received at an early age if the skill is to be adequately mastered.

A lack of alternatives. Public schools in parts of rural India are of notoriously poor quality; and many poor parents do not see the value of such schools. India invests relatively little in public primary schools, instead spending a greater proportion of educational funds at the secondary and university levels. In the villages we surveyed, villagers reported that teachers often do not even show up to hold classes.

The nimble fingers argument. Children are said to be better weavers than adults because of the dexterity of their “nimble fingers”. They are said to be able to make knots faster than adults. Children are also thought capable of making very fine carpets which adults cannot produce, with as many as 400 knots per square inch, for example. The first part of the nimble fingers argument implies that children have higher relative productivity, while the second part implies that they have a unique skill.

⁴ See, for example, Bequele and Boyden (1988), Myers (1991), Rodgers and Standing (1981), or Weiner (1991).

⁵ Ariès (1962) has researched the social construction of childhood.

⁶ See Mueller (1976) and Repetto (1976) for a discussion of this argument.

Wages. There is some evidence that children receive lower piece rates than do adults. While apprentices receive reduced wages during a number of months or years, even children who are fully trained may receive lower piece rates. This is almost certainly true of bonded workers. In general, children in India have been found to receive wages and piece rates which are about half those of adults.⁷

The docility of child workers. Employers are better able to enforce certain behaviors among child workers than among adult workers. For example, children will work longer without taking breaks, and they are less likely to miss days of work. Employers' ability to require certain behaviors is especially great in the case of children who are bonded workers.

Internationally competitive pricing. India competes in the world market for handknotted carpets with other major producers included in Table 1: Iran, the People's Republic of China, Pakistan, Turkey, and Nepal. In 1992 India produced 18 per cent of the total value (in dollars) of carpets imported into other countries. Most handknotted carpets are ultimately purchased by consumers in the European Economic Community (EEC), Switzerland, and the United States. Our case study of carpet importers and retailers in the United States suggests that buyers are responsive to small price differentials between countries' products. To the extent that the use of child labour keeps production costs lower than would be otherwise possible, it provides a competitive advantage in the world market. Unless there is a difference in the number of errors committed (resulting in more or fewer flawed carpets) a producer who employs more expensive adult labour may be at a competitive disadvantage.

Export revenue and foreign exchange. The handknotted carpet industry exported Rs. 10.8 billion or almost US \$350 million in 1992, generating a sizeable amount of export revenues for India.⁸ Making handknotted carpets has been a craft in India since the 16th century, but until recently production has been relatively low (Gans-Ruedin, 1984: 14-17). It was not until the 1970s that the Indian handknotted carpet industry began to grow rapidly, a pattern which has continued into the 1990s. Table 1 gives recent production of handknotted carpets by the world's major producers (exporters) and purchasers (importers). India's exports in the 1990s are undervalued in compared to exports in previous years, due to a devaluation of the Rupee; production in fact continues to expand to a greater extent than suggested by Table 1. The resulting export revenue is an important source of India's foreign exchange.

4. Enterprise survey

The sample. The survey of enterprises was fielded in the Mirzapur and Sonbhadra districts of Uttar Pradesh in May, June, July, and October of 1993. The sample frame was based on 3 blocks from the 1981 population census of India. Forty-three villages of different sizes were chosen by a combination of random and purposive selection. In each village, local key informants were used to identify all the carpet weaving enterprises of different sizes in that village. Enterprises were then sampled randomly with replacement within enterprise size strata of 1, 2, 3-4, and 5+ looms. Because large enterprises with many looms were relatively rare, and because we had reason to expect large enterprises to use more child labour than small

⁷ See, for example, Nangia (1986) and Mehrotra (1965).

⁸ Calculated at the 1992 exchange rate of Rs. 31 to the dollar (U.S. Department of Labour, 1993).

enterprises, the larger enterprises were oversampled.⁹ Table 2 shows the distribution of the 362 enterprises sampled according to the enterprise size strata.

The small team of highly trained Indian interviewers encountered a considerable amount of reluctance on the part of many loom owners, who were aware of recent negative publicity about the use of child labour in the carpet industry and were afraid to answer questions. Loom owners in some villages had been told by exporters' agents not to answer any questions. The interviewers were in most cases able to overcome the potential interviewee's reluctance by a combination of friendly conversation and the intervention of local contacts.

Design of the survey. Because we had anticipated the extreme nervousness and defensiveness in the carpet industry about the use of child labour, the enterprise survey was designed to avoid any direct questions about child workers. Interviews with weavers were out of the question, as we could not expect workers to truthfully report information on age in the presence of their employer. Moreover, illiterate workers often do not accurately know their own ages, one of the key variables of interest. Instead, the survey was designed to gather information through interviews with loom owners and through the interviewers' direct observations in the work places. In particular, interviewers took note of the sexes and ages of the weavers on each loom. They also recorded the absence of workers, which could be easily detected by gaps at looms where workers should have been weaving. We had anticipated that child workers might be sent away from their looms when strangers were known to be approaching, to hide the fact that child labour was being used; thus, noting the absence of workers was important in this study.

Under Indian law, "children" are defined to be persons under age 14. In order to increase the accuracy of their estimates of the ages of observed weavers, the interviewers were trained by child development specialists to observe physical developmental characteristics and to associate them with children and adolescents of different ages, taking into account the usual degree of malnutrition in the area. Interviewers then placed observed weavers into one of three age categories. Those clearly over age 14 were assigned to the "adult" category and those clearly under age 14 were assigned to the "definitely child" category. Weavers who were probably under age 14 but could conceivably be over age 14 were assigned to a "probably child" category. Upon completion of the survey, interviewers retrospectively estimated that about 75 per cent of those in the "probably child" category were under age 14 and about 25 per cent of them were age 14 or over. Table 3 shows the distribution of weavers by these observed age and sex categories: almost all the weavers are male, and 74 per cent are adults, 18 per cent fall in the "probably child" category, and 8 per cent are definitely children. Interviewers also estimated that approximately half of the "absent" weavers were children who had been sent away due to the presence of outsiders or who were out of their seats and gathered around the interviewers. These age categories and interviewer estimates are used to construct multiple measures for the presence of child weavers; these measures are discussed below. A first approximation, however, may be made by assuming that three-quarters of those in the probably child category are under age 14; in that case, an estimated 21 per cent of carpet weavers are children.

Information about the average piece rates and earnings of weavers was gathered from loom owners. It was not possible, however, to determine the individual wages of children who are working as so-called "apprentices." In particular, we do not know which children are bonded

⁹ Results which aggregate across firm sizes should be weighted according to the probability of appearing in the sample. Some of these results are, however, unweighted. Weighting leads to slightly lower proportions of child weavers relative to adults.

workers – children from other districts or states whose parents are paid a flat fee and promised monthly wages in exchange for the child's services. Bonded workers are most likely to work long hours for low pay. However, since the use of bonded workers is illegal in India and recent media publicity has made most exporters aware of international pressure to stop the use of bonded child workers, we felt that even to ask about child or apprentice earnings could have jeopardized the study.

When loom owners agreed to cooperate, further information was collected for weavers on up to two looms per enterprise in order to obtain a measure of productivity for those weavers. In this case, weavers' positions on their assigned portions of the carpet were marked at the time of the interview, and interviewers returned two days later to measure the progress made in the intervening time period.

5. Who employs child weavers?

Table 4 presents the distribution of the 2130 observed weavers by age categories and sex among enterprises of different sizes (that is, different numbers of looms). The column per centages show that the weavers in the "definitely child" and "probably child" categories are most concentrated in enterprises with one and two looms. The row per centages show that the largest enterprises, with 5 or more looms, rely the most heavily upon child labour.

Two other measures of the number of children per enterprise or per loom are used in this analysis. The first, using definition (a), includes all weavers in the "definitely child" category plus 75 per cent of those in the "probably child" category. The second, using definition (b), adds 50 per cent of the absent workers to measure (a). Together these measures provide a realistic range within which we expect the true number of children to fall. The second and third columns of Table 5 present the per centage of children in enterprises of different sizes using both measures of children. There is a strong positive correlation between the size of the enterprise and the proportion of its weavers who are children. The proportion of weavers who are children increases from 12-14 per cent in 1-loom enterprises, to 27-33 per cent in enterprises with 5 or more looms. On average, 17-22 per cent of weavers are children.

Two other ways of examining how child labour is used in weaving enterprises are presented in the last columns of Table 5. The per centage of enterprises with one-third or more child weavers and the per centage of enterprises with any child weavers are reported for child measures (a) and (b) and for the enterprise size categories. From these results, it becomes clear that larger enterprises rely much more heavily upon child labour than do 1- and 2-loom enterprises. While only 4 per cent of the largest enterprises do not use child labour, 52-59 per cent of 1-loom enterprises function without using any child weavers at all.

This result is somewhat surprising, as one might expect household enterprises to depend upon children in the family to do some weaving. Table 6 shows that the smallest firms are indeed the most likely to rely upon family members to weave, and they are the least likely to hire weavers from the village or from other areas. However, only 17 per cent of the employers/loom owners have children who worked as weavers in the past 12 months. This is explained in part by the young average age of the loom owners (33 years). These loom owners have an average of 3.8 children but only 1.7 sons, many of whom are too young to weave. In contrast, enterprises with more looms are more likely to use child weavers who are hired from the village and surrounding area or who are "imported" from outside the area specifically to weave (see Table 6).

6. Types of carpets woven by children and adults

In order to investigate the irreplaceability of child weavers, it is necessary to analyze which types of carpets children and adults weave. To what extent are children working side-by-side with adults? Do children ever produce the vast majority of any type of work, especially the more skilled work? If children dominate in highly skilled tasks, we will conclude that children may have unique skills and thus may not be easily replaced by adults. If children dominate in less skilled tasks, the implications are somewhat ambiguous but are more likely to indicate a sorting of tasks by skill levels. That is, it makes sense to use the least-skilled workers on the tasks requiring the least skill.

The quality of a carpet can be evaluated along a number of dimensions. We will focus on two dimensions in this analysis: knots per square inch and the complexity (difficulty) of the carpet's design. Other dimensions include the quality of wool used; the type of dye and its application to the wool; the quality of the finishing; and the evenness of the knotting. Wool and dye quality and the care taken in finishing are reportedly highly correlated with the other dimensions of carpet quality, as it does not make sense to use low quality wool, for example, to make a finely-knotted carpet. Unevenness results when weavers are not all knotting the same row simultaneously.¹⁰ The evenness of knotting requires a high degree of expertise to evaluate and, therefore, was not included in the study.

Information was collected which categorized carpet designs as Nepalese (a very simple and repetitive style) and easy, medium, hard, and very hard Persian style. Appendix A includes a description of how this carpet design categorization was accomplished. Table 7 draws upon the subsample of weavers for whom we have additional information. In Table 7, workers of different age groups are broken down by the design difficulty of the carpet on which they were working. Overall, most of the weavers in the subsample were working on medium (24 per cent), hard (43 per cent), or very hard (17 per cent) designs. Adults, "probably children," and children worked on all difficulties of carpet designs. The row per centages show that "probably children" and definitely children did not weave proportionately more of the very hard designs, although they did weave a somewhat greater proportion of the very hard designs than did adults, compared to the overall averages. The column per centages in Table 7 tell us that there are differences in the distributions of adults, "probably children" and definitely children over design difficulties, but that children never come close to dominating the production of carpets of a given difficulty.

Is the finding that adults and children do not specialize in particular design difficulties robust? Table 8 provides another perspective on this question. This time, we use the entire sample of observed workers and consider the proportion of children among weavers on a given loom by the design difficulty associated with that carpet-in-progress. Thus, looms (or carpets-in-progress) are the units of observation here. For example, very hard carpets were being made in enterprises in which children made up 14 to 22 per cent of weavers, depending on the definition of "child" which is used. Very hard carpets under production in enterprises with at least one observed child worker were being made in firms using, on average, 30 to 32 per cent child workers. Table 8 confirms that children do not dominate any particular category of design difficulty.

¹⁰ In high quality carpets, the absence of one weaver may force all the other weavers on that loom to stop working until his return, since each weaver's territory (a horizontal area) is clearly delineated. During the fielding of this survey, however, it was not uncommon to see uneven knotting heights on one loom.

The number of knots per square inch in a carpet should provide a more precise measure of carpet quality than our measure of design difficulty. We observed 31 different quality levels in terms of the accounting system used to describe knots in the Carpet Belt; we transformed these into knots per square inch and divided them into six categories.¹¹ The categories are coarse (under 50 knots per square inch); low (50-99); medium (100-134); high (135-179); fine (180-239); and extra fine (240+). Table 9 shows that almost two-thirds of the looms in our sample are being used to make medium (30.1 per cent) and high (32.1 per cent) quality carpets, in terms of knots per square inch. The table also shows that a greater proportion of the looms in larger enterprises are being used to make fine and very fine carpets than in 1- and 2-loom enterprises. Over one-third of carpets being made in the 5+ loom enterprises are very fine, while only 7 per cent of carpets being made in 1-loom enterprises are very fine. The average number of knots per square inch increases monotonically with enterprise size.

Since we know from Tables 4 and 5 that larger enterprises rely more heavily upon child labour than do small, household enterprises, does this mean that children are producing relatively more of the finest quality carpets? Tables 10, 11, and 12 address this question. Drawing upon the subsample of weavers for whom we have additional information, Table 10 presents carpet quality by age of weavers. It shows that there is some tendency for the per cent of children to be higher on looms with fine carpets but not extra fine carpets. Using the entire sample of looms (and observed weavers), Table 11 supports this finding. Moreover, substantial proportions of high, fine, and extra fine carpets are being made in firms which do not use any child labour.

Table 12 presents the per cent child labour on looms by enterprise size and knotting quality. While enterprises with 5+ looms use higher proportions of children when they make fine and medium carpets (37 and 33 per cent, respectively), 2-loom and 4-loom enterprises also use 34 and 32 per cent children to produce finely knotted carpets.

The results presented in this section indicate that children work side-by-side with adults in producing carpets of every design difficulty and knotting quality. Although there is some tendency for children to be more heavily used to produce fine (but not extra fine) quality carpets, this tendency is linked to a greater presence of child workers in large enterprises, which are also more likely to produce fine carpets. While it could be argued that large enterprises hire more children in order to gain a comparative advantage in producing fine carpets, it could just as easily be true that enterprises become large because of the presence of a highly-skilled master weaver. This type of loom owner would be more likely to have the ability to oversee the production of fine carpets.

These data provide no evidence that children dominate any particular design or quality niches. On the contrary, the tables presented here show that a higher proportion of adults than children are used to produce even the finest handknotted carpets.

7. Skill acquisition

At this point it is useful to clarify what can and cannot be ascertained by this study regarding the effects of skill acquisition and experience on productivity.

Ideally we would like to compare the productivity of adults who learned to weave as young children, adults who learned to weave at age 14 or older, and the productivity of children under

¹¹ These categories are roughly consistent with those used by other researchers; see, for example, Meerendonk and Picavet (1988: 22, 36). They are based in part on discussions with Indian exporters and in part on the categorizations reported by importers and retailers in the U.S. case study.

14 who are considered to be fully proficient weavers. That is, we would like to distinguish between productivity differentials that are due to *age* and productivity differentials that are due to *experience*. The popular wisdom implies a negative relationship between productivity and age in carpet weaving: older workers are less productive. An alternative hypothesis is that this relationship has an inverted U shape, if, for example, young children do not have the necessary strength. Then productivity would increase as children mature, but begin to decline for older workers as eyesight deteriorates. The relationship between productivity and experience, on the other hand, is expected to be positive and concave (increasing at a decreasing rate).

In this analysis, one way of separating out the effects of experience from those from age is by considering the number of times the weaver had previously woven the carpet pattern on which he was working at the time of the survey. However, the usefulness of this measure is limited somewhat by the fact that the Indian carpet industry is very responsive to changes in customer demands and thus carpet patterns change frequently.

It seems clear that weaving requires some skill, which must be acquired through training. We cannot estimate the number of full-time days necessary for a child or adult to become skilled enough to weave an average quality carpet. The length of the training period may well differ for children and adults; children learn many things faster than adults, and other things slower. It is not clear that 10 year olds have a great learning advantage over 14 or 15 year olds. The comparative advantage of children over adults in learning time may also not be great. One of the authors of this study asked a number of employers if he, at age 50, could learn to weave. He was repeatedly assured that he could certainly learn to weave at least lower quality carpets in three to six months and medium quality carpets by six months to one year. Government training centers report that trainees, who appear to be mainly adolescents and young adults, usually leave the programme after 3 to 4 months, at which time they start weaving for a loom owner or establish their own looms. Interviewed weavers report being fully proficient after a year of training, and loom owners also say that on-the-job training takes about a year.

The interviews with loom owners/employers provide some evidence that a (relatively) high level of skill can be attained even when boys begin weaving as older adolescents. Most loom owners provide training and supervision for weavers working on their looms, implying that these owners have attained a certain level of expertise. Only 3.5 per cent of interviewed loom owners reported that they could not weave. Among the rest, 51.4 per cent learned to weave between the ages of 10 and 13, 36.7 per cent learned at ages 14-16, and 7.5 per cent learned when they were age 17 or older. Although these reported ages must be regarded as approximate due to the high level of illiteracy of the loom owners, they are indicative of a pattern of training that does not depend on a very young beginning age.

8. Relative productivity of children and adults

Since we found that children and adults work on the same range of carpet qualities, it is possible to investigate the relative productivity of child and adult weavers by analyzing data on productivity of different age groups. The results presented here come from a straight-forward analysis of a subsample of the survey data; future work will use multivariate techniques to examine productivity.

When loom owners were cooperative, the interview team collected additional information relating to the productivity of weavers on one or two looms in the enterprise. This additional data will be called the productivity subsample. On the initial visit, weavers were identified by their position on a loom, and a coloured thread was used to mark the level of completion of each

weaver's section of the carpet at the time of the first interview. Interviewers returned on the second day after the first visit to measure the amount of carpet completed during the intervening period.¹² A question about how many times each weaver had woven that particular pattern (on other carpets) was also asked, as a measure of the very specific type of experience which is said to greatly affect productivity.

We constructed an output measure based on the width of the horizontal strip to which the weaver was assigned and the progress made between interviews in terms of vertical inches completed. Weavers usually work on a horizontal area between 18 and 36 inches wide; the average in our study is 27 inches. Very few weavers were able to complete more than 6 vertical inches in the approximately 2 days of weaving time between visits (including the remainder of the first interview day, the intervening day, and the part of the third day before the follow-up interview). From the horizontal and vertical measurements, we calculated output in terms of square inches knotted. In this analysis, the time spent weaving between interviews is assumed to be two full work days (part of each day of interviewing plus the interviewing day); this is used to calculate a measure of productivity: square inches woven per hour.

Table 13 presents the square inches woven per hour measure of productivity by age groups for male weavers. Because of the relatively low proportion of child weavers in the overall sample and because of missing data, the number of observations of "definitely children" is too small to be informative. Comparing "probably children" with adult men, these results yield higher levels of mean and modal productivity for the men. The means are statistically different at the 5 per cent confidence level. These results are tentative in nature as many other factors, such as the number of times a design had been woven, have not yet been taken into account.

An alternative, longer-term measure of productivity might be the horizontal distance assigned to each weaver. Presumably this assignment reflects the employer's or supervisor's evaluation of the skill of the weaver. This must be the case at least in a relative sense, as weavers on one carpet should work at approximately the same pace in order to keep knotting on the same horizontal line. (Carpet quality declines if the weaving is uneven due to weavers working on different lines.) If there is any variation in skill among the weavers on a loom, the supervisor can adjust for different knotting speeds by increasing or decreasing the length of the assigned horizontal section. Table 14 shows that while adults are assigned slightly longer sections than are "probably children," children are assigned slightly longer sections than adults. On the other hand, children and "probably children" are otherwise relatively concentrated in the shorter and longer sections. These apparently contradictory results may be due to the smallest horizontal work areas being assigned to apprentices, while for non-apprentices the horizontal range may be a function of carpet width, up to some maximum horizontal assignment per weaver.

Health impacts. It is often asserted that the conditions of work in carpet weaving enterprises are poor and cause health problems which would not have occurred otherwise. These problems could arise from long hours of sitting in one position, breathing cotton and wool fibers, and eye strain from doing very fine work, sometimes in less-than-adequate lighting. The relative productivity of adult and child weavers could be differentially affected by such health problems, as the degradation of health may increase as years spent weaving increases. The survey includes some indirect measures which may affect these health outcomes; these are described in detail in

¹² The revisit was conducted after two days in order to allow enough time to pass for an easily measured amount of knotting to be done – since daily production may be only 0.5 to 2 vertical inches – but to return before weavers had forgotten their schedules for the intervening period. That is, this interval was thought to minimize the potential measurement error for the two critical variables, output produced and time worked.

Appendix A. Interviewers observed and recorded the lighting and ventilation conditions within work areas and also asked about the use of electricity for lighting. Overall, the lighting was considered bad in 15 per cent of enterprises and the ventilation was considered bad in 17 per cent of them. Forty-one per cent of the enterprises had electricity available all of the time, and an additional 6 per cent had electric lighting only part of the time due to frequent power outages. Children were more likely to work in firms with electricity than were adults. This is not surprising, since large enterprises are more likely to be electrified than small ones. In the future, we will investigate how working conditions and experience relate to measured productivity.

The economic implications for the carpet industry of enforcing the child labour laws depend on how costly replacing child workers with adults would be. Although we have productivity information for a subsample of weavers – amount woven per hour on carpets of known quality – we cannot determine whether children are paid their marginal products. If children are currently being paid at rates which are less than their marginal products but adults are paid their marginal products, the cost to the industry of substituting adults for children will be considerably higher than if most children currently receive payments equal to their marginal products. In future analysis we will use a production function approach to estimate the degree of substitutability between adults and children at the weaving stage of production. We will then make several estimates of the cost of this substitution, thus providing a range within which we expect the truth to lie. We also must take into account the relatively large levels of adult underemployment in the area when considering the increase in adult wages necessary to attract an adequate number of men to replace all the boy weavers. In other words, we will have to make assumptions about the slope of the labour supply curve, which is probably fairly flat but not entirely horizontal.

9. Estimates of labour costs and employment in carpet production

In order to investigate how the elimination of child labour from carpet production would affect the industry, it is necessary to estimate (1) labour costs as a proportion of total costs and (2) the proportion of labour costs which are spent on child workers. The latter component can be derived from estimates of differential piece rate payments to children and adults and from estimates of the per centage of workers who are children. These calculations are not included here, but will be included in subsequent publications. To investigate the numbers of workers who would potentially be affected by the elimination of child labour, it is necessary to estimate the absolute size of the carpet industry's labour force.

Labour costs of weaving. Weaving charges are estimated to account for approximately 40 per cent of the export price of carpets on average, although this figure is lower for lower quality carpets and higher for higher quality carpets. These estimates are based on survey data and in-depth discussions with loom owners, exporters, and others. Although a series of assumptions are required to arrive at the estimates, they appear reasonable and are roughly consistent with estimates from earlier studies.

Employment in the carpet industry. There are numerous estimates of the number of persons working in the Indian carpet industry as well as the number of child labourers. The most striking aspect of these estimates is their variability. We have found estimates which range from 150,000 to 1,500,000 for total employment and from about 50,000 to 1,050,000 for child labour. The estimates of the per cent of total workers in the carpet industry who are children also display great variability, ranging from 8 per cent up to 70 per cent. Clearly, many of these estimates

must be taken with a grain of salt, as self-interest and/or desire to promote an advocacy position are often involved.

The data collected in our study allow us to make some rough estimates of the total number of carpet workers and child labourers. These are not exact estimates. At best, they are rough "ballpark" estimates. On the other hand, they are to a large extent based on reasonably good data taken from our own survey, and the various assumptions we made are indicated so that readers can judge for themselves regarding their reasonableness.

To estimate total employment, we worked backwards from the total value of Indian exports, which were Rs.10,934,879,000 in the year of our survey (US \$347,139 at an exchange rate of Rs.31.50). If we assume that labour costs for weavers comprise 40 per cent¹³ of total export prices on average, then the weavers' wage bill would be Rs. 3,444,487,000. If weaving is done about 210 days per year on average¹⁴ and weavers receive Rs. 24.5 per day on average¹⁵, this would imply, approximately 600,000 weavers, with total workers estimated based on the assumption that non-weavers are equal to about 10 per cent of weavers.¹⁶ The number of children working as weavers can then be estimated based on the above estimate of weavers and our study estimate of 22 per cent child labour.¹⁷ Given these assumptions, we estimate that there are approximately 130,000 child weavers in India's handknotted carpet industry.

10. Case study of U.S. carpet retailers and wholesalers

Most handknotted carpets produced in India are exported to many countries, and especially to the European Economic Community, Switzerland, or the United States (see Table 1). Information about these international markets for handknotted carpets is relevant to our study in so far as changes in who produces carpets – children or adults – affect the export and retail prices of carpets and, thus, the demand for Indian carpets abroad. In particular, it would be useful to obtain at least a crude approximation of the price elasticity of demand for Indian carpets in the context of the international market. Studies by Han van de Meerendonk, Ruud Picavet and their collaborators at the Insitutut voor Ontwikkelingsvraagstukken (IVO) include an examination of the world market for handknotted carpets; the case study which follows complements their careful analyses by focusing on the U.S. market.

¹³ We have calculated estimates of per cent labour costs for weavers for various carpet quality levels. A weighted average of those is calculated based on our estimate of per centage distribution of carpets by quality. This average includes the 25 per cent cut of the loom owner.

¹⁴ The assumption that weavers work an average of 210 days per year seems reasonable in light of the high level of absenteeism among hired workers (since 42.4 and 41.4 per cent of loom owners in our survey report that hired weavers are absent once or more than once per week, respectively). Moreover, almost all loom owners weave and at least 60 per cent of them also engage in other income-earning activities over the year. A similar assumption, about 240 days worked, is made by Meerendonk and Picavet (1988).

¹⁵ Average pay per work day is based mainly on our survey data where one square yard of a usual quality carpet reportedly takes about 25 days to weave with loom owners receiving Rs. 1000 for this, according to our survey data. If we assume that weavers receive 75 per cent of this as is customary, then average adult weavers may earn about Rs. 30 per day. We have assumed that average child weavers earn half of adult earnings, lowering our overall average daily earnings estimate to Rs. 24.5

¹⁶ According to an estimate of Sinya, reported in Meerendonk and Picavet (1988:32-33), the ratio of total workers to weavers in the Indian carpet industry is about 1:18. According to our own key informants, this ranges from 5-12 per cent, with larger exporters using a higher per centage.

¹⁷ Source: Table 5 for per cent child labour.

The United States market for handknotted carpets accounted for about 29 per cent of foreign sales of Indian carpets in 1992. The U.S. market is, for this reason, influential in determining how many and which carpets are produced in India. To better understand how the U.S. market functions and how responsive it is to changes in prices of imported carpets, a case study of wholesalers and retailers of hand-knotted carpets was conducted in one metropolitan area in the midwestern state of Minnesota.¹⁸

The Twin Cities metropolitan area, including the cities of Minneapolis and Saint Paul and their suburbs, had a population of 2.46 million in 1990. At the time of the case study, in May and June of 1993, the Twin Cities area supported about sixteen stores selling imported hand-knotted carpets, excluding department stores with carpet salesrooms. The sample, therefore, approximates a census of independent retailers and wholesalers in the Twin Cities area.¹⁹ Thirteen in-person interviews were completed, in each case with a manager/buyer, most of whom were also owners. The in-person interviews were supplemented by telephone interviews with five large out-of-state wholesalers identified by Twin Cities retailers. The five wholesalers were located in the cities of New York (2), Secaucus, New Jersey (2), and Los Angeles (1). Again, interviewees were all managers/buyers and usually part owners of the firm. Other details of the methodology are included in Appendix B. This case study is only generalizable to the extent that the firms in this case study are typical of U.S. carpet retailers and importers – which is plausible but impossible to ascertain. Results are, however, broadly consistent with those of Meerendonk and Picavet's (1988) survey of 95 U.S. importers of handknotted carpets.

Structure of the industry Importing of new handknotted carpets into the United States appears to be done by two different types of actors: large importers, with sales worth over US \$3 million per year, and smaller firms, with sales under \$3 million, which are usually retailers who may also do some importing. The large importers are relatively few in number – perhaps as few as 30 dominant firms, at a guess – and are mainly based in the New York City area and California. In addition to importing, they act as wholesalers and exporters and, less commonly, retailers. Among the local firms interviewed, 5 of 13 were only retailers, while the other 8 engaged in various combinations of import, export, wholesale, and retail activities. At least 6 of 13 were engaged in importing, including both contracting out manufacturing of handknotted carpets in other countries ($n=4$) and buying from the stock of foreign exporters ($n=5$). Many U.S. firms also buy from (other) U.S. importers, whether or not they also act as importers: local firms bought about 48 per cent of their rugs from other U.S. firms, and even the large non-local wholesalers bought an average of 13 per cent of their rugs from other importers. In every case, however, someone from the firm chooses the firm's inventory of carpets and sets their prices.

Although this study was only concerned with *new* handknotted carpets, it should be noted that most firms also carried old, sometimes antique, carpets. On average, 55 per cent of local firms' total annual sales were in new handknotted rugs. In contrast, the large wholesalers (non-local firms) had an average of 94 per cent of their total annual sales in new handknotted carpets.

Since the relationship between importers and their suppliers might affect the degree to which pricing is responsive to changing conditions, we asked about two kinds of such relationships. Hypothesizing that persons who had immigrated into the U.S. from a carpet-producing country were more likely to go into the carpet business in the U.S. than other persons, and were also likely to import and sell proportionately more carpets from their country of origin,

¹⁸ The case study was conducted by Deborah Levison, with the assistance of Carolyn Merritt.

¹⁹ The sample is described in more detail in Appendix B.

we asked whether the firm operated via family ties in any of the carpet-exporting countries. Although two-thirds of all the firms originally had family ties in a carpet-exporting country, only 3 of 18 still relied upon these family connections at the time of the survey. Only for one firm were family ties reported to result in lower purchase prices for carpets. Next, for those firms engaged in importing, we asked, "Do you establish ties with some particular exporters, or does who you buy from depend only upon price, availability, quality, what Americans are buying, etc.?" The degree to which U.S. firms rely on ties with particular exporters appears to vary substantially, with equal proportions reporting regular ties, some ties, and no ties.

Origin and type of handknotted carpets sold. Most of the firms in the U.S. case study stocked handknotted carpets from a number of different carpet-producing countries, as shown in Table 15. The majority of the 18 firms interviewed carried carpets from India, the People's Republic of China, Pakistan, and Turkey. Carpets from Iran, Nepal, Afghanistan, Eastern European countries, and Morocco were also sold by some of the U.S. firms. These results indicate that since American importers and retailers stock carpets from a number of different countries, it should be fairly easy for them to shift purchases among exporting countries as relative prices change.

Table 15 shows that India, China, and Pakistan dominate the U.S. market for new handknotted carpets among study firms. These figures are broadly consistent with the data presented in Table 1, implying that our sample is reasonably good on this dimension. Among these three primary competitors, India dominates in the provision of medium quality carpets, while Pakistan and China provide more of the fine quality carpets. On average, Indian carpets comprised 32 per cent of sales of new handknotted carpets by these firms. Of the Indian carpets sold, 70 per cent were considered to be medium quality and 25 per cent fine quality.

Any conclusions from these categorizations of handknotted carpets as coarse, medium, or fine must be tentative, due to the subjectivity of such categorizations, which were defined by the interviewees. Many interviewees protested when asked to define coarse, medium, and fine carpet qualities in terms of numbers of knots per square inch. They pointed out that knots per square inch is only one dimension of quality, which also depends upon the design, dyes, wool (or silk), knot type, and knot regularity of the carpet in question. Moreover, some interviewees' answers appear to have been biased by their firm's specialization. For example, rugs from Nepal (known as "Tibetan") were all classified as coarse by the non-local large wholesalers. However, local firms which had an above-average fraction of their sales in rugs from Nepal tended to set lower thresholds in terms of knots per square inch for the "medium" and "fine" qualities. Thus, they would consider Nepalese rugs to be of medium or fine quality. Overall, local firms reported selling a lower proportion of coarse handknotted carpets (13 per cent) than did non-local firms (18 per cent). While local firms reported that 49 per cent of their sales were of medium quality, compared to 45 per cent for non-local firms, both local and non-local firms reported an average of 38 per cent of total sales to be of fine quality.

The survey results regarding handknotted carpets from Iran are especially interesting due to the U.S. embargo on imported goods from Iran. Those owners who appeared most conscious of the embargo reported lower or no sales of Iranian rugs. Among the larger, non-local, importers, rugs from Iran made up only 2 per cent of their sales of new handknotted rugs. In contrast, local firms reported that an average of 22 per cent of their sales were of Iranian carpets. Some of the interviewees explained that new Iranian rugs could be legally sold in the U.S. if they had been purchased and warehoused outside of Iran before the embargo was put into place, and if the importer could provide the paperwork to prove this. It is also possible for such papers to be

forged. A trade magazine story about smuggled Iranian rugs claims that 100 bales of rugs are smuggled into the U.S. each day and that a corrupt U.S. Customs has ceased to enforce the embargo (Stroh, 1993).

Table 15 presents the case study results for carpet prices by country of origin, in terms of average U.S. dollars per square foot for three categories of carpet quality. These average prices are influenced by several factors: production costs in the country of origin, country-specific specialization in different types of carpets, and the selection of carpets by the U.S. firms. As such, these prices provide an approximate understanding of which carpets are the closest substitutes, by quality category and country of origin. Again, small sample sizes mean that averages must be interpreted with caution, especially since the range of carpets in a quality category is large and the distribution of carpets by quality differs for different exporting countries.

For coarse and medium quality carpets, local firms consistently pay higher prices per square foot than do the large (non-local) wholesalers. Only for fine carpets from Iran and Turkey do non-local firms pay more per unit than local firms, probably reflecting a greater proportion of purchases of unusually fine carpets from those countries. The per-unit prices of coarse and medium carpets from India and the People's Republic of China are close to identical and are substantially lower than carpets from other countries. (An exception is Afghanistan, which exports very limited quantities of carpets.) Among fine carpets, the average price of Indian carpets is the lowest.

The prices in Table 15 reflect the purchase price of the U.S. firms, which then sell carpets at a higher price. The difference between the purchase and sale prices goes to overhead and staffing costs, taxes, and profits. We asked interviewees whether they agreed that wholesalers usually had gross margins of about 30 per cent on handknotted rugs, while retailers usually had gross margins of about 60 per cent. These gross margins correspond to mark-ups of 60 per cent and 120 per cent, respectively, which are similar to those reported elsewhere (UNCTAD, 1981 and 1983).²⁰ Although half of the owners/managers interviewed agreed with this generalization, almost all of them went on to describe ranges for gross margins of wholesalers and retailers. Wholesalers were said to have gross margins of 10 to 55 per cent, averaging 37 per cent (implying a mark-up of about 75 per cent). Retailers were said to have gross margins of 30 to 400 per cent – although local interviewees reported a more restricted range of 53 to 81 per cent – averaging 65 per cent. (This is equivalent to an average mark-up of 130 per cent.) Two-thirds of the interviewees said that their firm's gross margins were about equal to the average for their category; most refused to be more specific.

We attempted to ascertain the price elasticity of U.S. firms' demand for handknotted Indian carpets via a series of questions: "If the cost to you of buying *Indian* rugs went up by 5 (10, 15, 20) per cent, by how much do you think sales of Indian rugs would fall off, if at all (in terms of the value of sales)?" "How much could the cost to you go up before you stopped buying Indian handknotted rugs altogether?" Fewer than a third of the interviewed owners/managers answered the first series of questions, and for those who answered, responses ranged widely. A 5 per cent increase was generally believed to have no effect on sales; but for a 10 per cent increase, answers ranged from zero to 100 per cent; for a 15 per cent increase, from zero to 50 per cent, and for a 20 per cent increase, from zero to 100 per cent. Many interviewees expressed impatience with these questions, perhaps indicating that they were unable or unwilling to answer

²⁰ Our goal here was to minimize an expected downward bias in the responses.

the questions. In most cases, they were also unable to consider differential effects on different quality carpets. Clearly the first series of questions were not adequate for our purpose of determining when price increases for Indian carpets would start affecting sales.

The final question was more manageable for the owners/managers, who gave an average price increase of 24 per cent as the level of increase at which they would *stop* buying Indian carpets altogether. The large wholesalers ($n=4$) were more price responsive, since they would on average stop buying after an 18 per cent price increase, as compared to local firms' ($n=10$) 27 per cent increase. All 18 respondents said that they would substitute carpets from other countries for Indian carpets, in the event of such a price increase. It thus appears that price elasticity is high enough to be a concern. If major importers would stop buying Indian carpets altogether after an 18 per cent increase (on average), it is clear that smaller increases would begin to affect the Indian carpet industry.

All the owners/managers agreed that U.S. consumers would be willing to switch to buying rugs from other countries. As to which other countries, 10 interviewees would substitute Chinese carpets; for all other countries, none was mentioned by more than two owners/managers. One interviewee commented that "99 per cent of the customers have no idea which country the rug came from." National "brand" loyalty seems very low. This is the case despite the fact that many importers and retailers are immigrants or the children of immigrants from carpet exporting countries. This is also consistent with the idea that handknotted carpets are generally sold as commodities, rather than as investments. Several interviewees commented on the three things that sell rugs in the U.S.: "colour, colour, colour." The overriding importance of colour was also found in the earlier IVO enquiry (Meerendonk and Picavet, 1988d).

Given customers who often don't know or care about the provenance of a carpet, and given the possibility of ordering similar products from different countries, it is not surprising that owners/managers are relatively price responsive. India's domination in the U.S. market for (primarily medium-quality) handknotted carpets is being seriously challenged by China. Owners/managers reported that the quality of Chinese carpets is more reliable than the quality of Indian carpets, which is more erratic. India's advantage, in their eyes, was the faster turn-around of new designs ordered by American firms. That is, Indian exporters can more quickly produce carpets to the specifications required by U.S. importers, who are very sensitive to American fashions. One owner described this flexibility as a result of the high organizational level of the cottage industry in India. The Chinese bureaucracy is perceived as a handicap in this respect, since it is (apparently) government officials who control production and exportation of Chinese handknotted carpets. However, we were left with the impression that the Chinese are becoming more responsive over time, as they increase their production of handknotted carpets.

At the end of the interview, interviewed owners/managers were given the opportunity to air their views on the effect of a U.S. import ban on new handknotted carpets. Almost all of the owners/managers were eager to express their opinions about this issue because of a bill which had been introduced to the U.S. Senate (with a similar bill being introduced to the U.S. House of Representatives). The Harkin Bill, if passed into law, would ban the importation of products made in foreign industries which are documented users of child labour, on a county-specific basis; only products certified to be "child labour free" would be exempted from the ban. The textile and handknotted carpet industries of South Asia would likely be among the most likely first targets of such a law. All but two of the interviewees predicted negative effects of such a

bill for the U.S. carpet industry and/or Indian carpet producers, including child weavers.²¹ Our impression was that these business people feared that carpet sales would fall for all new handknotted carpets, not just those from countries targeted by the legislation. About half of the interviewees expected carpet prices in the U.S. to rise, while others thought predicted further reaching implications in the form of retaliatory trade restrictions against U.S. products being sold abroad.

11. The cost of eliminating the use of child workers

Our calculations suggest that replacing child workers with adults in the weaving stage of handknotted carpet production would increase the cost of carpets to consumers by only a few percentage points. We use simulated changes in costs to explore alternative scenarios involving the elimination of child labour. These simulations, which are described at length in an appendix available from the authors, depend on a number of assumptions. We summarize these results briefly here.

We explore potential cost increases for carpets with knots per square inch corresponding to low, medium, high, and extra fine quality carpets. Our simulations differ along three dimensions. First, we consider weaving enterprises using varying amounts of child labour, as a percentage of the enterprise's total labour force. The study average of about 22 per cent child labour is our base assumption. Second, we consider cost increases arising from children earning lower piece rates than adults. We consider a range of possibilities, from situations where children receive only 25 per cent of adult piece rates to those where children are paid at the same rate as adults. A child piece rate equal to 50 per cent of the adult rate is our best guess (base) assumption. That is, if a child weaver were replaced by an adult weaver, then the loom owner would have to pay that new (adult) weaver 50 per cent more than he paid the old (child) weaver in the base assumption. Third, we consider cost increases arising from a general increase in piece rates. Some increase is likely be necessary in order to attract enough additional adult labour to replace child workers. Our best guess (base) assumption is that weaving rates would increase by 5 per cent, but we also examine increases ranging from 10 per cent to zero per cent. In addition, assumptions regarding whether increased costs are passed on or assumed (in the form of reduced profits) by loom owners, middlemen, exporters, or importers affect the final estimates.

Our best guess (base) assumptions show that if loom owners or exporters absorbed all of such cost increases, their impacts could be devastating for them, but if foreign retailers or consumers absorbed the entire cost increases, the impacts would be quite small. Even in the unlikely event that foreign retailers or consumers absorbed all of the cost increases, they would face increases amounting to 2–3 per cent, of the price (to them) of the carpet. In the worst case scenario, foreign consumers would pay no more than an additional 4 per cent for high quality handknotted carpets. These calculations vary little among the different carpet qualities.

12. Policy implications

Children are not irreplaceable workers in India's carpet industry. Our study provides convincing evidence that children do not have skills which adults cannot match. This is not to say, however, that it would be costless to replace children with adult weavers. Although there are substantial numbers of unemployed and underemployed men and women who could be

²¹ One of the two interviewees who expected no effect was probably behaving strategically, thinking that this report would influence U.S. policy.

employed as weavers, many of them would only accept such employment for a higher wage than that received by children, especially apprentices and bonded child workers.

Loom owners are least able to absorb losses that would arise from the (assumed) higher payment rates of adults who replaced children. Most weaving enterprises are very small, fairly marginal operations run by poor and illiterate men. Wage increases would have to be passed along to subcontractors and exporters, who would be better positioned to absorb any decrease in profits necessary to maintain internationally competitive carpet prices. If the absolute amount of the necessary payment increases were to be passed along all the way to, say, United States consumers, we estimate that the total increase in carpet purchase prices would be several times smaller than a typical state sales tax of around seven per cent. This scenario is unlikely, however, as all the actors will most likely keep their percentage margins. Thus Indian carpets could be placed at a slight competitive disadvantage – unless consumers were willing to pay more for a “child labour free” carpet – to very close substitutes, mainly in the form of Persian-style carpets from countries such as the People’s Republic of China, Pakistan and Iran.

The high degree of international competition for carpet sales implies that a global strategy is called for in order to avoid beggar-thy-neighbor policies by countries. If carpet-producing countries simultaneously implemented a no-child-labour strategy in their handknotted carpet industries, none of them would be at a competitive disadvantage.

In any case, India would still require an effective method for eliminating the use of child labour.²² This study suggests that enforcement of minimum age laws is difficult (and absolute guarantees probably impossible), since there are so many small looming enterprises (perhaps 100,000) which are spread over a very large rural area. Study results indicate that the most useful approach would begin by targeting relatively large looming enterprises, those with 5 or more looms, since the larger looming enterprises are also the heaviest users of child labour.

We also believe that it would be a good idea to get the collaboration of exporters as they could be effective enforcers of child labour laws as they periodically visit looming enterprises in order to check up on progress in the weaving. They could be given the incentive of either a ready market or higher prices.

Community enforcement and development is another possibility if, for example, villages where child weavers were not used received a premium for their rugs and/or community development projects were instigated as “rewards”. And the Indian government needs to become a more effective agent in increasing the opportunity cost of child labour by providing rural schools which parents feel have a good standard of education and include practical skills or training to improve children’s income earning opportunities later in life; if so, the attractiveness of weaving would decline. Also local area development programmes are required to help reduce poverty levels and so help reduce the incentive to use child labour as well as the supply of labour, since carpet weaving is concentrated in poor areas.

²² Also, one characteristic of weavers suggests an alternative source of labour for the carpet industry. Almost all the weavers observed in our survey were male. It is not clear why this should be the case, especially as weaving is a female-dominated occupation in other carpet-producing countries such as Iran. It is probably not considered safe for women to work in enclosed rooms in close proximity with male weavers, as would be necessary if men and women were to work on the same loom. The promotion of all-female weaving enterprises, however, may be one way of accomplishing two policy goals: improving the status of women by increasing their income-earning opportunities, and eliminating the use of child labour.

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Appendix A

Measures of carpet quality and working conditions

Design difficulty of carpets

Carpet designs are drawn on graph paper which shows each knot and its colour. The simplest carpet designs are very repetitive; to weave such designs only a small fraction of the overall design is adequate to instruct the weavers. The interviewers used the following criteria to classify the difficulty of carpet designs:

Easy: A corner of the graph paper design used.

Medium: One-quarter of the graph paper design used.

Hard: Half of the graph paper design is necessary.

Very hard: The full graph paper required.

These criteria were generally followed, but on occasion the interviewers had to rely upon their own judgement or that of the loom owner.

Adequacy of natural light in the work area

The following criteria were used to systematically record the natural light availability for weavers:

Bad: The room has only one door, and the only natural light source is the door.

Average: The room has one door and one good-sized window. Natural light comes through the door and the window and is at an acceptable level.

Good: The room has one or two doors and more than one window. The room is fully open and has proper lighting.

Excellent: The room has all modern facilities and is fully open. It has fully proper natural light.

Adequacy of ventilation in the work area

The following criteria were used to systematically record the ventilation of the work area:

Bad: The room has no windows.

Average: The room has one door and one or two windows with some cross-ventilation.

Good: The room has one or two doors and a good window for good cross-ventilation.

Excellent: The room is open with two doors and more than one window, or open sides. It is well-ventilated.

Appendix B

U.S. case study of carpet importers and retailers

Methodology

Twin Cities non-department store retailers and wholesalers of imported handknotted carpets were identified as follows. First, current Minneapolis and St. Paul telephone directory categories for “Carpet & Rug Dealers – New” and “Carpet & Rug Distributors & Manufacturer” yielded approximately 200 distinct stores listed as selling carpets or rugs. Second, telephone calls were made to all these stores. If a salesperson said that the store sold handknotted imported rugs, then the store was included in the study. Approximately 22 stores did not answer telephone calls. Department stores with carpet salesrooms were also dropped from the study. Such salesrooms were found to be stocked by buyers and managers at the chain’s headquarters or by independent contractors, and on-site salespeople were not knowledgeable enough to provide information for this study.

Third, a letter describing the purpose of the study and requesting permission to make an appointment for an interview was sent to each carpet store owner or manager. Since the Harkin Bill provides a useful real life example of a (potential) supply restriction – one of a number of possible scenarios which exclude or limit the use of child labour – the research was said to involve “figuring out how U.S. consumers will be affected and how they will react if the Harkin Bill results in higher prices for handknotted carpets.” The letter was sent on University of Minnesota letterhead in order to establish the credibility of the investigator. The University of Minnesota is highly respected in the Twin Cities, and a number of the owners/managers interviewed said that they had attended the University of Minnesota.

Fourth, telephone calls were made to set up in-person interviews at the store. Of the sixteen stores which were said to sell imported hand-knotted carpets, two did not answer repeated telephone messages and the manager of the third – which was holding a going-out-of-business sale – was not in the store at the time of the scheduled interview.²³

Fifth, interviews were conducted in the stores. Either owners or managers were interviewed. It became apparent that the local trade association had held a meeting after the receipt of letters requesting interviews and had discussed how to approach the issue of child labour.²⁴ While this seemed to affect general conversation and answers to the final question of the survey, which was open-ended, in most cases we could not discern any systematic effect on other survey responses. However, the owner who had organized the association discussion of child labour reported the highest responsiveness by far to increases in the supply of Indian carpets in response to this question. This response may have been strategic, or, if true, it may explain the owner’s degree of concern about the topic.

Sixth, large wholesalers on the East and West coasts were identified by asking cooperative interviewees if they would tell us how to contact their primary wholesalers. Fifteen wholesalers were identified in this way. Most were located in either New York City, Secaucus, New Jersey, or Los Angeles; but Philadelphia, Atlanta, and Dallas wholesalers were also mentioned. Many of

²³ Firms which host “going-out-of-business” sales are often viewed as dishonest by other retailers. The local trade association has recently sued a firm which it accused of using deceptive and misleading advertisements (Kennedy, 1994).

²⁴ The Association of Minnesota Oriental Rug Retailers is described as a “nonprofit trade group bent on cleaning up unfair dealings in the local oriental rug industry” (Kennedy, 1994).

them were identified by more than one interviewee. The letter of introduction was modified to include not only retailers and importers in the Twin Cities area but also the wholesalers from whom they buy. The five completed interviews were conducted with either owners or upper-level managers/salespeople to whom the Twin Cities interviewees had directed us. Most wholesalers, however, did not return phone calls or said they were too busy to be interviewed.

The final sample includes 13 in-person interviews plus 5 telephone interviews. Coding consistency between the two interviewers was checked by comparing data from interviews with both interviewers present.

The survey questionnaire may be obtained from the authors upon request.

Table 1. Imports of handknotted carpets by major suppliers (exporters) and consumers (importers)

Country	Imports in thousands of US\$ (nominal) by year							
	1965	1970	1975	1980	1985	1990	1991	1992
World total*	133 253	191 353	525 882	1 490 429	927 028	1 865 515	1 910 918	1 937 025
US total	17 333	19 951	40 321	165 500	248 550	259 721	270 420	309 482
Germany	496	2 295	21 154	117 200	92 511	166 902	186 837	186 472
USA	2 566	4 840	10 857	40 969	65 363	87 170	89 989	100 069
Japan		25	99	415	229	763	581	465
EEC (excl. Ger.)	4 444	3 508	6 078	42 204	29 293	48 812	48 415	48 214
Switzerland	248	226	3 329	16 278	12 512	13 867	10 273	11 919
Total	7 754	10 894	41 517	217 086	199 908	317 514	336 095	347 139
% of world total	5.82%	5.69%	7.89%	14.57%	21.56%	17.03%	17.59%	17.92%
% of US total	14.80%	24.26%	26.93%	24.75%	26.30%	33.56%	33.28%	32.33%
Germany	46 360	77 759	148 759	349 036	74 402	231 560	294 271	299 915
USA	7 125	7 529	15 815	30 858	33 392	4 592	1 888	143
Japan	7	38	179	897	4 121	48 963	37 358	27 786
EEC (excl. Ger.)	18 651	21 176	54 966	95 998	25 514	111 766	152 819	149 320
Switzerland	8 037	7 841	18 342	38 709	20 494	34 243	35 054	33 079
Total	80 180	114 343	238 061	515 498	157 923	431 124	521 390	510 243
% of world total	60.17%	59.76%	45.27%	34.59%	17.04%	23.12%	27.28%	26.34%
% of US total	41.11%	37.74%	39.22%	18.65%	13.43%	1.77%	0.70%	0.05%
Germany	364	962	4 431	19 538	23 981	69 842	71 589	70 060
USA			829	37 793	69 080	79 260	85 097	111 625
Japan	59	682	6 602	24 324	18 370	99 411	97 382	99 852
EEC	2 305	4 349	10 130	39 359	31 235	59 263	70 630	66 727
Switzerland	347	527	457	5 002	3 186	5 201	3 748	4 515
Total	3 075	6 520	22 449	126 016	145 852	312 977	328 446	352 779
% of world total	2.31%	3.41%	4.27%	8.46%	15.73%	16.79%	17.19%	18.21%
% of US total	0.00%	0.00%	2.06%	22.84%	27.79%	30.52%	31.47%	36.07%
Germany	864	3 785	32 570	86 902	35 660	34 989	38 434	29 764
USA	534	1 156	5 450	33 277	32 995	57 081	65 030	61 811
Japan		11	331	1 616	4 207	19 070	15 626	11 100
EEC	2 560	4 243	21 593	84 013	35 174	60 443	60 141	49 565
Switzerland	306	903	5 208	13 074	8 905	12 951	9 062	7 436

Country	Imports in thousands of US\$ (nominal) by year							
	1965	1970	1975	1980	1985	1990	1991	1992
Total	4 264	10 098	65 152	218 882	116 941	184 534	188 293	159 676
% of world total	3.20%	5.28%	12.39%	14.69%	12.61%	9.90%	9.85%	8.24%
% of US total	3.08%	5.79%	13.52%	20.11%	13.27%	21.98%	24.05%	19.97%
			Turkey (exporter)					
Germany	485	1 290	9 532	34 178	16 458	70 612	42 060	56 662
USA	93	159	655	3 580	12 790	18 173	18 492	26 440
Japan		3	1	59	692	8 739	4 884	3 914
EEC	266	438	4 265	17 606	16 195	52 402	31 989	35 586
Switzerland	220	303	1 991	10 464	7 402	14 790	7 656	8 131
Total	1 064	2 193	16 444	65 887	53 537	164 716	105 081	130 733
% of world total	0.80%	1.15%	3.13%	4.42%	5.78%	8.83%	5.50%	6.75%
% of US total	0.54%	0.80%	1.62%	2.16%	5.15%	7.00%	6.84%	8.54%
			Nepal (exporter)					
Germany	18	44	315	5 214	14 585	85 552	122 034	158 049
USA		5	14	582	730	3 468	2 750	3 184
Japan			10	13	37	113	182	104
EEC	0	19	133	2 035	6 392	29 603	17 107	18 292
Switzerland	12	38	80	336	1 632	13 431	14 665	16 301
Total	30	106	552	8 180	23 376	132 167	156 738	195 930
% of world total	0.02%	0.06%	0.10%	0.55%	2.52%	7.09%	8.20%	10.11%
% of US total	0.00%	0.03%	0.03%	0.35%	0.29%	1.34%	1.02%	1.03%

Source: U.N. Foreign Trade Data Bank GATT DP Section S3.

* The world total includes the following countries:

1965 - Iran, Afghanistan, India, United Kingdom, Pakistan, China, USSR, Algeria, FR Germany, Morocco, Turkey, Romania, Tunisia, United States, France, Bulgaria, Yugoslavia, Switzerland, Belgium-Luxembourg, Lebanon, Hong Kong, Portugal, Ireland, Netherlands, Czechoslovakia, Sweden, Austria, Italy, Greece, Finland, Norway, Denmark, Fm. German DR, Spain, Canada, Poland, Nepal, Panama CA, ZN, Iraq, Egypt, Malaysia, S. Vietnam Rp., S. Africa Cus. Un., Barbados, Carib. NES, Syria, Kenya, Peru, Vietnam D. Rep., Argentina, Ecuador, Israel, Japan, Mexico, Madagascar, Kuwait, Qatar, Australia, Bolivia, Saudi Arabia, Fm. Yemen Dm., Jordan, Malta, Libya, Cyprus, Nigeria, Korea Rep., Thailand.

Years 1970 - 1992 include the same countries as 1965 with new countries added every period.

The following are the additions to (or removal from, if noted) the world total.

Assume base countries are those of previous period plus new countries.

1970 - New Zealand, Venezuela, Philippines, Colombia, Haiti, Mauritania, Ethiopia, Albania, Singapore, Myanmar, Benin, Sierra Leone, Cote D'Ivoire, Bahamas, Gibraltar, Norway, Antilles, Kenya and S. Vietnam not in world total.

1975 - Costa Rica, Bangladesh, Jamaica, Mozambique, Nicaragua, Brazil, Chile, Sri Lanka, Sikkim, New Caledonia, Bahrain, Antigua, Liberia, Paraguay, Solomon Is., Burkina Faso, and Chad.

1980 - United Arab Emirates, El Salvador, Macau, Lao P. Dem. Rep., Trinidad, Papua New Guinea, Iceland, Uruguay, Indonesia, Zaire, Tanzania, Djibouti, Mongolia.

1985 - Bhutan, Mauritius, Andorra, Cape Verde, Greenland, Guinea.

1990 - Niger, Oman, Maldives, Zimbabwe, Sudan, Vanuatu.

1991 - Toklva, Cambodia.

1992 - EC figures do not include Greece.

Table 2. Distribution of enterprises in sample by number of looms* per enterprise

Number of looms in enterprise	n	Unweighted percent	Weighted percent
1 loom	134	37.0	55.7
2 looms	108	29.8	25.5
3 – 4 looms	94	26.0	14.3
3 looms	72	19.9	10.9
4 looms	22	6.1	3.4
5+ looms	26	7.2	4.6
Total number of enterprises	362	100.0	100.0

* Only non-broken looms are included.

Weighted percent takes into consideration that larger sized enterprises were oversampled and smaller sized enterprises were undersampled.

Source: authors' tabulations.

Table 3. Distribution of weavers in sample by observed age-sex categories

Age/sex category of observed weaver	n	Unweighted percent	Weighted percent
adult male	1554	73.0	74.2
male, probably child	400	18.8	18.1
male, definitely child	171	8.0	7.5
adult female	3	0.1	0.1
female, probably child	2	0.1	0.2
Total observed weavers	2130	100.0	100.0

Weighted percent takes into consideration that larger sized enterprises were oversampled and smaller sized enterprises were undersampled.

Source: authors' tabulations.

Table 4. Unweighted distribution of weavers in sample by observed age-sex categories and by enterprise size (number of looms) (number of observations, row %, column %)

Number of looms in enterprise	Adult	Males probably child	Definitely child	Adult	Females probably child	Total observed weavers
1	293	55	18	0	2	368
	79.6%	15.0%	4.9%	–	0.5%	100.0%
	18.9%	13.8%	10.5%	–	100.0%	17.3%
2	417	111	46	3	0	577
	72.3%	19.2%	8.0%	0.5%	–	100.0%
	26.8%	27.8%	26.9%	100.0%	–	27.1%
3	439	117	52	0	0	608
	72.2%	19.2%	8.6%	–	–	100.0%
	28.3%	29.3%	30.4%	–	–	28.5%
4	153	40	16	0	0	209
	73.2%	19.1%	7.7%	–	–	100.0%
	9.9%	10.0%	9.4%	–	–	9.8%
5+	252	77	39	0	0	368
	68.5%	20.9%	10.6%	–	–	100.0%
	16.2%	19.3%	22.8%	–	–	17.3%
Total observed weavers	1554	400	171	3	2	2130
	73.0%	18.8%	8.0%	0.1%	0.1%	100.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: authors' tabulations.

Table 5. Percentage child labour in enterprise, by size of enterprise using two measures of children

Number of looms in enterprise	Average percent child labour (in enterprise)		Percent firms with 33.3+% child labour		Percent firms with any child labour		n
	(a)	(b)	(a)	(b)	(a)	(b)	
1	12.4	14.2	12.7	14.2	41.0	47.8	134
2	18.9	23.5	15.7	18.5	71.3	83.3	108
3	22.0	27.0	26.4	31.9	88.9	94.4	72
4	20.2	28.1	22.7	36.4	90.9	95.5	22
5+	26.6	33.4	30.8	46.2	96.2	96.2	26
Average (unweighted)	17.8	21.8	18.2	22.7	66.6	74.0	

Notes:

Child definition (a) includes all "definitely child" observations plus 75 percent of "probably child" observations.

Child definition (b) includes all "definitely child" observations plus 75 percent of "probably child" observations plus 50 percent of absent workers.

Source: authors' tabulations.

Table 6. Enterprises with weavers who are family members, hired from the village, or hired from outside the village (percent) by enterprise size (number of functional looms)

Size of enterprise	FAMILY MEMBERS		FROM VILLAGE OR AREA		FROM OUTSIDE VILLAGE/AREA	
	Percent of firms with any family weavers	Percent of firms with 50+ percent family	Percent of firms with any village weavers	Percent of firms with 50+ percent village	Percent of firms with any outside weavers	Percent of firms with 50+ percent outside
1 loom	100.0	74.6	61.2	47.8	2.2	0.8
2 looms	96.3	32.4	89.8	69.4	16.7	4.6
3 looms	95.8	15.3	90.3	63.9	29.2	13.9
4 looms	86.4	18.2	95.5	45.5	59.1	36.4
5+ looms	88.5	0.0	88.5	42.3	69.2	38.5

Source: authors' tabulations.

Table 7. Carpet design difficulty by age of weavers for productivity subsample (number of observations, row %, column %)

Design difficulty	Adult	Probably child	Definitely child	n
Nepalese	32	16	0	48
	66.7%	33.3%	0.0%	100.0%
	20.4%	3.8%	0.0%	2.2%
Easy	53	5	9	67
	79.1%	7.4%	13.4%	100.0%
	3.4%	1.2%	6.4%	3.2%
Medium	387	108	19	514
	75.3%	21.0%	3.7%	100.0%
	24.7%	26.0%	13.6%	24.2%
Hard	802	224	108	1134
	70.7%	19.8%	9.5%	100.0%
	51.1%	53.8%	77.1%	43.3%
Very hard	294	63	4	361
	81.4%	17.5%	1.1%	100.0%
	18.8%	15.2%	2.9%	17.0%
Total	1568	416	140	2124
	73.8%	19.6%	6.6%	100.0
	100.0%	100.0%	100.0%	100.0

Source: authors' tabulations.

Table 8. Design difficulty of carpets-in-progress by percent child labour in enterprise using two measures of children (unit of observation: looms with carpets-in-progress)

Design difficulty of carpet being made on loom	n	Number (n) of carpets-in-progress in firms with any child labour		Number of carpets-in-progress in firms with 33+% child labour		Average* percent child labour in all firms making carpets		Average *% child labour in firms with any child labour	
		(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Nepalese	12	5	5	5	5	26.4	27.4	63.3	65.8
Easy	102	26	40	21	25	11.6	16.0	45.6	40.7
Medium	248	131	161	76	95	19.5	24.3	36.8	37.5
Hard	287	171	204	99	115	22.0	25.9	36.9	36.5
Very hard	123	55	89	20	27	14.4	21.5	32.1	29.7
Total n	772	388	499	(looms with carpets-in-progress)					

* Note that averages are calculated over carpets-in-progress, not firms.

Thus, on average, Nepalese design carpets are being woven in firms with 26.4 (or 27.4) percent child labour. If a Nepalese design carpet is being woven in a firm which uses any child labour, then on average it is being woven in a firm with 63.3 (or 65.8) percent child labour.

Child definition (a) includes all "definitely child" observations plus 75 percent of "probably child" observations.

Child definition (b) includes all "definitely child" observations plus 75 percent of "probably child" observations plus 50 percent of absent workers.

Source: authors' tabulations.

Table 9. Quality of carpets being woven (knots per square inch) by enterprise size (%) (unit of observation: looms with carpets-in-progress)

Quality of carpet in knots per square inch	Percentage and total number of looms* in enterprise						Total	n
	1	2	3	4	5+			
Coarse	8.2	2.8	0.0	4.1	0.0	2.6	20	
Low	8.9	7.4	2.8	0.0	3.9	5.1	39	
Medium	36.3	33.0	30.2	12.2	28.9	30.1	230	
High	32.6	37.2	33.0	40.5	16.4	32.1	245	
Fine	6.7	8.4	19.8	25.7	11.7	13.5	103	
Very fine	7.4	11.2	14.2	17.6	33.1	16.6	127	
Total	100.0	100.0	100.0	100.0	100.0	100.0	764	
Mean knots per sq. inch	142.2	156.3	171.4	180.6	186.8			

* Broken looms are excluded.

Source: authors' tabulations.

Table 10. Carpet quality (knots per square inch) by age of weavers for productivity subsample (number of observations, row %, column %)

Carpet quality (knots/sq in)	Adult	Probably child	Definitely child	n
Coarse/low	40	0	4	44
	90.1%	0.0%	9.9%	100.0%
	2.6%	0.0%	2.9%	2.1%
Medium	522	165	67	754
	69.2%	21.9%	8.9%	100.0%
	33.3%	39.7%	47.9%	35.5%
High	655	178	59	892
	73.4%	20.0%	6.6%	100.0%
	41.8%	42.8%	42.1%	42.0%
Fine	86	14	6	106
	81.1%	13.2%	5.7%	100.0%
	5.5%	3.4%	4.3%	5.0%
Extra fine	265	59	4	328
	80.8%	18.0%	1.2%	100.0%
	16.9%	14.2%	2.9%	15.4%
Total	1568	416	140	2124
	73.8%	19.6%	6.6%	100.0%
	100.0%	100.0%	100.0%	100.0%

Source: authors' tabulations.

Table 11. Quality of carpets-in-progress, as indicated by knots per square inch by percent child labour in enterprise using two measures of children (unit of observation: looms with carpets-in-progress)

Quality category for carpet (knots per square in)	Number (n) of carpets-in-progress in firms with any child labour		Number of carpets-in-progress in firms with 33+% child labour		Average percent child labour in all firms making carpets*		Average % child labour in firms with any child labour*		
	n	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Coarse	20	1	3	1	2	1.9	5.6	37.5	37.5
Low	39	9	16	3	5	6.6	11.7	28.5	28.5
Medium	230	124	151	71	83	19.9	24.0	36.9	36.5
High	245	131	163	69	84	19.0	23.5	35.5	35.3
Fine	103	59	77	37	48	22.0	28.4	38.4	38.0
Extra fine	138	66	91	42	47	19.5	24.7	40.7	37.4
Total n	775	390	501	(looms with carpets-in-progress)					

* Note that averages are calculated over carpets-in-progress, not firms.

Child definition (a) includes all "definitely child" observations plus 75 percent of "probably child" observations.

Child definition (b) includes all "definitely child" observations plus 75 percent of "probably child" observations plus 50 percent of absent workers.

Source: authors' tabulations.

Table 12. Percent child labour by enterprise size and carpet quality using child definition (a) (number of observations of looms in parentheses)

Quality of carpet in knots per square inch	Total number of looms* in enterprise				
	1	2	3	4	5+
Coarse	2.3 (11)	8.3 (6)	—	12.5 (3)	—
Low	6.3 (12)	15.4 (16)	11.5 (6)	—	13.3 (5)
Medium	16.0 (49)	23.0 (71)	26.7 (64)	20.1 (9)	32.6 (37)
High	16.6 (44)	22.5 (80)	27.5 (70)	27.3 (30)	22.6 (21)
Fine	19.0 (9)	33.8 (18)	23.5 (42)	32.3 (19)	36.5 (15)
Extra fine	11.3 (10)	22.5 (24)	27.0 (30)	22.6 (13)	26.5 (50)

* Broken looms are excluded.

Child definition (a) includes all "definitely child" observations plus 75 percent of "probably child" observations.

Source: authors' tabulations.

Table 13. Productivity of weavers (square inches knotted per hour) by age-sex groups

	All weavers	Adult males	Males probably child	Males definitely child
Average productivity (sq. inches/hour)	9.5	9.9	7.8	10.4
Modal productivity	7.0	7.5	6.9	6.7
Number of observations (unweighted)	165.0	129.0	27.0	7.0

Source: authors' tabulations.

Table 14. Horizontal inches of carpet section assigned to weavers, by age for Productivity Subsample (number of observations, row %, column %)

Horizontal inches assigned to weaver	Adult	Probably child	Definitely child	Total
<20 inches	34	17	10	61
	55.7%	27.9%	16.4%	100.0%
	7.8%	19.5%	25.0%	10.9%
20 – 25 inches	212	44	12	268
	79.1%	16.4%	4.5%	100.0%
	48.9%	50.6%	30.0%	47.8%
26 – 36 inches	165	22	12	199
	82.9%	11.1%	6.0%	100.0%
	38.0%	25.3%	30.0%	35.5%
37 – 60 inches	23	4	6	33
	69.7%	12.1%	18.2%	100.0%
	5.3%	4.6%	15.0%	5.9%
Total	434	87	40	561
	77.4%	15.5%	7.1%	100.0%
	100.0%	100.0%	100.0%	100.0%
Average inches assigned	27.0 inches	25.2 inches	28.2 inches	

Source: authors' tabulations.

Table 15. U.S. case study firms' sales of handknotted carpets by country of origin and carpet quality (N=18)

Country	N (firms)	Percent of total sales	Percent of sales which are		
			coarse	med.	fine
India	18	32	6	70	25
local		32			
non-local		31			
China	15	31	10	25	64
local		25			
non-local		46			
Pakistan	14	25	0	13	87
local		27			
non-local		20			
Iran	8	17	12	30	58
local		22			
non-local		2			
Nepal	8	16	25	56	19
local		16			
non-local		15			
Turkey	14	7	13	60	28
local		6			
non-local		10			
Afghanistan	7	6	0	42	58
E. Europe	7	4	0	59	42
Morocco	1				

Local firms are located in the metropolitan area of the Twin Cities of Minneapolis and Saint Paul, Minnesota.

Non-local firms are located elsewhere in the United States.

Source: authors' tabulations.