- When comparing the percentage of State vendors that are HUBs to the availability of HUBs in Texas, we find that there has been some improvement in the representation of HUBs in the State's vendor pool, particularly for African Americans and white women. However, each race/ethnic/gender group continues to be substantially underrepresented. In all cases, the underrepresentation of HUBs is statistically significant.

(ii) **Professional Services**

- Based on their availability, HUBs as a group received 58 percent of their expected professional services dollars, an improvement from the 34 percent received during the pre-program period. The disparity is statistically significant.

- White woman-owned firms continued to be the most underutilized of the HUB subgroups, receiving only 34 percent of the professional services dollars we would expect them to get based on their availability in the marketplace. While this was a substantial improvement over the 10 percent they received during the pre-program period, the disparity remains substantial and is statistically significant.

- Hispanic and African American-owned professional services firms fared worse during FY92/93 than during the pre-program period. They received 36 percent and 40 percent of their expected share of dollars, respectively, given their availability in the marketplace.

- Asian and other minorities continued to receive more than their expected share of dollars based on their availability in the marketplace.[113]

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[113] During the program period, we find the distribution of Asian professional services dollars across the Asian subgroups to be as follows: 67 percent paid to Asians, 5 percent paid to Asian Indians and 28 percent paid to Native Americans. As the information on race of the State's vendors was derived from HUB directory data, we were only able to distinguish Asian Indians from Asians to the extent that these groups were distinguished in the directories. We would expect, however, that there are a fair number of Asian Indians identified simply as Asian.

We also compared disparities for Native American-owned businesses to disparities for Asian-owned businesses using the method described in the previous footnote. For the program period, the disparity ratio for Native American-owned firms in construction was extremely low compared to that for Asian-owned firms (6 for Native Americans versus 95 for Asians), in professional services, both ratios are greater than 100, but that Native American ratio is much higher (411 for Asians, 2191 for Native Americans). In other services, the disparity ratio for Native Americans was roughly half that for Asians, but both were better than in the pre-program period (20 for Native Americans and 47 for Asians). Finally, in commodities in the pre-program period, Native Americans had a disparity ratio much greater than 100 while Asians still had a substantial disparity (ratios were 294 for Native Americans and 80 for Asians).

- When comparing the percentage of State vendors that are HUBs to the availability of HUBs, we find that each race/ethnic/gender group continues to be substantially underrepresented. Disparities range from 7 percent (white woman-owned firms) to 45 percent (African American-owned firms). All disparities are statistically significant.

(iii) **Other Services**

- HUBs as a group, and all HUB subgroups, continued to be substantially underutilized in other services. No HUB subgroup received more than 45 percent of their expected service dollars based on their availability. Disparities for Hispanic and white woman-owned firms were statistically significant.

- We find that each race/ethnic/gender group continues to be substantially underrepresented in the State's vendor pool compared to the availability of HUBs in the marketplace. In all cases, the underrepresentation of HUBs is statistically significant.

(iv) **Commodity Purchasing**

- HUBs (as a group) fared better under the State's HUB program than in the pre-program period. They received 78 percent of their expected share of commodity dollars based on their availability in the marketplace.

- Disparities for African American and Hispanic-owned firms increased during FY92/93. In both cases, the disparities were found to be statistically significant.

- Disparities were eliminated for Asian-owned firms under the State's HUB Program. While they received only 51 percent of their expected share of dollars during the pre-program period, they received 76 percent more than their expected share of dollars, given their availability, under the State's HUB Program.[114]

- As with the other procurement categories, HUBs continue to be underrepresented in the State's vendor pool based on their availability in the

[114] During the program period, we find the distribution of Asian commodities dollars across the Asian subgroups to be as follows: 56 percent paid to Asians, 24 percent paid to Asian Indians and 21 percent paid to Native Americans. As the information on race of the State's vendors was derived from HUB directory data, we were only able to distinguish Asian Indians from Asians to the extent that these groups were distinguished in the directories. We would expect, however, that there are a fair number of Asian Indians identified simply as Asian.

marketplace. While there have been improvements made, these disparities continue to be statistically significant.

3. Disparity Results at the Subcontractor Level

Tables 3.13 and 3.14 report the disparity results at the subcontractor level for the pre-program period and program periods for the five State agencies (GSC, TDCJ, MHMR, UT-Systems and TAMU-Systems) and TxDOT, respectively. The first column repeats the utilization figure (by subcontracts) from Table 3.7.[115] The second column reports the availability percent (weighted by subcontracts) for the applicable procurement category and race/ethnic/gender group. The third column reports the disparity ratio, the percent utilization over the percent available, by subcontracts. In Table 3.14, three additional columns use dollar weights. The fourth column in that table repeats the utilization figure (by dollars) from Table 3.7. The fifth column reports the availability percent (weighted by dollars) for the applicable procurement category and race/ethnic/gender group. The sixth column reports the disparity ratio by dollars, again the ratio is the percent utilization over the percent available. An asterisk beside a disparity ratio indicates that it is statistically significant.

For the five State agencies (GSC, TDCJ, MHMR, UT-Systems and TAMU-Systems),

- During the pre-program period, in the absence of goals, HUBs, as a group, received 42 percent of the subcontracts we would expect them to receive given their availability in the marketplace. This share increased under the State's HUB program when HUBs received 56 percent of the subcontracts we would expect them to receive given their availability. In both periods, these disparities are both substantial and statistically significant.

- Minority-owned firms received 27 percent of their expected share of subcontracts given their availability during the pre-program period. African American-owned firms received 21 percent; Hispanic-owned firms received 27 percent and Asian-owned firms received 37 percent of the subcontracts we

[115] As discussed previously, the response rate to the prime contractor survey was too low to ensure reliable utilization and disparity results by dollars for the five State agencies. TxDOT provided subcontractor information, including dollars paid to subcontractors, on all State-funded prime contracts.

TABLE 3.13

SUMMARY OF DISPARITY RESULTS BASED ON THE NUMBER OF SUBCONTRACTS FOR SELECTED AGENCIES [1]

Race/Sex Group	Percent of Subcontracts: Utilization	Availability	Disparity Ratio
	(Percent)		
	(1)	(2)	(3)
Pre-Program Period [2]			
African American	0.3 %	1.5 %	21.4 *%
Hispanic	2.8	10.7	26.7 *
Asian & Other Minorities	0.3	0.9	37.2 *
MBE Subtotal	3.5	13.0	26.8 *
White Women	4.6	7.9	58.6 *
HUB Total	8.1	19.4	41.9 *
Program Period [3]			
African American	0.5 %	1.4 %	32.8 *%
Hispanic	3.6	9.9	36.7 *
Asian & Other Minorities	1.0	0.8	120.8
MBE Subtotal	5.1	12.1	41.9 *
White Women	5.0	7.5	67.0 *
HUB Total	10.1	18.2	55.7 *

Note: An asterisk (*) indicates that the disparity ratio is statisitcally significant at the five percent level.
[1]The agencies included are: Texas Department of Criminal Justice, General Services Commission, UT System, Texas A&M System, and the Department of Mental Health and Mental Retardation. Sufficient data were not available to analyze disparities based on subcontractor dollars.
[2]The pre-program period is defined as fiscal year 1989 through fiscal year 1991.
[3]The program period is defined as fiscal year 1992 through fiscal year 1993.

Source: Agency construction contract/subcontractor data. Prime contractor survey responses.
Prime contractor survey responses.

TABLE 3.14

SUMMARY OF DISPARITY RESULTS BASED ON THE NUMBER OF SUBCONTRACTS AND SUBCONTRACT DOLLARS FOR THE DEPARTMENT OF TRANSPORTATION

Race/Sex Group	Percent of Subcontracts			Percent of Subcontract Dollars		
	Utilization	Availability	Disparity Ratio	Utilization	Availability	Disparity Ratio
	(Percent)			(Percent)		
	(1)	(2)	(3)	(4)	(5)	(6)
Pre-program Period [1]						
African American	0.6 %	2.2 %	26.6 * %	0.3 %	2.1 %	16.4 %
Hispanic	5.1	18.3	27.8 *	6.4	17.4	36.9
Asian & Other Minorities	0.5	0.8	66.0	1.4	0.7	216.6
MBE Subtotal	6.2	21.2	29.1 *	8.2	20.1	40.7
White Women	21.7	9.9	219.2 *	13.9	8.2	169.3
HUB Total	27.9	29.2	95.6	22.1	26.7	82.7
Program Period [2]						
African American	2.4 %	2.6 %	92.7 %	6.6 %	2.4 %	280.9 %
Hispanic	5.6	15.1	37.5 *	15.0	16.4	91.2
Asian & Other Minorities	1.1	0.8	136.1	1.2	0.9	131.2
MBE Subtotal	9.2	18.5	49.6 *	22.8	19.7	115.8
White Women	25.3	11.5	218.8 *	13.9	8.3	167.7
HUB Total	34.4	27.7	124.2 *	36.7	26.3	139.4

Note: An asterisk (*) indicates that the disparity ratio is statisitcally significant at the five percent level.
[1]The pre-program period is defined as fiscal year 1989 through fiscal year 1991.
[2]The program period is defined as fiscal year 1992 through fiscal year 1993.

Source: TxDOT contract/subcontract data for State-funded construction contracts.

would expect them to receive given their availability in the marketplace. In each case these disparities are statistically significant.

- During the pre-program period, white woman-owned firms received almost 59 percent of the subcontracts we would expect them to receive given their availability in the marketplace.

- During the program period minority-owned firms received 42 percent of their expected share of subcontracts given their availability. African American-owned firms received 33 percent and Hispanic-owned firms received 37 percent of the subcontracts we would expect them to receive given their availability in the marketplace. In each case these disparities are statistically significant.

- In contrast to the other minority subgroups, disparities for Asian-owned firms were eliminated during the program period.

- The disparity for white woman-owned firms decreased during the program period but remained substantive and statistically significant.

For TxDOT,

- During the pre-program period, when TxDOT applied its 10 percent DBE goal to State funded projects, HUBs received 96 percent of the subcontracts and 83 percent of subcontractor dollars we would expect them to receive given their availability in the marketplace.

- Minority-owned firms received 29 percent of the subcontracts and 41 percent of the dollars we would expect them to receive given their availability in the marketplace during the pre-program period.

- In contrast to the other HUB subgroups, white woman-owned firms received more than their expected share of subcontracts and subcontractor dollars given their availability in the marketplace during the pre-program period.

- During the program period, when TxDOT attempted to achieve the 30 percent goal set by the State, HUBs received more than their expected share of subcontracts and subcontractor dollars given their availability in the marketplace.

- Under the State's HUB program, the decrease in disparity was especially dramatic for minority-owned businesses. Minority-owned businesses received 50 percent of the subcontracts and 116 percent of the dollars that we would expect them to receive given their availability during the program period.

- As in the pre-program period, white woman-owned businesses received more than their expected share of subcontracts and subcontractor dollars given their availability in the marketplace during the program period.

4. Detailed Findings for State Agencies

The disparity results for particular State agencies vary somewhat from the disparities found for the State as a whole. For example, during the pre-program period HUBs received 45 percent of their expected share of State construction dollars; by agency the disparities ranged from 21 percent of expected construction dollars (Texas Parks and Wildlife Department) to almost 50 percent of expected construction dollars (TxDOT) given HUB availability in the marketplace.

During the pre-program period:[116]

- In construction, HUBs received between 21 percent (Texas Parks & Wildlife Department) and 50 percent (TxDOT) of their expected share of dollars, given their availability in the marketplace.

- In professional services, HUBs received between 2 percent (University of Texas campuses and System) and 40 percent (TxDOT) of their expected share of dollars given their availability in the marketplace.

- In other services, HUBs received between 15 percent (Texas Parks & Wildlife Department) and 39 percent (the General Service Commission) of their expected dollars given their availability in the marketplace.

- In commodity purchasing, HUBs received between 33 percent (Texas Parks & Wildlife Department) and 100 percent (the General Service Commission) of their expected share of dollars given their availability in the marketplace.

[116] Results reported in the text are based on an analysis of the State's central payment data. These findings are presented in Appendix A. Findings based on an analysis of the agencies' own data are presented in Appendix B.

<u>During the program period</u>:

- In construction, HUBs received between 24 percent (the General Service Commission) and 58 percent (TxDOT) of their expected share of dollars, given their availability in the marketplace.

- In professional services, HUBs received between 11 percent (Texas A&M University campuses and System) and 84 percent (Texas Department of Criminal Justice) of their expected share of dollars given their availability in the marketplace.

- In other services, HUBs received between 13 percent (Comptroller) and 73 percent (University of Texas campuses and System) of their expected dollars given their availability in the marketplace.

- In commodity purchasing, HUBs received between 57 percent (Texas Department of Criminal Justice) and 136 percent (Comptroller) of their expected share of dollars given their availability in the marketplace.

Disparities for detailed race and gender groups also vary across agencies within procurement categories. For example, during the pre-program period, minority-owned firms in construction received no more than 35 percent of the dollars we would expect them to receive given their availability in the marketplace. In contrast, white woman-owned firms received between 32 percent (University of Texas campuses and System) and 95 percent (TxDOT) of their expected share of construction dollars given their availability in the market.

We report agency disparity results based on the central payment data in the disparity tables in Appendix A. Agency disparity results based on the agency's own data are reported in the disparity tables in Appendix B.[117]

[117] For some agencies in particular procurement categories, there are too few vendors or contracts to report statistically reliable utilization statistics.

5. Summary of Findings

The results of our statistical analysis show that, in the absence of the State's HUB Program, HUBs, as a group, were underutilized in all major procurement categories. HUBs, as a group, fared somewhat better under the State's HUB Program, although the disparities remained substantial across procurement categories.

In construction, all HUB subgroups, except for white women, were substantially underutilized.[118] African American-owned firms fared worse than the other subgroups at both the prime and the subcontractor level. At the prime contractor level, African American-owned firms received no more than 3.2 percent of the dollars we would expect them to receive given their availability in either the pre-program or program period. As subcontractors, African American-owned firms received no more than 33 percent of their expected share of subcontracts, given their availability, during either period. In contrast, white woman-owned firms showed no substantial disparity at the prime contractor level, receiving almost 89 percent of their expected share of dollars during the pre-program period and 99 percent of their expected share of dollars under the State's HUB Program. At the subcontractor level, white woman-owned firms received between 59 and 67 percent of the subcontracts we would expect them to receive, based on availability, during the pre-program and program periods, respectively.

Greater detail on the results for white woman-owned firms in construction is provided by the disparity results for the individual agencies (Appendix A) and for the State at the two-digit SIC level of detail (Appendix H). A review of the agency results show that white woman-owned firms received 95 percent or more of their expected share of TxDOT construction dollars during both periods, given

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[118] When we estimated Native American and Asian utilization and availability in a separate analysis, we found that Asians specifically were not underutilized in construction in the program period, although Native Americans were.

their availability in the marketplace. For all other agencies, white woman-owned firms were substantially underutilized. This result may be due, in part, to the fact that TxDOT tried to achieve its 10 percent DBE goal mandated for federal projects on State-funded projects as well in the period before the State had a program. Because TxDOT is the State's largest procurer of construction services, the agency result drives the overall State disparity result. An examination of disparities for the State at the two-digit SIC level of detail further supports this hypothesis. Here we find that there are no disparities for white woman-owned firms in heavy construction (SIC16), which is the primary type of construction service procured by TxDOT, and in specialty trade construction (SIC17). There are, however, substantial disparities for white woman-owned firms in building construction (SIC15); this category generally accounts for the larger construction procurements of the other State agencies.

In professional services, we find very different results. Here, all HUB subgroups, except for Asian and other minorities, are substantially underutilized. White woman-owned firms are the most underutilized of any of the HUB subgroups; they receive no more than 34 percent of their expected share of dollars during either period. In contrast, Asian and other minorities received 51 percent more than their share of dollars during pre-program and 175 percent more during the program period, given their availability in the marketplace.

In other services, no HUB subgroup received more than 45 percent of their expected share of dollars during either the pre-program or program period, given their availability. Asian and other minorities were the most underutilized (9.0 percent) during the pre-program period. However, under the State's HUB Program, utilization of Asian and other minority firms increased and, while the disparity remained substantial (45 percent), this group fared better than the other HUB subgroups during the program period.

In commodity purchasing, the disparity results shift dramatically between the pre-program and program periods. For example, during the pre-program period, all HUB subgroups except African Americans were substantially underutilized. However, during the program period, African American-owned firms received only 33 percent of their expected share of dollars and Asian and other minorities received more than their share of dollars, given their respective availabilities.[119]

The State, therefore, underutilized HUBs in both the pre-program and the program periods. In the next chapter, we examine whether HUBs fare better or worse in the private sector than in the public sector.

[119] Again, when we estimated Native American and Asian utilization and availability in a separate analysis, the disparity in commodities for Asians specifically was about 80, whereas that for Native Americans was roughly 200 (no underutilization).

Appendix to Chapter 3

The correct t-statistic is given by:

$$t = \frac{\hat{d} - d_0}{\sqrt{\dfrac{d_0(1-d_0) * \sum c_i^2}{(\sum c_i)^2}}}$$

where $\begin{cases} \hat{d} = \text{ratio of HUB dollars to total dollars} \\ d_0 = \text{ratio of HUBs to total available firms} \\ c_i = \text{dollar payments for contract i} \end{cases}$

Using only vendor data it was not possible for us to calculate this t-statistic precisely because we did not know the c_i terms: we do not have data on payments by contract. However, the sum of contract payments,

$$(\sum c_i)$$

is equal to the sum of dollars paid to vendors, or

$$(\sum f_j)$$

where f_j is the dollars paid to vendor j, since both sums are equal to total payments. Since we know the value of $(\sum f_j)^2$, we need only an estimate of $\sum c_i^2$ to correct the t-statistic.

We estimated $\sum c_i^2$ by applying a correction factor based on available data detailing contract payments to different vendors. The correction factor was as follows:

$$\left[\frac{(\sum C_i^2)}{(\sum F_k^2)}\right]$$

where C_i is the dollars paid to contract i and F_k is the dollars paid to vendor k. The values for C_i and F_k were drawn from procurement/payment data for TDCJ, the GSC, TPWD and the Comptroller.[120] The correction factor describes the relative variability of contract dollar amounts compared to the variability of vendor dollar amounts. While the correction factor will always be less than one, it will be closer to one the more similar are the amounts paid per contract compared to the amounts paid to different vendors. At the end of this Appendix, we present a more detailed discussion of these properties of the correction factor.

We used the correction factor to estimate $\sum c_i^2$ as follows:

$$\sum c_i^2 = \left(\sum f_j^2\right) * \left[\frac{\left(\sum C_i^2\right)}{\left(\sum F_k^2\right)}\right]$$

That is, to estimate the sum of squared contract dollar terms we multiply the sum of squared payments to vendors by a ratio that describes how much smaller the sum of squared contract dollar terms should be relative to the sum of squared payments to vendors based upon a sample of available contract data.

We calculated separate estimates and separate correction factors following this procedure for each procurement category: construction, professional services, other services and commodities.

The Correction Factor:

The following factors are vital to understanding the properties of the correction factor. First, $\sum C_i$ and $\sum F_k$ must be equal. That is, the actual contract payments, C_i, and vendor payments, F_k, may differ in size or in number, but they must sum to the same total amount paid. Second, while each vendor may receive payments from more than one contract, each contract is written with only one vendor: each F_k consists of one or more C_i. This means that the set of contract

[120] TDCJ, GSC, TPWD and the Comptroller provided their respective agency's payment data reporting the total dollars paid to individual contracts and purchase orders. The data included information on the contract, including the date of award and/or date of first payment, total dollars paid to date and the State's object code for which the largest payment on the contract was made. The data also included vendor information including the vendor identification number and address.

payments will consist of more payments than the set of vendor payments, and the contract payment amounts cannot be larger than the amounts paid to related vendors. Third, a mathematical property dictates that the sum of a set of squared numbers will be lower if (1) the numbers in the set are more uniform in size, and (2) there are more numbers in the set. To illustrate the first condition, consider the two sets of number {4,4,1} and {3,3,3}. Each set of numbers sums to 9, but $4^2+4^2+1^2=33$ compared with $3^2+3^2+3^2=27$: the set of more uniform numbers sums to a lower number when squared. To illustrate the second condition, consider the two sets of number {6,4,2} and {3,3,4,2}. Each set sums to 12, but $6^2+4^2+2^2=56$, compared with $3^2+3^2+4^2+2^2=38$: the set with more numbers sums to a lower number when squared.

Taking these factors together, we see that the ratio we use as a correction factor will always be less than one because there are more contract payments than vendor payments. Further, the ratio will be larger (closer to one) the more similar is the variability of contract payments to the variability of vendor payments. If there are many more contract payments than vendor payments and some of the contracts are very small and others are very large, the correction factor will be much smaller than one. Therefore, when we multiply the sum of squared vendor data by the correction factor, the factor scales the sum downward appropriately to reflect just how much smaller we expect the sum would have been if the total dollars had been broken into contract amounts instead of vendor amounts.

CHAPTER 4
STATISTICAL ANALYSIS OF HUB BUSINESS UTILIZATION IN THE PRIVATE SECTOR

In this chapter we examine whether and to what extent HUBs have been utilized in the private sector in Texas. In doing so, we respond to the following questions:

- What percentage of small businesses in Texas are HUBs?
- To what extent have small HUBs been utilized in the private sector?
- Have small HUBs been utilized to the extent that they are available in the private sector?
- Is there evidence of disparity in the State's marketplace that may, under *Croson*, suggest a need for remediation?

It is useful to examine HUB utilization in the private sector for at least four reasons.[121] First, to the extent that discriminatory practices limit the ability of HUBs to compete, those practices are likely to be felt in the private as well as the public sector. For example, discrimination in lending would affect the availability of working capital for HUBs who do private as well as public-sector work. Second, the utilization of HUBs in the private sector gives us a picture of the extent to which HUBs are used in the absence of affirmative-action efforts, since few firms in the private sector make such efforts. This analysis therefore supplements our analysis of the utilization of HUBs by the State of Texas in the pre-program period. Third, the data used to estimate private sector utilization (i.e., HUB revenues divided by total revenues) and private sector HUB availability (i.e., HUB firms divided by total firms) are restricted to sole proprietorships, partnerships and Subchapter S corporations. By excluding large corporations which are generally non-HUBs, we will be able to examine how HUBs fare with respect to similar non-HUB firms. Fourth, in its *Croson* decision, the Court indicated that "passive participation" in discrimination by a municipality may provide, in itself, the "compelling governmental interest" necessary to support a program.[122] "Passive participation" has been interpreted by the courts to include evidence of systematic discrimination in relevant local private industries.[123]

In the first section of this chapter, we describe our calculation of private sector availability. This calculation of availability is similar to the methodology applied in the public sector calculations.

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[121] Several courts have accepted or suggested examining disparities in the private sector. For example, see *Associated General Contractors of Connecticut, et al. v. Gity of New Haven*, 791 F. Supp. 941 (D. Conn. 1992) and *Concrete Works of Colorado, Inc. v. Denver*, 823 F. Supp. 821, 834 (D. Colo. 1993).

[122] For a deeper discussion of the interpretation of "compelling governmental interest," see Chapter 7, Section II.A., *infra*.

[123] *Coral Construction Co. v. King County*, 941 F.2d 910. 927 (9th Cir. 1991).

In the second section, we describe how we calculate HUB utilization in the private sector. In the third section, we compare private-sector utilization of HUBs to their availability.

We will report estimates of utilization and availability for three major procurement categories —construction, professional and other services, and commodity purchasing.[124] Although these three procurement categories are fairly broad, they have been selected because they are supported by the level of precision of the underlying data. We also report results for three major race groups (African Americans, Hispanics, and Asians, Native Americans and other minorities) and women. These are the groupings for which the most reliable data on HUBs are available. All of our results are based on establishments with paid employees. These establishments are restricted to sole proprietorships, partnerships and Subchapter S corporations. Unlike the analysis in Chapter 3, this analysis excludes 1120 corporations because, in the private sector, there is insufficient data to include 1120 corporations.[125]

I. Estimation of HUB Availability

We estimate *actual availability* of HUBs in the private sector in a manner similar to the way we estimate availability of HUBs for our public-sector analysis. Actual availability is the percent of all establishments that are HUBs in each two-digit SIC code industry. For private sector availability, we use three sources of data. First we use the 1987 *Census of Minority and Women Owned*

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[124] Construction includes of building construction, heavy construction and special trade construction. Services include finance, insurance and real estate; engineering, accounting, research and management services; business services such as advertising; transportation services; repair services; health services; legal services; personal services such as cleaners; social services; and educational services. Commodity purchasing includes manufacturing, wholesale trade and retail trade.

[125] To the extent that 1120 corporations tend to be large and large corporations tend to be non-HUBs, excluding 1120 corporations from our calculations will yield higher estimates of HUB availability.

Businesses to obtain the number of HUB establishments in each two-digit SIC code industry in Texas.[126, 127] Our second source is the 1987 *County Business Patterns* which we use to obtain the total number of establishments in each two-digit SIC code industry in the State.[128] Finally, we use the 1987 *Census of Industries Geographic Area Series* to obtain total industry revenues by two-digit SIC code industry.[129] We use these revenues to weight availability more heavily for those two-digit SIC code industries that account for a greater fraction of revenues in each procurement category.

The *County Business Patterns* data include establishments owned by 1120 corporations while the *Census of Minority and Women Owned Business* data include establishments organized as sole proprietorships, partnerships or Subchapter S corporations. To make our data sources consistent, we subtract the percent of establishments that are owned by 1120 corporations from the total number of establishments.[130] We first used the 1987 *Enterprise Statistics, Company Summary* to determine the percent of all firms that are corporations (1120 and Subchapter S) as opposed to sole proprietorships or partnerships.[131] We then used the 1987 *Statistics of Income, Corporation Income Tax Returns* to

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[126] To obtain the number HUB establishments at the two-digit SIC code level, we use the 1987 *Census of Minority and Women-Owned Businesses* computerized data.

[127] Because businesses owned by minorities and women are small, we expect that the preponderance of these businesses are single-establishment firms. We refer to the businesses reported in the *Census of Minority and Women-Owned Businesses* as establishments even though some of them could be multi-establishment firms.

[128] *County Business Patterns*, 1987, Bureau of Census.

[129] The 1987 *Census of Industries Geographic Area Series* includes the *Census of Construction*, *Census of Manufactures*, *Census of Wholesale Trade*, *Census of Retail Trade* and *Census of Service Industries*. U.S. Bureau of Census.

[130] In Chapter 3, we estimated the number of 1120 corporations using the GSC HUB Directory and the State's ES202 and sales tax data. We used this data to adjust our estimates of HUB availability. However, to estimate HUB utilization in the private sector, we would need to determine the revenues of HUB 1120 corporations. This information was not available.

[131] *Enterprise Statistics, Company Summary*, 1987, Bureau of the Census.

determine the percent of corporations that are 1120 corporations versus Subchapter S corporations.[132] Finally, we reduced the total number of establishments in the private sector by the percent of firms that are 1120 corporations nationally.[133,134]

To illustrate our approach, we describe our calculation of the percent of construction establishments owned by Hispanics. Construction consists of three two-digit SIC code industries: SIC15 (building construction), SIC16 (heavy construction) and SIC17 (special trade construction). For each two-digit SIC code industry we calculate $\mathbf{H_I}$ which denotes the availability of Hispanic-owned establishments in the two-digit SIC **I**. We also calculate $\mathbf{W_I}$ which denotes the fraction of total construction revenues in the two-digit SIC **I**. Then, we calculate the availability of Hispanic construction firms by:

$$H_{Const} = W_{15}H_{15} + W_{16}H_{16} + W_{17}H_{17}$$

where **CONST** denotes the major procurement category, in this case, construction. The same calculation is done for African American, Asian and woman-owned establishments and for commodities and services.

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[132] *Statistics of Income, Corporation Income Tax Returns*, 1987, U.S. Department of the Treasury, Internal Revenue Service.

[133] The estimated percent of businesses that are 1120 Corporations is based on national data. State and local data are not available. The actual percent in any particular geographic area may differ from than the national percent.

[134] In reducing the number of *establishments* by the percent of *firms* that are 1120 corporations, we are assuming that the percent of *establishments* that are owned by 1120 corporations is the same as the percent of *firms* that are 1120 corporations. In fact, we would expect that the percent of *establishments* that are owned by 1120 corporations is greater than the percent of *firms* since 1120 corporations tend to be larger multi-establishment firms. As a result, our calculations result in an overestimate of the number of establishments owned by firms that are not 1120 corporations and an therefore underestimate of the percent of establishments that are owned by minorities or women.

Table 4.1 provides an illustration of our calculation. In 1987, the percentage of all establishments in Texas that are Hispanic-owned ranges from 6 percent for heavy construction to approximately 16 percent for building construction and 40 percent for special trade construction. If the private sector procured solely from building construction establishments, we would consider the availability of Hispanic-owned construction establishments to be 16 percent. If the private sector procured solely from heavy construction establishments, we would consider availability to be 6 percent. In reality, the private sector procures from a mixture of two-digit SIC code industries. As shown in Table 4.1, the two-digit SIC code weighted average of availability for Hispanic construction establishments in Texas is 24 percent.

TABLE 4.1

HISPANIC AVAILABILITY
WEIGHTED BY THE TWO-DIGIT SIC CODE INDUSTRIES
IN WHICH THE PRIVATE SECTOR SPENDS ITS CONSTRUCTION DOLLARS
(Weights are based on 1987 construction revenues)

Industry	Fraction of Construction Firms that Are Hispanic-Owned	Fraction of Total Construction Spending in Two-Digit SIC Industries	Contribution to Overall Availability
Building Construction	15.5%	27.5%	4.3%
Heavy Construction	6.1	28.9	1.8
Specialty Construction	40.0	43.6	17.5
Weighted Average		100.0	23.5

Source: Census of Minority and Women-Owned Business computerized data, 1987
County Business Patterns computerized data, 1987
Census of Construction, Table 3, page TX-6, Column H.

II. Estimated Utilization of HUBs in the Private Sector

For construction, services and commodity purchasing, we calculated the total revenues received by HUBs in Texas. These data were obtained from the 1987 *Census of Minority and Women-Owned Businesses.*[135] The minority and woman-owned business data collected by Census are limited to sole proprietorships, partnerships and Subchapter S corporations.

We then divided total HUB revenues received by sole proprietorships, partnerships and Subchapter S corporations by the estimated total revenues of all sole proprietorships, partnerships and Subchapter S corporations in Texas. We estimated the total revenues of all sole proprietorships, partnerships and Subchapter S corporations from several sources. The 1987 *Census of Construction Industries*, *Census of Manufactures*, *Census of Wholesale Trade*, *Census of Retail Trade*, and *Census of Service Industries*[136] report the total sales of establishments in Texas for each of these major industry categories. These sources include establishments owned by 1120 corporations which are not included in the 1987 *Census of Minority and Women-Owned Businesses*. To estimate the percent of total revenues that were attributable to establishments owned by 1120 corporations, we first used the 1987 *Enterprise Statistics, Company Summary*[137] to determine the percent of all business receipts that were from corporations (1120 and Subchapter S) as opposed to sole proprietorships or partnerships. We then used 1987 *Statistics of Income, Corporation Income Tax Returns*[138] to determine the percent

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[135] To obtain the HUB revenues at the two-digit SIC industry level, we use the 1987 *Census of Minority and Women-Owned Businesses* reports.

[136] *Census of Construction*, *Census of Manufactures*, *Census of Wholesale Trade*, *Census of Retail Trade* and *Census of Service Industries*, Geographic Area Series, Texas, 1987, U.S. Bureau of Census.

[137] *Enterprise Statistics, Company Summary*, 1987, Bureau of the Census.

[138] *Statistics of Income—Corporation Income Tax Returns*, 1987. U.S. Department of the Treasury, Internal Revenue Service.

of corporate receipts that were attributable to 1120 corporations versus Subchapter S corporations.[139] Finally, we reduced the total revenues of establishments in the private sector by the percent of revenues that are attributable to 1120 corporations nationally.[140]

The Census revenue data include revenues from both private and public-sector sources. It is not possible to subtract public-sector revenues from the Census data. Given that public-sector agencies generally have affirmative action efforts to encourage HUB utilization, our estimates of utilization are probably higher than they would be had we been able to exclude public-sector revenues. For example, in 1987, the year on which our calculations are based, most of the construction contracts for the Texas Department of Transportation had HUB goals of 10 percent; most of these contracts were, in part, federally-funded and were therefore required to have goals under United States Department of Transportation guidelines.

III. HUB Disparity Analysis

We calculated a disparity ratio similar to that discussed in the last chapter. We did not have sufficient information to calculate the exact level of statistical significance of the disparity ratios. The test for statistical significance requires a calculation of the sum of the squared values of the individual contract amounts. Since the Census data sources provide only aggregate totals, we used vendor amounts to estimate contract size based on the distribution of payments described in Chapter 3. We used these estimates to calculate an approximate test of statistical significance; we believe that this

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[139] The estimated percent of business sales that are attributable to 1120 corporations is based on national data. State and local data are not available. The actual percent in any particular geographic area may differ from the national percent.

[140] Had we not made this adjustment, HUB utilization would have been lower and our results would have been biased towards finding disparities in HUB utilization.

test is conservative in that the true level of statistical significance is likely to be even greater than reported by the test.[141]

Table 4.2 reports the results of our private-sector disparity analysis for the State of Texas. The results are provided for each major race and sex group by major procurement category. Column (1) reports the estimated percent of all private-sector revenues that are attributable to HUBs. Column (2) reports the weighted availability of HUBs in these categories. Column (3) reports the disparity ratio—i.e., the ratio of HUB utilization to HUB availability. Disparity ratios that are statistically significant are indicated with an asterisk.

There are substantively significant disparities for all race and sex groups in all procurement categories. The lowest disparity ratio, thus the largest disparity, is 31 percent for African American-owned firms in construction. The disparity ratios for all groups except Asian and other minority firms in construction are statistically significant at the 95 percent level.

Minority-owned businesses received 33 percent of their expected share of private-sector construction revenues (based on their availability). In commodities, minority-owned businesses receive 46 percent of their expected share of the private-sector revenues and in services they receive 40 percent of their expected share. Asian firms have lower disparities than the other minority-owned businesses, but the disparity ratios for Asian firms are still well below 80 percent. Woman-owned businesses appear to do better than other groups in both construction and commodities, although they

[141] Specifically, we assumed that procurements in the private sector have the same mean and variance as procurements for the State of Texas. Using information on the mean and variance for State projects, from the Central Payments Database described in the previous chapter, we were able to estimate the sum-of-contract-size-squared term in the disparity test statistic (see the previous chapter for a discussion of that test). This test statistic understates the true level of statistical significance if the variance of contracts in the public sector is greater than in the private sector. Since the public sector tends to have very large public works-type projects, we would expect that the variance would be larger in the public than in the private sector.

TABLE 4.2
SUMMARY OF DISPARITY RESULTS
FOR THE PRIVATE SECTOR
IN TEXAS
1987

Race/Sex Group	Utilization (1)	Availability (2)	Disparity Ratio (3) (1)/(2)
	(Percent)		
Construction:			
African American	1.1 %	3.5 %	30.5 * %
Hispanic	9.5	29.2	32.4 *
Asian and Other Minorities[1]	0.7	1.2	55.8
Minority Subtotal	11.2	33.9	33.0 *
Women	8.4	11.7	71.7 *
Commodities:			
African American	0.4 %	0.9 %	45.1 * %
Hispanic	2.3	5.8	40.4 *
Asian and Other Minorities[1]	1.4	2.3	60.0 *
Minority Subtotal	4.1	9.0	46.0 *
Women	7.3	10.3	70.7 *
Services:			
African American	1.0 %	3.0 %	32.6 * %
Hispanic	3.8	9.8	38.8 *
Asian and Other Minorities[1]	2.1	4.4	48.2 *
Minority Subtotal	6.9	17.2	40.2 *
Women	9.6	20.3	47.0 *

Note: An asterisk (*) indicates that the disparity ratio is statistically significant at the five percent level or better.

[1]Asian and Other Minorities include: Asian Indian, Chinese, Japanese, Korean, Vietnamese, Filipino, Hawaiian, other Asian or Pacific Islander, Aleut, Eskimo and American Indian.

Source: 1987 Census of Minority & Women-Owned Business Enterprises, Texas; 1987 Census of Construction Industries, Texas; 1987 Census of Manufacturers, Texas; 1987 Census of Wholesale Trade, Texas; 1987 Census of Retail Trade, Texas; 1987 Census of Service Industries, Texas.

received only 72 percent of their expected share of construction revenues and 71 percent of their expected revenues in commodities.

IV. Summary

As described in the previous section, we found that HUBs are substantially underutilized in the private sector in all industries, and that these differences are statistically significant in almost every case. These results further support the findings in Chapter 3, where we show that HUBs were substantially underutilized by the State in all major procurement categories. Comparing the private-sector results to those based on the State's utilization of HUBs during the pre-program period (as shown in Tables 3.11),[142] we find that African American-owned construction firms are, again, the most underutilized of all the HUB subgroups. In the private sector, compared to other similar firms, African American-owned construction firms received only 31 percent of their expected share of dollars. In turn, they received less than 1.4 percent of the State's construction dollars in both the pre-program and program periods. Similar to our findings for white women in State construction, we see that, of the HUB subgroups, woman-owned firms were the least underutilized in the private sector (72 percent). In both the private and public sector, all minority groups are substantially underutilized. This underutilization is statistically significant for African Americans and Hispanics in the private sector.

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[142] When comparing disparities found in the private sector to disparities found in State procurement, we should keep in mind three qualifications: First, the calculations of private-sector utilization and private sector availability excluded 1120 corporations, thus leaving out an entire class of generally very large firms. Second, the calculations of private-sector availability, utilization and disparity report the results for all women, not simply white women, so these numbers cannot be compared directly. Finally, in making the comparison, we must note that the private-sector analysis uses data for 1987, while the public sector analysis uses the period from September 1, 1988 to August 31, 1991 for the pre-program-period and September 1, 1991 to August 31, 1993 for the program-period.