

Job Concordances for Brazil: Mapping the
Classificação Brasileira de Ocupações
(*CBO*) to the *International Standard*
Classification of Occupations (ISCO-88)

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Numerous statistical and economic investigations into labor market performance and beyond rely on a classification of occupations. Brazil's occupational classification system *CBO* (*Classificação Brasileira de Ocupações*) from 1994 classifies jobs in an hierarchical ordering by their task and skill content. To make the system comparable to international classifications, we provide a mapping from *CBO* to the international standard classification *ISCO-88* (*International Standard Classification of Occupations*).

In 2002, Brazil's commission for standards agreed on and issued a revised occupational classification, called *CBO* again. The present document refers to the *CBO* system from 1994, however, which we are calling *CBO-94* to prevent misunderstandings.

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Brazil's *CBO-94* generally provides classifications at a finer level of detail than *ISCO-88* so that a mapping from *CBO-94* to *ISCO-88* is precise. In particular, the level of detail in the Brazilian system permits the necessary reclassifications to transform the more profession-based Brazilian classification system *CBO-94* into the more skill-oriented international system *ISCO-88*. Conversely, a reverse mapping would be less easily achievable and is not discussed here.

Several countries and regional organizations adopted *ISCO-88* for their labor statistics, among them all members states of the European Union, the Commonwealth of Independent States and the ILO/UNDP Asian Regional Programme on International Labour Migration. Most importantly, *ISCO-88* pays explicit tribute to economies outside the OECD and is designed to reflect the labor markets of developing as well as of industrialized countries. For this purpose, *ISCO-88* covers some aspects of the “informal” as well as the “formal” segments of labor markets and tends to account for the use of technology in occupations. We therefore view *ISCO-88* as the most suitable international occupational classification to be mapped from *CBO-94*. Its principles of classification permit direct inferences about the likely skills required for competent performance of an occupation.

Our concordance *cbo2isco* is available from

<http://econ.ucsd.edu/muendler/brazil>

both in comma separated and Stata 8 format. Several auxiliary files with descriptions and their translations are provided alongside.

1 The Brazilian Occupational Classification: *Classificação Brasileira de Ocupações*

A high degree of detail in the Brazilian classification *CBO-94* permits a precise mapping to *ISCO-88* in general, although the two systems differ in their organizing criteria. In fact, the degree of detail in the Brazilian occupational classification *CBO-94* far exceeds that in *ISCO-88*. While *CBO-94* identifies 2,355 individual occupations, *ISCO-88* only recognizes 390 occupations—corresponding to a degree of detail that Brazil's 354 base groups (“grupos de base”) would exhibit.

The Brazilian Occupational Classification (*Classificação Brasileira de Ocupações*, *CBO-94*) groups occupations into classes by analogue of their ‘content’

(“*analogia dos conteúdos*”) and the ‘conditions required for competent performance’ (“*condições exigidas para o desempenho do trabalho*”).

Underlying principles and concepts in Brazil’s *CBO-94* classification are similar to those of the international system *ISCO-88*. This permits a mapping of occupations in *CBO-94* to closely related, though more aggregate, categories of jobs in *ISCO-88*. In particular, ‘content’ in the Brazilian system means a set of tasks and duties to be executed by one person in the production of a good or the provision of a service. This concept is also what constitutes a job in *ISCO-88*. Similarly, ‘conditions required for competent performance’ are closely related to the concept of skill in *ISCO-88*, defined as the degree of complexity of constituent tasks and the required abilities and knowledge to conduct the tasks. So, the principal concepts of ‘content’ and ‘conditions required for competent performance’ in *CBO-94* resemble their counterparts in *ISCO-88*.

At higher levels of the hierarchical classification, the Brazilian *CBO-94* system stresses the sectoral affiliation of an occupation (‘content’ as profession) more than the abilities and knowledge (‘content’ as demands on physical and mental contributions to a job) required for an occupation. We describe the basic structure of the *CBO-94* system in subsection 1.1.

The *ISCO-88* system, on the other hand, tends to rely more on the concept of skills required for the execution of a job and the degree of complexity of constituent tasks when defining higher-level groups. However, we find this difference between *CBO-94* and *ISCO-88* at high aggregation levels to be of little if any relevance at the finest level of individual occupations. We discuss in subsection 1.2 how the Brazilian *CBO-94* orders individual occupations within base groups by their degree of required skills, abilities and responsibility. This enables us to infer a concordance that respects the guiding classification criteria in *ISCO-88*.

1.1 Principles of classification in *CBO-94*

The job is the ultimate object of consideration in *CBO-94*. *CBO-94* views the job as a set of tasks, duties and operational assignments to a worker who produces goods or provides services (Secretaria de Políticas de Emprego e Salário 1998). At the finest level, *CBO-94* defines an individual occupation as a category that unifies jobs which are fundamentally similar with regard to their ‘content’ and ‘skill requirements.’ *CBO-94* then groups these individual occupations into an hierarchical system with three higher-order layers

Table 1: *CBO-94* HIERARCHY

Categories	Frequency
Main groups (“grande grupos”)	7
Subgroups (“subgrupos”)	84
Base groups (“grupos de base”)	354
Individual occupations	2,355

Source: Secretaria de Políticas de Emprego e Salário (1998).

(table 1): The 2,355 individual occupations are combined into (i) 354 base groups (“grupos de base”), (ii) 84 subgroups (“subgrupos”), and (iii) seven main groups (“grande grupos”). Hammock makers (“Redeiro”), for instance, have occupation 7-59.40 within the base group (“grupo de base”) 7-59 for spinners, weavers, dyers and similar workers not elsewhere classified (“Fiandeiros, tecelões, tingidores e trabalhadores assemelhados não-classificados sob outras epígrafes”). Base group 7-59 in turn is part of subgroup (“subgrupo”) 7-5 for spinners, weavers, dyers and similar workers (“Fiandeiros, tecelões, tingidores e trabalhadores assemelhados”), and that belongs to main group (“grande grupo”) 7/8/9 for workers in industrial production, machine and vehicle operators, and similar workers.

Table 2 provides an overview of the seven main groups. The definitions of main groups (“grande grupos”) illustrate that *CBO-94* tends to stress the sector affiliation of a profession beyond the skill requirements.

A numeric system of five digits serves to express the hierarchical organization of *CBO-94*. The seven main groups (“grande grupos”) take the first digit of these five digits and represent the widest definitions. The 84 subgroups (“subgrupos”) are identified with the first two of the five digits and are meant to be closer to economically similar occupations within the main groups. The 354 base groups (“grupos de base”) are identified with the first three of the five digits and are more narrowly defined so that the complexity of tasks becomes more similar across jobs within the base groups. The individual occupations are identified with all five digits.

The largest main group (“grande grupo”) of occupations is ‘7/8/9.’ It comprises occupations in any non-agricultural production process. This main

Table 2: MAIN GROUPS (“GRANDE GRUPOS”) IN *CBO-94*

Main group	Description	Occupations
0/1	Scientists, technicians, artists and similar workers	620
2	Members of the legislature, executive branch, or judiciary, senior public administration officials, senior managers of companies and similar workers	87
3	Administrative and similar workers	173
4	Workers in commerce and similar workers	50
5	Workers in tourism, the hotel industry, personal services, hygiene, beauty culture, and security, and similar workers	121
6	Workers in agriculture, forestry and fishery, and similar workers	157
7/8/9	Workers in industrial production, machine and vehicle operators, and similar workers	1,127
X	Members of the armed forces, the police and fire brigades	20
	<i>Total</i>	<i>2,355</i>

Source: Secretaria de Políticas de Emprego e Salário (1998).

group, more than most other main groups in *CBO-94*, also includes supervisory occupations with responsibilities not only for the immediate production of a good or for the provision of a service but also for related workers. Although occupations may share similar objectives—to manufacture a specific type of good or to provide a specific service—there is a considerable variety in the degree of complexity of constituent tasks and the required abilities and knowledge to conduct the tasks. This variety is frequently a function of the technologies involved in the performance of the occupation. In several instances, *CBO-94* labels an individual occupation once as “à mão” and once as “à máquina” (e.g. ‘Wire drawers, manual’ and ‘Wire drawers, machine-operating’). As a consequence, the mapping of occupations in this main group links to diverse groups of suitable jobs in *ISCO-88*.

1.2 Classification criteria in *CBO-94*

To facilitate the classification of observed occupations, each occupational category in *CBO-94* carries a description of attributes and tasks with three key elements: (i) a summary of the ‘content’ of the occupation (main characteristics of the tasks and duties related to the subject matter of the production process or service provision, to the equipment used, the materials worked with, or the final goods and services obtained); (ii) the principal tasks or attributes of the occupation that demand the worker’s main physical and mental attention, the required abilities and time, and similar factors; (iii) secondary, optional or supplementary tasks that exhibit a certain analogy to the principal tasks.

We call the final two digits of Brazil’s five-digit classification system the suffix value. This suffix value distinguishes the individual 2,355 occupations within the 354 base groups (“grupos de base”) at the three-digit level. Beyond their use for subclassification, *CBO-94* assigns a general meaning to these suffix values (the final two digits):

- Suffix values between 01 and 10 identify occupations of general nature. Workers with multiple abilities (“trabalhadores polivalentes”) fill these occupations. Generally, these are workers who have accomplished wide professional experience and may take on leadership, monitoring or similar supervisory tasks relative to other workers with a similar occupation;
- Suffix values between 11 and 89 identify specialized occupations. These occupations are different from the general occupation and more specific to the processing of the produced good or the provision of the service;
- The suffix value 90 identifies occupations that are not explicitly specified under the preceding suffix values between 01 and 89. So, a suffix value of 90 goes to occupations not elsewhere classified (n.e.c.) but fundamentally related to the base group. In addition, emerging or disappearing occupations within the base group receive a suffix value of 90. Finally, and most importantly for the purposes of our mapping, workers who perform auxiliary tasks also receive a suffix value of 90. *CBO-94* considers these occupations to be statistically less relevant or qualitatively inferior.

We exploit these systematic distinctions at the five-digit level to accomplish a precise mapping from *CBO-94* to *ISCO-88*. Most importantly, elementary jobs in *ISCO-88* are defined as a group of their own, but *CBO-94* does not separate such elementary jobs. Instead, *CBO-94* lists them among similar more

complex occupations that require more specific abilities and broader knowledge. However, by the above criteria, no elementary job could be assigned a suffix value between 01 and 10 in the final two digits of the five-digit *CBO-94* code. Conversely, elementary jobs are most likely to appear in such base groups of *CBO-94* that only contain occupations with suffix values between 11 and 90 in the final two digits of the five-digit code.

Workers who perform supervisory tasks within their occupations generally receive a suffix value between 01 and 10 in *CBO-94*. *ISCO-88*, however, prefers to separate lower-level managerial occupations in a sub-major group (subdivision 12 of major group 1) of its own. In some instances, we therefore map supervisors from their occupations in *CBO-94* to the sub-major group of managers in *ISCO-88*. However, *CBO-94* is more systematic about lower-level management tasks than it may appear. In fact, *CBO-94* classifies production supervisors (“mestres”) and foremen (“contramestres”) into base groups of their own so that we can map clearly defined supervisory occupations to the suitable *ISCO-88* jobs. Supervisory personnel with less responsibility for overall goods manufacturing or service provision processes—such as flight supervisors, sales supervisors, or purchasing supervisors—, do generally not receive a suffix value between 01 and 10 in *CBO-94*. Accordingly, we do not map them to managerial occupations in *ISCO-88*.

CBO-94 does not classify workers with respect to formal education, professional training or tenure but only with respect to their performed occupation. As a consequence, apprentices do not receive a classification of their own but fall under the occupation for which they are trained. Similarly, interns fall under the occupation that they currently fill. The international *ISCO-88* applies the same criteria to apprentices and interns.

CBO-94 is explicit about helpers, farm-hands, assembling laborers and other workers who perform auxiliary tasks but are not in training. Workers with such occupations also receive a suffix value of 90 in the final two digits of the five-digit *CBO-94* code. Therefore, elementary jobs are most likely to appear among individual occupations with a suffix value of 90. We account for this fact in our concordance to *ISCO-88*, where such auxiliary jobs are classified within a separate category of elementary occupations.

2 The *International Standard Classification of Occupations (ISCO-88)*

The International Conference of Labour Statisticians adopted *ISCO-88* in November 1987 for use from 1988 on. The new International Classification of Occupations replaces the previous version, known as *ISCO-68*. We regard *ISCO-88* as a particularly suitable occupational classification system to be mapped from *CBO-94* for mainly two reasons. First, the ordering of occupations in *ISCO-88* permits a direct inference of the likely skills required for competent performance of an occupation—ranging from elementary tasks at the least skill-intensive level to technicians and professionals at the highest skill level. Second, *ISCO-88* has proven useful for cross-country comparisons in many contexts. One such instance is the harmonization of national occupational classifications across the European Union (Elias and Birch 1994). We partially use the European experience as a benchmark to inform our mapping from *CBO-94* to *ISCO-88*.

This section presents the principles and classification criteria in the *ISCO-88* system, identifies important differences to *CBO-94* and discusses our principles for an adequate mapping between the two systems. We relegate critical details of the mapping procedure to the later section 3.

2.1 Differences between *ISCO-88* and *CBO-94*

Just as *CBO-94*, *ISCO-88* too calls the lowest-level unit of observation for its classification system a job. A job is defined as a set of tasks or duties designed to be executed by one person. *ISCO-88* groups jobs into occupations according to the degree of similarity in their constituent tasks and duties. *ISCO-88* also organizes these jobs in an hierarchical framework. Both the lowest-level units in the system and the organizing principles of *ISCO-88* differ from those of Brazil's *CBO-94*.

To illustrate differences to *CBO-94*, the following example (from Elias and Birch 1994) shows how *ISCO-88* arranges jobs to form the lowest-level four-digit occupation unit for announcers in non-print media, called “3472 Radio, television and other announcers.” News announcers, radio announcers, and television announcers all fall under this occupation unit, but the unit would not include disc jockeys, media interviewers and newscasters. *CBO-94*, on the other hand, assigns an occupation of its own to each of the following announc-

ers (“Locutores”): ‘1-53.10 Announcers, general’, ‘1-53.20 Television news announcers’, ‘1-53.30 Radio and television commentators’, ‘1-53.40 Sports commentators’, ‘1-53.90 Other radio and television announcers and commentators.’

ISCO-88 regards the announcer jobs as sufficiently similar in terms of the abilities required to perform these tasks and treats them as a single occupational unit for statistical purposes. To the contrary, *CBO-94* considers these jobs as distinct in terms of the performance required from the workers who execute the constituent tasks, and would only unify the occupations at the higher level of base groups (“grupos base”), in this case ‘1-59 Radio and television announcers and commentators.’ This level of detail in the Brazilian system permits the necessary re-classifications to concord the more profession-based Brazilian classification system *CBO-94* to the more skill-based international system *ISCO-88*.

2.2 Principles of classification in *ISCO-88*

The most distinctive feature of *ISCO-88*, as compared to Brazil’s *CBO-94*, is that *ISCO-88* explicitly introduces the concept of skill as an organizing criterion. The idea is to define a job’s degree of complexity through the *nature of its skill requirements*. A job’s complexity is a function of the competence demanded from the worker to perform the constituent tasks and duties. However, as we described in subsection 1.2 above, Brazil’s *CBO-94* system orders individual occupations by their likely skill content within base groups (“grupos base”). This enables us to create a mapping that adheres to the *ISCO-88* principles.

ISCO-88 classifies occupations by their *nature of skill requirements*. Skill requirements constitute the competence demanded of a worker to perform the tasks and duties of the job. In order to reduce the multiplicity of actual skill requirements to few basic elements, *ISCO* definitions of individual occupations (unit groups) also refer to the subject matter of the production and service provision processes, to the equipment used, the materials worked with, and the final products and services obtained. These basic features of the job, rather than the training of the incumbent worker or specific job characteristics, amount to the nature of skill requirements.

ISCO-88 refers to four broad ‘skill levels’ (1st through 4th) for its occupational classification. For that purpose, *ISCO-88* partly draws on the *International Standard Classification of Education (ISCED)*. At the time, *ISCO-88* used the *ISCED* definitions from 1976, but definitions could be reformulated

Table 3: SKILL LEVELS IN *ISCO-88* AND RESPECTIVE *ISCED* CATEGORIES

Skill level	<i>ISCED</i> Category	Education and formal training involved ^a
1st	1	Primary education <i>Starting at ages 5 to 7, lasting up to five years.</i>
2nd	2 and 3	First and second stages of secondary education <i>First stage starting at ages 11 to 12, for about three years.</i> <i>Second stage starting at ages 14 to 15, for about three years.</i> <i>Including periods of on-the-job training and apprenticeships.</i>
3rd	5 ^b	Non-academic post-secondary education <i>Starting at ages 17 to 18, for about four years.</i> <i>Not leading to the award of a university degree or equivalent.</i>
4th	6 and 7	Academic education <i>Starting at ages 17 to 18, for three, four, or more years.</i> <i>Leading to the award of a university or post-graduate university degree or equivalent.</i>

^aAges refer to typical ages for pupils and students to start and end an education or training period.

^b*ISCED* 1976 deliberately omits category 4.

Sources: International Labour Office (1990) and Elias and Birch (1994).

with reference to the *ISCED* revision from 1997 (Hoffmann 1999). Table 3 summarizes the four broad skill levels, and table 5 further below shows how they relate to the the major groups of occupations in *ISCO-88*.

Its explicit reference to *ISCED* notwithstanding, *ISCO-88* does not define occupations through the incumbent worker's observed skills nor does it limit itself to narrow skill definitions as formal education and training. The classification principles of *ISCO-88* stress that skills may, and often are, acquired through experience and informal training, even though formal training may play a more important role in some economies than in others and a more prominent role at higher skill levels than at lower levels. *ISCO-88* neither considers the way in which workers acquired their skills as relevant for an occupational classification, nor would it take into account that a job incumbent may have skills not required by the job.

ISCO-88 defines four levels of aggregation (table 4): 10 major groups,

Table 4: *ISCO-88* HIERARCHY

Categories	Frequency
Major groups	10
Sub-major groups (major group subdivisions)	28
Minor groups (sub-major group subdivisions)	116
Unit groups (minor group subdivisions)	390

Sources: International Labour Office (1990) and Hoffmann (1999).

28 sub-major groups (subdivisions of major groups, a level not present in *ISCO-68*), 116 minor groups (subdivisions of sub-major groups), and 390 unit groups (subdivisions of minor groups). Table 5 documents the structure of major groups and their relationship to skill levels. The first skill level involves the least skills, mostly from primary education, while the fourth and most advanced skill level comprises university education.

Eight of *ISCO-88*'s ten major groups are delineated with reference to the four broad skill levels (1st through 4th). Among these eight major groups, three groups (2, 3, and 9) are uniquely identified with one broad skill level (4th, 3rd, and 1st, respectively). However, five major groups (4 through 8) share the same broad skill level (2nd). They are further distinguished by types of occupation, similar to the classification in Brazil's *CBO-94* system. Two major groups (government officials and managers, and members of the armed forces) span a wide range of skill levels and were grouped together because of the related objects of their respective occupations rather than common skill requirements (the respective sub-major and minor groups, however, arrange occupations in classes of similar skill requirements).

2.3 Classification criteria in *ISCO-88*

As opposed to the profession-based classification criteria in *CBO-94* (where the 'content' of the occupation is considered the main characteristic of the tasks and duties), *ISCO-88* applies skill-oriented criteria to classify occupations. Most importantly, *ISCO-88* distinguishes craft occupations, operative occupations, and elementary occupations across professions.

Table 5: MAJOR GROUPS AND SKILL LEVELS IN *ISCO-88*

Major group	Description	Unit groups	Skill ^a level
1	Legislators, senior officials and managers	33	-
2	Professionals	55	4th
3	Technicians and associate professionals	73	3rd
4	Clerks	23	2nd
5	Service workers and shop and market sales workers	23	2nd
6	Skilled agricultural and fishery workers	17	2nd
7	Craft and related workers	70	2nd
8	Plant and machine operators and assemblers	70	2nd
9	Elementary occupations	25	1st
0	Armed forces	1	-
	<i>Total</i>	<i>390</i>	

^aFor definitions of skill levels 1st through 4th, see table 3.

Sources: International Labour Office (1990) and Hoffmann (1999).

At the major group level, the highest level of aggregation, *ISCO-88* sets apart the craft-oriented occupations from those occupations oriented towards the operation of tools, equipment and industrial plants. Craft-oriented occupations (major group 7) comprise skilled jobs directly involved with the production of finished goods so that the tasks and duties require an understanding of and experience with the raw materials as well as the manufacturing techniques and practices. If craft-oriented occupations utilize technically advanced tools and equipment, this utilization must not affect the general skills and understanding required of the worker. To the contrary, occupations that are oriented towards the operation of tools, machinery and industrial plants require a stronger understanding of the workings of the machinery and equipment, the ability to assess their operation and potential malfunctioning. According skill requirements are associated more closely with the machine operation than with the transformation process and its outcome and are classified among plant and machine operators and assemblers (major group 8). Occupations related to product assembly from component parts under strict rules and procedures belong to the same major group as machine-oriented occupations (major group

8). Finally, if jobs merely require low or elementary skills and little or no understanding of the transformation process or the workings of the machinery and equipment, they are classified among the elementary occupations (major group 9).

Textile workers such as weavers and knitters and their helpers, for instance, are classified in three very distinct categories in *ISCO-88*: Weavers, knitters and related workers can perform their occupation as (i) Craft Workers (unit group 7432: Weavers, knitters and related workers), (ii) as Textile-Products Machine Operators (unit groups 8261: Weavers, knitters and related workers, and 8262: Weaving- and knitting-machine operators), or (iii) they may be Manufacturing Laborers and perform auxiliary tasks only (unit group 9322: Hand packers and other manufacturing laborers). *CBO-94*, on the other hand, takes a profession-based view and all weavers, knitters and their unskilled helpers are classified in detailed occupations within their according subgroup (“subgrupo”) 7-5 (compare 3.3).

Managerial occupations enter the *ISCO-88* system in three ways. First, *ISCO-88* makes a distinction between General managers of smaller operations and Corporate managers of larger operations. Second, Corporate managers are in turn classified according to their impact on the core business of an operation. Among the Corporate managers, *ISCO-88* classifies chief executive officers and directors in a unit group of their own, and classifies managers of the core business of an enterprise or organization in sector-specific unit groups but pools managers of support departments and staff divisions in general unit groups.

The criterion to separate Corporate from General managers in *ISCO-88* is the total number of managers at an enterprise or organization. Managers are Corporate managers if there is a total number of three or more managers at the enterprise or organization. Otherwise, managers are considered General managers. *CBO-94* does not make such a distinction. However, Brazilian data sources such as *Relação Anual de Informações Sociais (RAIS)* permit head counts of managers to refine the classification and thus make an adequate mapping to *ISCO-88* possible.¹

¹The task force harmonizing European occupational classifications on the basis of *ISCO-88* considered it an operational problem to count the total number of managers within an enterprise or organization to classify them as Corporate or General managers. Instead, *ISCO-88 (COM)* for the European Union uses the total number of employees within the administrative unit. The task force regarded the total number of administrative employees as more commonly available than information on the head count of managers. Accordingly,

3 Mapping *CBO-94* to *ISCO-88*

Although Brazil’s *CBO-94* applies a profession-based perspective to its occupational classification, whereas *ISCO-88* is geared to the skill requirements and complexity of jobs, the level of detail in the Brazilian *CBO-94* system permits the necessary re-classifications. Our proposed concordance *cbo2isco* completely and consistently transforms the Brazilian classification system *CBO-94* into the skill-oriented international system *ISCO-88*.

3.1 Guiding principles

The final two digits of the Brazilian five-digit classification system do not merely distinguish the individual 2,355 occupations. More systematically, Brazil’s *CBO-94* uses these final two digits to assess skill requirements of the occupations and assigns (i) suffix values between 01 and 10 to identify occupations of general or supervisory nature, (ii) suffix values between 11 and 89 to identify typical specialized occupations, and (iii) a suffix value of 90 to occupations that are not elsewhere classified. (We call the final two digits of Brazil’s five-digit code the suffix value.)

Occupations with a suffix value of 90 in the final two digits also include helpers, farm-hands, assembling laborers and other workers who perform auxiliary tasks. Therefore, elementary jobs are most likely to appear in these occupations. We account for this fact in our concordance to *ISCO-88*, where such auxiliary jobs are more frequently classified within the separate category of elementary occupations (major group 9) than others. Moreover, we consider base groups (“grupos base”) of occupations in Brazil’s *CBO-94* that do not contain any individual occupation ending in suffix values between 01 and 10 as typically requiring lower skills than neighboring base groups (“grupos base”) with suffix values between 01 and 10 (occupations of general or supervisory nature).

Being a profession-based occupational classification system, Brazil’s *CBO-94* groups laborers, craftsmen and manual workers, machine-operating workers, assemblers and fitters as well as their lower-level supervisors all within a general base group (“grupo base”) of occupations. However, the *CBO-94* job descriptions and several systematic qualifiers and keywords indicate skill requirements of the occupations. We exploit these features for our mapping to

managers working in organizations with fewer than 10 administrative employees are classified as General managers (Elias and Birch 1994).

ISCO-88. Table 6 summarizes the occupational qualifiers and keywords and their use for our mapping.

We generally map occupations with the *CBO-94* qualifier “à mão” to Craft and Related Trades Workers (major group 7 in *ISCO-88*) and occupations with “à máquina” to Plant and Machine Operators and Assemblers (major group 8 in *ISCO-88*). We frequently map *CBO-94* occupations with the keyword “auxiliar” to Elementary Occupations (major group 9 in *ISCO-88*) if the auxiliary occupation is related to services, agricultural professions, craftsmanship or equipment operation. However, if the auxiliary occupation is related to technical or clerical work, we generally map it to according unit groups at higher levels of skill requirement (such as major groups 3 and 4 in *ISCO-88*).

3.2 Managerial occupations

Brazil’s *CBO-94* classifies managers in individual occupations within the larger professional context. Corporate managers, for instance, fall among administrative and similar workers (main group 3). General managers of smaller or larger operations in commerce, tourism and personal services, agriculture, mining and manufacturing appear as early individual occupations within their respective main groups (4 through 9). Depending on the profession, Brazil’s *CBO-94* can also classify managers among individual occupations ending in two-digit suffix values between 01 and 10.

Brazil’s classification of managers within their respective professional contexts simplifies their mapping to *ISCO-88* for our purposes. *ISCO-88* classifies corporate managers with regard to the core business of the enterprise or organization they manage, and pools managers of support departments and staff divisions in according general unit groups. Our concordance *cbo2isco* replicates the classification of corporate managers to appropriate unit groups for support departments and staff divisions (minor group 123).

However, *ISCO-88* separates Corporate from General managers. To make the distinction, *ISCO-88* uses the total number of managers at an operation: Managers are Corporate managers if there is a total number of three or more managers at the enterprise or organization. Otherwise, managers are considered General managers. *CBO-94* does not make such a distinction. By default, our mapping assigns managers primarily to the minor group 131: General Managers in *ISCO-88*. However, if their enterprise or organization employs three or more managers, these assignments have to be altered manually to the according unit groups for Corporate managers in *ISCO-88* minor group 122:

Table 6: OCCUPATIONAL QUALIFIERS AND KEYWORDS IN *CBO-94*

<i>CBO-94</i>	<i>ISCO-88</i> (translation and/or mapping)
<i>Qualifiers</i>	
à mão	manual
à máquina	machine-operating
<i>Keywords</i>	
Auxiliar	Assistants, Associates (mostly clerical occupations)
Montador	Fitters, Assemblers (within their unit group)
Confeccionador	Makers, Assemblers (within their unit group)
Contramestre	Foremen (within their unit group)
Supervisor	Supervisors (within their unit group, unless managers)
Mestre	Corporate managers ^a (fishery only, minor group 122)
Patrão	General managers ^a (minor group 131)
Capataz	Corporate managers ^a (minor group 122)
Chefe	Corporate managers ^a (minor groups 122 or 123)
Gerente	Corporate Managers ^b (minor groups 122, 123 or 131)
Administrador	General Managers ^d (minor group 131 ^c)
Diretor	Directors and chief executives ^d (minor group 131 ^d)

^aIrrespective of head-count rule, see sections 2.3 and 3.2.

^bDistinction by head-count rule necessary, see sections 2.3 and 3.2. Refer to table 7 for according reassignments.

^cExcepting accounting

^dExcepting education and the arts

Production and Operations Department Managers (compare table 7).

Brazilian labor market and worker data such as *Relação Anual de Informações Sociais (RAIS)* permit head counts of managers by plant so that the classification can be refined accordingly.

3.3 Craftsmanship, manufacturing work, and elementary occupations

The profession-based view of Brazil's *CBO-94* system is a concern especially for craftsmanship, manufacturing work, and elementary occupations. In those

Table 7: MANAGERIAL OCCUPATIONS IN *ISCO-88*

Corporate ^a managers	General	in/of sector
1221	1311	in agriculture, hunting, forestry and fishing
1222	1312	in manufacturing
1223	1313	in construction
1224	1314	in wholesale and retail trade
1225	1315	of restaurants and hotels
1226	1316	in transport, storage and communications
1227	1317	of business services
1228	1318	in personal care, cleaning and related services
1229	1319	not elsewhere classified (n.e.c.)

^aProduction and operations department managers in the enterprise or organization (minor group 122). To be assigned whenever a general manager (by default mapped to minor group 131 in our concordance *cbo2isco*) works at an enterprise or organization with three or more managers.

occupations, skill requirements are the major criterion of classification for *ISCO-88*. But *CBO-94* only discerns skill requirements at the finest level of individual occupations through the job description or the suffix value of the final two digits in the five-digit code.

Returning to our example of weavers and knitters and their helpers from section 2.3 above, Brazil's *CBO-94* classifies weavers, knitters and their unskilled helpers in 65 detailed occupations within subgroup ("subgrupo") 7-5 (spinners, weavers and knitters, fiber dyers, and similar workers). Some of those occupations are based on craftsmanship, others involve machine operations, still others may only require elementary skills. Recall that these textile workers are classified in mainly three distinct categories in *ISCO-88*: Weavers, knitters and related workers can perform their occupation as (i) Craft Workers (unit group 7432: Weavers, knitters and related workers), (ii) as Textile-Products Machine Operators (unit groups 8261: Weavers, knitters and related workers, and 8262: Weaving- and knitting-machine operators), or (iii) they may be Manufacturing Laborers and perform auxiliary tasks only (unit group 9322: Hand packers and other manufacturing laborers).

Concrete job descriptions such as ‘Lace makers, manual’ (“Passamaneiro, à mão”) or ‘Lace makers, machine-operating’ (“Passamaneiro, à máquina”) permit a distinction between craftsmen and machine operators when we map to *ISCO-88*. In addition, we exploit the fact that *CBO-94* assigns a suffix value of 90 to the final two digits of the five-digit occupation code if workers perform auxiliary tasks. Although a suffix value of 90 also goes to occupations not elsewhere classified and to emerging or disappearing occupations within the base group, we consider it highly likely that less skill-intensive jobs frequently appear among the occupations with a suffix value of 90.

For instance, among the jersey and sock weavers in base group (“grupo de base”) 7-55, we map the weavers with codes 7-55.20 through 7-55.37 to the unit group 8262: Weaving- and knitting-machine operators in *ISCO-88*. However, we map 7-55.90, other jersey weavers not elsewhere classified, to the less skill-requiring unit group 7432: Weavers, knitters and related workers in *ISCO-88*. In *CBO-94*’s base group (“grupo de base”) 7-59, which itself embraces many textiles workers not elsewhere classified, we map the remaining lace makers, knitters and hammock makers in occupations 7-59.20 through 7-59.80 to both 8262 (Weaving- and knitting-machine operators) and to 7432 (Weavers, knitters and related workers) in *ISCO-88*, depending on the degree of craftsmanship or machine operation that their jobs entail. However, we map the *CBO-94* occupation 7-59.90, where all other spinners, weavers, dyers and related workers not elsewhere classified fall, to the lowest skill-requiring elementary occupations in 9322 (Hand packers and other manufacturing laborers) in *ISCO-88*.

We intend such mappings to account for lower skill-requiring, auxiliary and elementary occupations that are less explicit in Brazil’s *CBO-94* system, whereas *ISCO-88* discerns them in detail. Clearly, many of these mappings involve judgements. To alert the user of possibly problematic cases, we list concordances that deserve special attention in table 10 at the end of this manual. In fact, we regard the last example of a mapping from base group (“grupo de base”) 7-59 to 9322 (Hand packers and other manufacturing laborers) in *ISCO-88* as a potentially problematic case.

As for craftsmanship and manufacturing work, elementary occupations may also trouble mappings to service occupations and agricultural or fishery occupations. Brazil’s profession-based view in *CBO-94* may result in a too skill-intensive classification when certain occupations are mapped to *ISCO-88*. The first three entries in table 10 (at the end of this manual) reflect potentially problematic cases for service occupations and agricultural or fishery occupa-

Table 8: DELIBERATELY UNMAPPED UNIT GROUPS IN *ISCO-88*

<i>ISCO-88</i>	<i>ISCO-88</i> description ^a	<i>CBO-94</i> reverse ^b
1130	Traditional chiefs and heads of villages	2-12.20
1141	Senior officials of political-party organizations	-
1142	Senior officials of ... economic-interest organizations	3-19.70
1143	Senior officials of humanitarian ... organizations	0-73.10
3241	Traditional medicine practitioners	5-72.90
3242	Faith healers	5-72.90
3480	Religious associate professionals	-
5151	Astrologers and related workers ^c	1-99.60
5152	Fortune-tellers, palmists and related workers	1-99.60
6210	Subsistence agricultural and fishery workers	6-11.90
5139	Personal care and related workers n.e.c.	5-40.90
5142	Companions and valets	5-40.90
1210	Directors and chief executives ^d	-

^aDescriptions may be altered to fit.

^bPossible reverse mapping from *ISCO-88* to *CBO-94*.

^cUnexpectedly mapped from 1-99.60.

^dReassignment through head-count rule necessary, see sections 2.3 and 3.2.

tions.

3.4 Informal occupations and unmapped unit groups

Non-occupations from base group (“grupo de base”) 9.99 in Brazil’s *CBO-94* have no correspondence in the international system *ISCO-88*. These non-occupations are 9-99.10 Person searching for the first job, 9-99.20 Workers with declared but unidentified occupations, and 9-99.30 Workers with undeclared occupations.

Despite the considerably finer degree of detail in the Brazilian classification *CBO-94*, there are some unit groups in *ISCO-88* which do not get mapped from any occupation in *CBO-94* under our proposed concordance *cbo2isco*. Unmapped *ISCO-88* unit groups arise for mainly two reasons.

Table 9: OTHER UNMAPPED UNIT GROUPS IN *ISCO-88* UNDER *cbo2isco*

<i>ISCO-88</i>	<i>ISCO-88</i> description ^a	<i>CBO-94</i> reverse ^b
3151	Building and fire inspectors	0-39.90
3441	Customs and border inspectors	3-12.90 and 3-13.90
4214	Pawnbrokers and money-lenders	3-39.90
5139	Personal care and related workers n.e.c.	5-40.90
5142	Companions and valets	5-40.90
6142	Charcoal burners and related workers	6-59.20
6154	Hunters and trappers	6-73.90
8162	Steam-engine and boiler operators	7-44.90

^aDescriptions may be altered to fit.

^bPossible reverse mapping from *ISCO-88* to *CBO-94*.

First, several unit groups in *ISCO-88* refer to *informal* occupations that are not explicitly listed in Brazil’s *CBO-94* since the classification system was designed mainly for formal-sector employment. Table 9 lists unit groups with informal occupations such as faith healers, fortune-tellers, subsistence agricultural and fishery workers, or companions and valets. Similarly, traditional chiefs of villages, and senior officials of political, social or humanitarian organizations are not covered. Expectedly, our proposed concordance *cbo2isco* does not map any individual *CBO-94* occupation to them.

Second, several unit groups in *ISCO-88* remain unexpectedly unmapped because the *ISCO-88* system happens to exhibit a finer degree of detail than Brazil’s *CBO-94*. With only one exception (unit group 3441: Customs and border inspectors), the reverse mapping from *ISCO-88* back to Brazil’s *CBO-94* would be unique. Generally, this reverse mapping goes to *CBO-94* occupations with a suffix value (final two digits of Brazil’s five-digit code) of 90. Occupations with a suffix value of 90 include residual and other jobs, not elsewhere classified. The *ISCO-88* remain unmapped because we prefer to map these residual jobs in Brazil’s *CBO-94* system to different and generally broader (residual) categories in *ISCO-88*.

The treatment of public-administration jobs in *CBO-94* may potentially

pose additional difficulties. Elias and Birch (1994) observe similar problems with *ISCO-88* in a cross-national application for member countries of the European Union. Unit groups 3151: Building and fire inspectors, and 3441: Customs and border inspectors (table 9), for instance, remain unmapped. In general, the assignment of adequate skill requirements to public-administration jobs in *CBO-94* and in *ISCO-88* remains unresolved.

Table 10: POTENTIALLY PROBLEMATIC MAPPINGS IN *cbo2isco*

<i>CBO-94</i>	<i>CBO-94</i> description (translation) ^a	<i>ISCO-88</i>	<i>ISCO-88</i> description ^a
4-52.90	Other street vendors, door-to-door ...	5230	Stall and market salespersons
6-39.50	Specialized day laborers in agriculture	6114	Mixed-crop growers
6-39.90	Other specialized agricultural workers ...	6114	Mixed-crop growers
9-51.10	Bricklayers, general	7121	Builders, traditional materials
9-31.30	Metal structure painters	7142	Varnishers and related painters
8-59.90	Other electricians, electronic workers ...	7241	Electrical mechanics and fitters
8-51.90	Other electrical-equipment assemblers	7241	Electrical mechanics and fitters
8-52.90	Other electronic-equipment assemblers	7242	Electronics fitters
8-90.90	Other glass blowers, molders ...	7322	Glass makers, cutters, grinders ...
9-21.50	Assemblers (cut and folded materials)	7341	Compositors, typesetters ...
9-21.90	Other printing and similar workers	7341	Compositors, typesetters ...
7-75.40	Cheese makers	7413	Dairy-products makers
7-75.30	Butter makers	7413	Dairy-products makers
7-81.90	Other tobacco workers	7416	Tobacco preparers ...
7-83.90	Other cigarette makers	7416	Tobacco preparers ...
7-59.90	Other spinners, weavers, dyers ...	7432	Weavers, knitters ...
7-99.90	Other sewers, upholsterers ...	7436	Sewers, embroiderers ...

^aDescriptions may be altered to fit.

Table 10: POTENTIALLY PROBLEMATIC MAPPINGS IN *cbo2isco*, cont'd

<i>CBO-94</i>	<i>CBO-94</i> description (translation) ^a	<i>ISCO-88</i>	<i>ISCO-88</i> description ^a
7-11.70	Mineral graders	8112	Mineral-ore-processing-... operators
8-39.80	Cutting machine operators	8211	Machine-tool operators
8-39.15	Blacksmiths	8211	Machine-tool operators
8-39.90	Other metal processing workers	8211	Machine-tool operators
9-22.80	Cut and folded materials printers	8251	Printing-machine operators
7-75.60	Margarine production workers	8272	Dairy-products machine operators
7-79.90	Other food and beverage ... workers ...	8275	Fruit-processing-machine operators
7-79.60	Ration preparers	8275	Fruit-processing-machine operators
7-79.70	Vegetable and grain preparation operators	8275	Fruit-processing-machine operators
9-02.40	Tire repair workers	8284	Rubber-products assemblers
9-02.90	Other tire vulcanization ... workers	8284	Rubber-products assemblers
4-52.20	Street vendors	9111	Street food vendors
4-32.20	Street vendors	9112	Street vendors, non-food products
4-32.90	Other street vendors, sales ...	9112	Street vendors, non-food products
6-59.90	Other forestry workers n.e.c.	9212	Forestry laborers
6-64.90	Other water related workers	9213	Fishery, hunting ... laborers
9-59.90	Other civil construction ...	9313	Building construction laborers
9-91.90	Other unskilled workers n.e.c.	9321	Assembling laborers
7-59.90	Other spinners, weavers, dyers ...	9322	Hand packers and other ...

^aDescriptions may be altered to fit.

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