

Section II: Economic Assessment

A. Introduction

25 The Bank team's primary objective was to evaluate the impact of the Marmara earthquake on the Turkish economy over the remainder of 1999 and during 2000. The team carried out the assessment from three specific perspectives: the macroeconomic implications (growth, inflation, balance of payments, and fiscal accounts), the effect on the enterprise and financial sector (including the insurance industry), and the social dimension (the human toll, employment losses and the increased burden on social protection programs). On the basis of its findings, the team also formulated some relevant recommendations, notably with respect to the authorities' policy response so far.

26. It is important to underscore that the team's findings are preliminary and subject to further revision as more detailed data become available. The size of the affected region and the complexity of the regional economy explain why the data currently available on the impact of the earthquake are preliminary and incomplete. Damage estimates vary widely and survey data for enterprises and households in the region are still being collected. Under the circumstances, the team was obliged to make a number of critical assumptions the validity of which will have to be tested over the coming weeks and months. These assumptions are highlighted in the text below and the methodologies and data used are presented in the Annex. In addition, several proposals have been made for follow-up work to obtain a more detailed and accurate picture of the economic consequences of the earthquake.

B. Macroeconomic Implications of the Marmara Earthquake

27. The earthquake hit just as Turkey's economy was recovering from a sharp downturn in the wake of the Russian crisis. During the July 1998 to June 1999 period, GNP contracted by 1.6 percent relative to the same period a year earlier. Starting in the second quarter of this year, however, there was clear evidence that the economy was emerging from the slump. Aside from endangering this nascent recovery, the earthquake (and additional fiscal burden that it will impose) came as the Government was implementing essential economic reforms including development of an ambitious macroeconomic stabilization program requiring strong fiscal adjustment. This assessment of the macroeconomic implications of the earthquake covers the impact on growth, inflation, government debt servicing obligations, the balance of payments and the fiscal accounts.

28. **Lessons from Mexico and Japan.** The magnitude of the earthquakes that struck Mexico City in 1985, Kobe (Japan) in 1995 and northwestern Turkey on August 17 are broadly similar (Table 3). The Turkish earthquake has, however, wrought greater cost in terms of loss of lives: over 15 thousand confirmed deaths so far compared with 6½ and 9½ thousand deaths in Japan and Mexico respectively. This section looks at the experiences of Mexico and Japan as a starting point for assessing the likely macroeconomic consequences of the Turkish earthquake.

Table 3: Earthquakes in Mexico, Japan and Turkey

	Mexico	Japan	Turkey
Date	Sep. 1985	Jan. 1995	Aug. 1999
Seventy (Richter Scale)	8.1	7.2	7.4
Loss of lives	9,500	6,430	15,135
Buildings destroyed (dwellings in the case of Mexico)	40,000	180,000	46,039
Material Damage (% of GDP)	2.7 - 3.5	1.5 - 2.0	1.5 - 3.3
Earthquake related fiscal burden (% of GDP)	...	1.0	1.8 - 2.3

29. The impact of the earthquakes on output in Mexico and Japan were generally limited. In Japan, GDP in the quarter in which the earthquake occurred declined by 0.5 percent. However, economic activity picked-up thereafter and in calendar 1995, real GDP growth was higher (1.4 percent) than in 1994 (0.7 percent). Moreover, in 1996, GDP growth accelerated to 4.1 percent, in large part due to a fiscal stimulus package, a big component of which was directed at reconstruction expenditures in the Kobe region. Of the material damage estimated at 1.5-2 percent of GDP, the Government appears to have shouldered around half this amount.

30. In Mexico, the adverse consequences the earthquake were swamped by the negative effects of the decline in international oil prices which occurred just before the twin earthquakes hit Mexico City in September 1985. Thus, the recession that began around the time the earthquake occurred is attributable primarily to the decline in oil prices rather than the earthquake. The material damage from the earthquake was estimated at some 3 percent of GDP by the World Bank. The cost borne by the budget is more difficult to discern. The domestic public sector borrowing requirement was expected to increase by 0.3 percent of GDP in the last quarter of 1985 simply for the tasks of demolition, rehabilitation and, to a lesser extent, reconstruction.

31. **Potential Implications for Output in Turkey.** This section attempts to assess the extent to which growth in 1999 and 2000 could be affected by the earthquake. In the case of Turkey, the area most severely hit by the earthquake accounts for about 7 percent of GDP. In addition, some of the outer suburbs of İstanbul have also been hit quite hard. The city including its suburbs accounts for nearly a quarter of national output. Extensive damage to electricity power lines and a key refinery has also entailed some disruption to economic activity, albeit temporary, across a large swath of an economically important part of the country. Small and medium scale enterprises have also suffered greatly. However, early indications are that the damage to larger industrial enterprises has been limited.

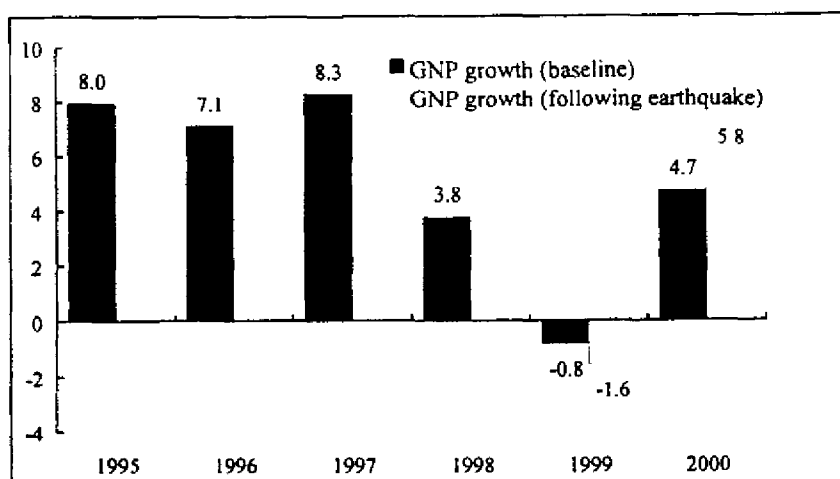
32. Since the earthquake has hit Turkey's "industrial heartland", the consequence for output may prove to be more severe than in either Mexico or Japan. The findings—which suggest that relative to the baseline, GNP could be 0.8 percent *lower* in 1999 and around 1 percent *higher* in 2000—are subject to a large degree of uncertainty as they depend on assumptions which still have to be confirmed by enterprise level data. Using approximately the same methodology, different analysts have arrived at a relatively wide range of estimates (negligible - 2.5 percent) for the decline in GNP relative to their

baseline projections for 1999. The preliminary projection prepared by the State Planning Organization (SPO) is for GNP growth in 1999 to be some 1 percent below the baseline due to the earthquake.

33. A starting point for assessing the magnitude of the output loss that the earthquake may entail is the contribution to GDP made by the affected region. The four regions affected most severely by the earthquake (Kocaeli, Sakarya, Bolu and Yalova) account for some 7 percent of GDP. The team assumes that these regions will make no contribution to value added to the industry and service sectors for the rest of Q3 and that production thereafter to pick-up only gradually reaching normal levels in Q3 2000 (a full year after the earthquake). At the same time, the team's estimate takes into account the likelihood that the production loss in the affected region will be partially off-set by a pick-up in production in other parts of the country. There is, for example, anecdotal evidence that a significant part of the production loss due to the temporary shut-down of Tüpraş's refinery in İzmit will be offset by increased production in other refineries across the country. The low levels of capacity utilization in most other sectors due to the cyclical position of the economy should permit part of the loss in production in the earthquake affected region to be picked up elsewhere in the economy relatively easily. In the projections, it is assumed that a third of the production loss in the affected region will be offset by increases in output elsewhere. At the same time, it is possible that the stimulus to increase production in other regions of Turkey could be offset at least in part by the adverse impact deriving from reduced output of intermediate goods in the affected region. However, the estimates do not include this latter effect.

34. Based on the assumptions outlined above and using the latest baseline projections prepared by the Bank, simulations suggest that GNP growth could be 0.8 percent lower than in the baseline for 1999 (Figure 4). In 2000, expenditures related to the reconstruction effort, as well as the lower starting point, are expected to generate higher growth than in the baseline. Assuming that public investment expenditures will be US\$1.5 billion higher relative to the baseline, this will lift projected GNP growth in 2000 from 4.7 percent to 5.8 percent. Sensitivity analysis made by varying the underlying assumptions suggests that the effect on growth could be in the range of -0.6 percent to -1 percent for 1999 and +0.6 percent to 1.1 percent in 2000. It is important to note that there are at least three other channels through which the earthquake could affect economic activity. First, to the extent that the Government is unable to finance the reconstruction effort by mobilizing additional revenues and foreign financing, recourse to domestic financial markets will push interest rates higher raising borrowing costs and crowding out private investors. This will have adverse implications not just for Turkey's fragile public finances, but may also retard the fledgling economic recovery that was underway. Second, the above analysis neglects negative consequences due to the collapse in demand from those affected directly by the earthquake which could have a negative impact on output. Third, the earthquake could affect tourism revenues for the remainder of 1999.

Figure 4: GNP Growth (%)

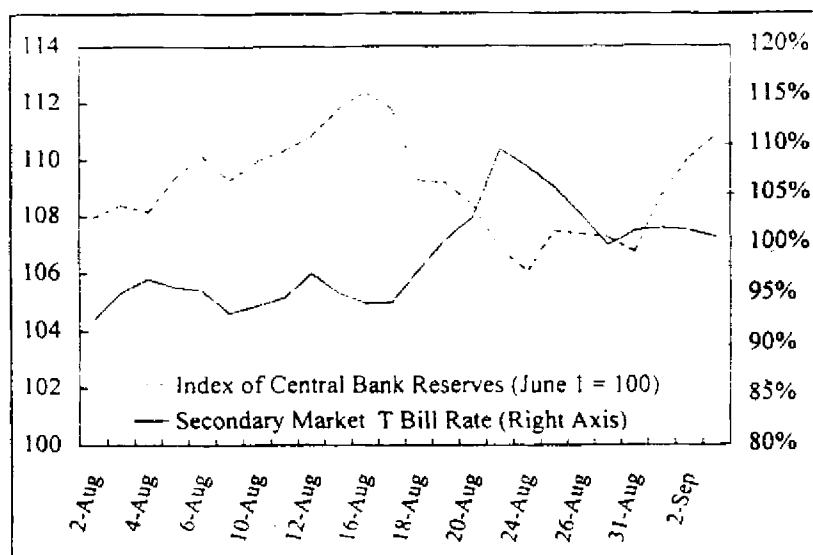


35. **Inflation.** As a negative supply shock, the earthquake could in principle be expected to induce a price rise. While it is too early to gauge the full impact on prices, as yet, there is no perceptible impact on the country-wide aggregate price index. The wholesale and consumer price indices for August which are based in part on surveys completed after the earthquake show no sign of a spike in prices, including in the most severely affected regions. Indeed, price increases in the affected regions appear to have been below price increases in other regions. However, according to the State Institute of Statistics, only partial data collection was possible in the regions affected by the earthquake, and the below average price increases in the most affected regions are likely to reflect this fact. Increased demand pressures arising from reconstruction could have an impact on inflation in 2000, particularly if external financing falls short.

36. **Interest Rates and Government Debt Service.** Having averaged some 95 percent in the first half of August, the secondary market interest rate on the most actively traded treasury bill jumped to 110 percent a week after the earthquake (Figure 5). By and large, this reflected two factors. First, capital outflows amounting to around US\$1 billion (see below), which led to tighter domestic monetary conditions. Second, concern that the earthquake will entail a large fiscal burden. A related concern was the possibility that the earthquake may hamper the momentum for reform that had built-up over the summer months. The Government's quick passage of the pension reform bill upon the re-opening of parliament after a week long closure in the wake of the earthquake appears to have reassured investors and interest rates have since declined to below 100 percent.³ The Central Bank of Turkey (CBT) has also partially recovered the foreign reserves that it lost.

³ Spreads on Turkish Government Eurobonds also increased by some 80 basis points in the immediate aftermath of the earthquake but have since declined to the levels of early August.

Figure 5: T-Bill Rates and Central Bank Reserves



37. Determining whether the earthquake has had or will have a durable impact on domestic interest rates depends on two key factors: first, whether the earthquake has induced an increase in the risk premia associated with Turkish assets and second, whether it will lead to an increase in domestic borrowing by the Government. While interest rates are presently higher than they were before August 17, CBT officials and market participants are of the view that the earthquake is unlikely to have led to an increase in risk premia. The initial upward shift in rates evident in Figure 2 can be partly attributed to the increase in the withholding tax on repurchase transactions that came into effect on September 1, 1999. However, if the Government were obliged to finance earthquake related expenditures in the domestic market, this would exert upward pressure on interest rates in the coming months. Avoiding this outcome will depend on the Government's ability to mobilize tax revenues and/or reallocate expenditures to meet any spending needs arising from the earthquake which cannot be covered by external financing.

38. **Balance of Payments.** As noted above, in the week following the earthquake, the CBT lost reserves of the order of US\$1 billion. While most of these losses have subsequently been recovered, the earthquake is likely to have further implications for the balance of payments. With regard to the current account, the decline in production in the affected region and disruption to the İzmit port, is expected to lower exports by around US\$500 million relative to the baseline scenario in 1999 (Table 4) and a more modest US\$250 in 2000. An expected drop in tourism revenues could magnify this loss by around US\$200 million in 1999. Imports, on the other hand, are projected to increase quite sharply in 2000, reflecting the positive stimulus to domestic demand from reconstruction activity.⁴ The team has not attempted to estimate the impact on workers' remittances or other private transfers which is expected to be positive.

⁴ The implied income elasticity of imports underlying this projection is well within the range of elasticities observed in Turkey over the past decade.

39. Cumulatively, these developments are projected to widen the current account deficit by 0.4 percent of GNP in 1999 and 0.8 to 1 percent of GNP in 2000. Relative to the preliminary baseline projection by the IMF staff, this would imply a current account deficit in the range of 2.7 percent of GNP next year. This projection assumes that the required additional external financing will be available. Otherwise, further policy actions will be needed to contain the increase in the current account deficit which could slow the reconstruction effort. Provided that the widening of the current account deficit remains temporary, concerns about sustainability should not arise. Nevertheless, developments in the current account will bear careful monitoring in the coming months.

40. With regard to the capital account, most components are expected to remain broadly unchanged relative to the baseline with the exception of privatization revenues which are assumed to be US\$150 million lower relative to the baseline. In particular, it is assumed that the outlook for portfolio investment is unlikely to have been altered significantly relative to the baseline scenario. According to the CBT and market participants, the capital outflows in the immediate aftermath of the earthquake reflected non-resident investors pulling out of the fixed income market. Since then, no additional outflows have been evident. Indeed, there have even been some capital inflows, allowing the CBT to recover more than half of the initial reserve loss. However, it is not yet possible to conclude from this that the trend of strong capital inflows witnessed in the weeks leading up to the earthquake has resumed. Assuming the Government's commitment to economic reform remains firm and given the relatively high rates of return on Turkish Lira assets, the outlook for portfolio investment should remain favorable.

41. The additional external financing required in 1999-2000 to maintain reserve accumulation as projected under the baseline is estimated at slightly over US\$3 billion. At some US\$23 billion, the CBT's gross reserves are adequate to deal with most types of current account shocks, but less adequate in the event of a major capital account shock. In the baseline scenario, reserves were projected to increase substantially in the coming months so that by end-2000 they would be approximately equal to the stock of short-term debt. The projected widening of the current account deficit as a result of the earthquake and lower privatization proceeds will alter this picture. It is expected that the additional external funds would come from official creditors and be used to finance earthquake reconstruction efforts by the Government.

Table 4: Summary Balance of Payments

Baseline and Post Earthquake Scenarios (US\$ Billions)

	Baseline			Post-Earthquake	
	1998	1999	2000	1999	2000
Current account balance	1,872	-1,075	-3,630	-2,008	-5,663
(percent of GNP)	0.9	-0.6	-1.7	-1.0	-2.7
Trade Balance	-14,332	-12,413	-16,628	-13,113	-18,010
Exports	31,220	29,078	30,281	28,567	30,031
Imports	-45,552	-41,491	-46,909	-41,680	-48,041
Services (net)	10,477	5,476	6,899	5,243	6,248
of which, interest (net)	-2,342	-3,209	-3,066	-3,242	-3,170
Private transfers	5,568	5,480	5,707	5,480	5,707
Official transfers	159	382	392	382	392
Capital account balance	545	7,535	7,799	7,535	7,649
Direct investment	573	545	645	545	645
Portfolio investment (excl. privatization)	-6,057	450	-500	450	-500
Public Sector (incl. Central Bank of Turkey)	-1,221	1,895	5,680	1,895	5,530
Privatization	250	500	1,500	500	1,350
Borrowing (net)	-1,933	1,225	3,600	1,225	3,600
Bonds (net)	-261	1,979	4,500	1,979	4,500
Loans (net)	-1,672	-754	-900	-754	-900
Central Bank of Turkey (net)	462	170	580	170	580
Domestic Money Banks (net)	1,935	2,272	631	2,272	631
Other Private Sector (net)	5,315	2,373	1,343	2,373	1,343
Errors and Omissions	-2,197	131	0	131	0
Overall Balance and Change in Gross Reserves	220	6,591	4,169	5,658	1,986
Projected financing gap relative to the baseline 1/ Cumulative gap	933	2,183 3,116
Memorandum items					
Gross reserves	19,893	26,484	30,653	26,484	30,653
in months of import of G&NFS	3.9	5.5	5.7	5.3	5.7
Gross Reserves (in percent) 2/	51.4	60.9	70.4	59.4	70.4
Short-term debt/foreign reserves	137	116	107	119	107

1/ The total external financing needs of the budget arising from the earthquake could exceed this amount

2/ Central bank foreign reserves divided by the end-period short-term debt plus MLT debt repayments falling due in the year

42. **Fiscal Impact of the Earthquake.** In the recent period prior to the earthquake the Government had initiated fiscal reform measures in support of a macro-stabilization program under discussion with the IMF. Fiscal targets for 1999 and 2000 have been agreed with the IMF. Agreement was also reached on further prior actions for access to an IMF standby arrangement in support of the Government's stabilization and reform efforts. Pension reforms aimed at gradually reducing the large deficit of the social security system were passed shortly following the earthquake. The underlying parameters of the government's fiscal program need to be reexamined with a view towards addressing the fiscal impact of the earthquake, and implementing further measures to safeguard the government's stabilization program. This section aims to estimate the near term impact on the consolidated public sector deficit. These efforts suffer from more than the usual amount of statistical uncertainty. There is still a severe shortage of reliable information on the amount and severity of damage sustained by businesses, housing stock, municipal infrastructure, and by the population. New information continues to

change these estimates almost daily, and revisions will no doubt continue to occur well after the work of reconstruction has commenced.

43. The overall fiscal impact of the earthquake is estimated to result in an additional burden on the budget in the range of US\$3.6 to US\$4.6 billion as shown in Table 5. The lower bound estimate includes disaster mitigation measures aimed at strengthening institutions and insurance markets to better prepare for future natural disasters. Adding contingencies would bring this total to US\$4 billion. In addition, considerable uncertainty surrounds the estimates of the fiscal burden arising from housing reconstruction and rehabilitation. Taking an upper bound estimate for housing costs (para. 51) would bring the total fiscal burden to US\$4.6 billion. These costs are estimated to be evenly borne during the remainder of 1999 and during 2000, representing between 1.8 and 2.3 percent of GNP cumulatively over this period.

44. The largest direct cost to the budget will be through reconstruction costs arising from damage to the housing stock of the region, estimated to total \$620 million. Costs from infrastructure replacement and rehabilitation are estimated to add a further \$400 million to pressure on the budget in 1999-2000. Total damage (wealth loss) from both items significantly exceeds this amount, but the burden of reconstruction is shared with the private sector. Revenue losses and credit programs represent one third of total estimated costs of the earthquake during 1999-2000, totaling US\$1.3 billion. These arise from four principal sources: (i) reduced tax revenues from the region due to the negative output shock, (ii) losses from a tax payment deferral announced by the Government, (iii) credit subsidies for loan refinancing and new loans to small and medium enterprises which sustained damage in the region, and (iv) postponed non-tax revenues from public enterprise privatization. Additional costs are expected from emergency assistance to the population and associated compensation for loss of life and disability, totaling an estimated US\$540 million, mostly falling on the 1999 budget. This includes costs for temporary housing for the estimated four to six hundred thousand people left homeless by the quake. These estimates represent costs related to capital stock replacement and mitigating the huge human costs of the earthquake. **A much larger fiscal burden could arise if large scale relocation of people and infrastructure is determined to be necessary.** This report has not been able to assess the need for major relocation efforts, thorough cost-benefit analysis of options by the Government is recommended.

45. To help finance the fiscal burden, approximately US\$3 billion in external assistance has been tentatively identified including the World Bank, IMF, and other institutional and bilateral donors. This would leave a residual financing requirement for earthquake related needs of up to US\$1.6 billion in 1999-2000 (excluding any major relocation costs). Domestic borrowing to close the remaining fiscal gap would be very costly given the extremely high real interest rates on T-bills and crowding out of private investment at a time of high credit demand. Supplemental tax legislation awaiting consideration by the Parliament in October could generate up to US\$1.2 billion in

additional revenue.⁵ This could leave a residual financing gap of up to US\$400 million which would have to be covered by additional external financing if available or through domestic revenue mobilization. In any event, the Government should avoid financing earthquake costs through domestic borrowing which would put additional pressure on domestic interest rates.

Table 5: Estimated Fiscal Impact of the Marmara Earthquake

	1999-2000		1999-2000		1999-2000		Cumulative share of GNP (%)
	1999 (\$ mn)	2000 (\$ mn)	Total (\$ mn)	1999 (TL trn)	2000 (TL trn)	Total (TL trn)	
I. Revenue loss and credit programs							
Estimated tax losses from Marmara region	577.3	-113.6	463.7	273.0	-63.7	209.3	0.24%
Estimated non-tax revenue loss	0.0	150.0	150.0	0.0	84.2	84.2	0.07%
Estimated lost social security contributions	158.6	-34.4	124.2	75.0	-19.3	55.7	0.06%
Cost of credit refinancing	39.5	100.3	139.9	18.7	56.3	75.0	0.07%
Credit subsidies for rehabilitation lending	282.5	126.0	408.5	133.6	70.7	204.3	0.20%
Subtotal	1057.9	228.4	1286.3	600.3	128.1	628.4	0.65%
II. Housing Rehabilitation							
Housing reconstruction costs	155.7	467.1	622.8	73.6	262.1	335.7	0.30%
III. Infrastructure Rehabilitation							
Transport Infrastructure	64.8	97.2	162.0	30.6	54.5	85.2	0.08%
Electricity and Telecoms Rehabilitation	53.2	33.2	86.4	25.2	18.6	43.8	0.04%
Energy sector rehabilitation costs	2.6	10.1	12.7	1.2	5.6	6.9	0.01%
Public infrastructure rehabilitation costs	17.5	52.5	70.0	8.3	29.5	37.7	0.03%
Education facility rehabilitation	51.7	48.4	100.0	24.4	27.1	51.6	0.05%
Health facility rehab and emergency care	9.3	9.3	18.6	4.4	5.2	9.6	0.01%
Subtotal	199.1	250.6	449.7	94.2	140.6	234.8	0.22%
IV. Social Assistance Costs							
Emergency assistance	54.9	64.7	119.6	25.9	36.3	62.3	0.06%
Cost of temporary housing	289.9	101.3	391.2	137.1	56.8	193.9	0.19%
Compensation for death and disability	30.5	0.0	30.5	14.4	0.0	14.4	0.02%
Subtotal	375.2	166.0	541.3	177.5	93.2	270.6	0.27%
V. Disaster Mitigation							
Disaster insurance system development ³	100.0	400.0	500.0	47.3	224.4	271.7	0.24%
Emergency response institutional dev't ³	55.0	55.0	110.0	26.0	30.9	56.9	0.05%
Subtotal	155.0	455.0	610.0	73.3	255.3	328.6	0.29%
VI. Public borrowing costs							
Interest on additional public borrowing ¹	0.0	130.2	130.2	0.0	73.0	73.0	0.06%
Total Fiscal Impact	1943.0	1697.2	3640.2	918.9	952.3	1871.2	1.78%
VII. Contingencies							
Contingency provision ²	253.9	157.9	411.8	120.1	88.6	208.7	0.20%
Incremental upper bound housing costs ⁴	118.5	473.9	592.3	56.0	265.9	321.9	0.28%
Subtotal	372.4	631.8	1004.1	176.1	354.5	530.6	0.48%
Total (Upper Fiscal Bound)	2315.3	2329.0	4644.3	1095.0	1306.8	2401.8	2.27%
Source: Official Government sources, World Bank staff estimates							
1) Borrowing costs based on full financing from official foreign sources							
2) Contingency allowance (15%) for uncosted items and underprovisioning (environmental costs, demolition, municipal offices, relocation etc.)							
3) Details and cost estimates from World Bank MEER mission report, September 1999							
4) Higher housing cost estimates based on preliminary higher damage estimates and higher eligibility assumptions (75%)							

⁵ This estimate does not include estimated revenues from the alternative military service payment program recently tabled, or from Article 13 of the pending tax package pertaining to, inter alia, taxation of stock exchange and Competition Council activities.

46. **Revenue Loss and Credit Subsidy Costs.** The main revenue loss arises through the policy announced shortly after the earthquake granting tax deferrals to individuals and businesses affected by the earthquake. In addition, a credit subsidy package was announced which includes: (i) a subsidized deferral of debt service payments for one year applicable to debt owed by parties adversely affected by the earthquake and outstanding to the three leading state banks, and (ii) new subsidized credits. Details of the tax deferral and credit subsidy program have not yet been fully clarified, although the basic elements have been announced.⁶

47. **Impact on Government Revenues.** The net impact on tax revenues is estimated to total close to US\$460 million for both fiscal years, with only partial recovery of deferred 1999 tax liabilities in 2000. This accounts for 60 percent of total revenue and social security contribution losses. There are three sources of this tax loss: (i) the short term slowdown in growth resulting from the quake, (ii) more long term losses due to businesses or individuals that have sustained irretrievable damage, and (iii) the imputed cost to government from the tax deferral due to inflation (the 'Tanzi effect'). In addition, forgone tax revenues from reduced tourism during 1999 are estimated to total around US\$32 million as tourism and demand for conference facilities is expected to decline in İstanbul and surrounding areas. The main burden of the tax loss will be felt during 1999. During 2000 it is estimated that there will be a modest increase in revenues over baseline arising from collection of deferred 1999 taxes. However, only a small portion (about one-fourth) of the lost revenues are expected to be recoverable due to the loss of tax records and losses arising from severely damaged businesses.⁷ Non-tax revenues of the Government will also be reduced through delayed privatization of state enterprises in the region, including the Tüpraş oil refinery although alternative firms for privatization may be prepared. It is estimated that foregone privatization revenues will total \$150 million in 2000, but will be recovered the following year. Finally, reduced contributions to the social security system are estimated to increase the consolidated public deficit by a further \$159 million in 1999.

48. **Credit Subsidy Program.** All liabilities outstanding to Halk Bank, Ziraat Bank, and Emlak Bank by businesses that have suffered from the earthquake are to be rescheduled on subsidized terms and new subsidized loans will be extended. The cost from this rescheduling arises from the delayed repayment of loans and the reduced interest rates at which the loans will be repaid as well as from interest rate subsidies for new loans. These losses do not include the original duty losses that would have been reported by state banks in the absence of the Marmara quake.

49. The total stock of outstanding debt held by the three banks to be rescheduled in the affected regions is estimated to total TL 121 trillion. The additional losses arising

⁶ Provisions for debt rescheduling are provided in Government Decision No. 23800 promulgated August 28, 1999 and annexed to Decree no 99/13233. Provision on tax deferrals are provided in the Ministry of Finance circular dated September 1, 1999

⁷ Tax liabilities on business that have lost one-third or more of total assets are to be entirely forgiven according to Tax Procedure Law, Article 115.

from rescheduling these debts at more highly subsidized credit terms is estimated to be TL 75 trillion. Significantly larger losses are likely to arise if the Government proceeds with unrestricted new lending at subsidized rates to the region. New credit demand following the quake is difficult to estimate. Most apartment buildings in the region are constructed with small service establishments and shops in the bottom floors that sustained heavy damage. It is estimated that 6000 shops were destroyed, 1500 service establishments, and hundreds of enterprises. The total credit required by these businesses (shown in Table 7) is based on state bank estimates of their existing client demand. Total demand is estimated at US\$380 million (TL 180 trillion), about three-fourths of which would be disbursed in 2000. By contrast, the state banks have estimated a considerably higher demand for subsidized credit for all potential clients in the region, on the order of TL four to five hundred trillion. It will be important for the Government to constrain total lending through this mechanism to only the most deserving parties. Otherwise, diversion of resources to non-quake related activities is likely to occur. Every TL 100 trillion in new credit is estimated to cost the central government budget approximately TL 72 trillion in subsidies and TL 100 trillion in transfers through Halkbank for onlending, or TL 36 trillion in subsidies through Ziraat Bank.

50. **Reconstruction of Destroyed Housing Stock.** Earthquake insurance for housing is not developed in Turkey, in part due to the implicit insurance provided through state guarantees to replace owner-occupied housing losses. Thus the bulk of replacement costs fall on the public budget rather than being financing through risk pooling in a developed insurance industry. The most recent estimate by the Ministry of Public Works and Reconstruction shows 35 thousand houses were destroyed and 80 thousand damaged by the earthquake, however this number is changing daily. Table 6 provides cost estimates of housing damage using these figures. On the basis of cost parameters estimated by the MEER team, the full cost of reconstruction borne by government is US\$620 million, three quarters of which is expected to fall on the 2000 budget. Rehabilitation cost estimates distinguish between three levels of severity of damage. Housing that has collapsed or is too heavily damaged to be inhabitable will need to be demolished and rebuilt at an estimated cost of US\$20,000/unit. Housing with moderate damage is estimated to cost US\$8,000/unit for repairs, and light damage repairable at US\$3,000/unit. These estimates also draw on the Adana earthquake experience, and are adjusted to reflect higher replacement costs and additional costs of heating.

51. Considerable uncertainty surrounds these estimates and a full accounting of housing stock damage will have to await completion of survey work currently underway. The mission has prepared an upper bound estimate for the fiscal cost of housing stock rehabilitation of US\$1.25 billion. This upper bound estimate is based on increasing two key cost parameters. First, more recent but not yet officially confirmed estimates of housing stock damage are used.⁸ Second, a higher estimate of houses eligible for public

⁸ Updated press reports that have yet to be confirmed by the Ministry of Public Works and Reconstruction show just under 51 thousand houses destroyed, 51 thousand with medium damage, and 61 thousand lightly damaged

restitution under Disaster Law 7269 is assumed.⁹ This upper bound estimate would raise the total fiscal impact of the earthquake by some \$600 million. Therefore, the total fiscal impact is estimated to range between US\$3.6 to US\$4.6 billion.

⁹ Under Disaster Law 7269, eligibility for public provision of housing reconstruction is limited to dwellings which are owner occupied and are the primary residence of the inhabitants. Based on preliminary MEER mission estimates of owner occupied dwelling meeting government criteria, the eligibility rate is estimated to cover 55 percent of total housing units. For the upper bound estimate 75% has been assumed.

Table 6: Estimated Permanent Housing Reconstruction Costs

(updated by the Ministry of Public Works as of Sept 9, 1999)²

Damage	Number of units	Share eligible ¹	Units eligible	Cost per unit ⁴ (\$)	Total cost (\$ mns)	1999 ³ (\$ mns)	2000 (\$ mns)
Collapsed/Heavy damage	35,074	55%	19,291	20,000	385.8	96.5	289.4
Medium damage	37,803	55%	20,792	8,000	166.3	41.6	124.7
Light Damage	42,805	55%	23,543	3,000	70.6	17.7	53.0
TOTAL	115,682	55%	63,625	9,788	622.8	155.7	467.1

Notes.

1) Eligibility estimated based on ratios of ownership and rental (MEER mission).
2) Data provided by the Ministry of Works and Reconstruction, General Directorate of Disasters
3) Expenditures are apportioned evenly over 16 month period through end 2000.
4) Unit cost for reconstruction and repairs are estimated by the World Bank MEER mission
Land costs are excluded. Adding estimated land cost based on per unit land from Adana reconstruction and assuming half of land is state, half purchased at \$22/m², adds \$31.5 mn to the total estimate

52. **Electricity, Energy and Telecommunications Infrastructure.** Costs for repair and replacement of damaged electric power distribution facilities is estimated at US\$48 million. Most of the electricity infrastructure losses reported are concentrated in power transmission and distribution systems. Transmission substations sustained equipment and building damage, an estimated 3400 distribution towers and 490 km of overhead lines were damaged or destroyed, and there was extensive damage to underground cable lines. There was little or no damage to the thermal power plants and hydropower plants in the six provinces affected, and damage to the regions 39 industrial power plants has yet to be fully assessed.

53. The damage reported to oil and gas production facilities was substantial, but the fiscal impact is estimated to be a modest US\$12.7 million due to insurance coverage of the damage sustained by the Tüpraş refinery. Costs arising from pollution abatement along the shoreline due to oil and chemicals discharged into the Sea of Marmara are estimated at US\$5 million. Modest oil and gas pipeline damage was sustained (about US\$2 million) and damage to municipal distribution systems is estimated at US\$5 million. Telecommunications damage is estimated to total US\$38.4 billion, including transmission lines, station damages, buildings, and network repair necessitated by the quake. These estimates are from Turkish Telecoms and need further assessment.

54. **Transport Infrastructure.** The total estimated cost of repairing the assessed damage to transport infrastructure is US\$118 million, two-thirds of which is due to damage sustained by the railway system, railcar factory, and rolling stock. The earthquake caused damage to streets in the heavily hit communities, extensive damage to many sections and structures of the Istanbul-Ankara motorway (about 49 km in length), and scattered damage along 410 km of district roads and provincial highways. In addition, there was substantial damage to railway track and installations, the train wagon manufacturing facility in Adapazari, and port facility in Derince. The railcar

manufacturing and port facilities are not expected to be operable until extensive reconstruction is completed through 2000.

55. **Educational Infrastructure.** Damage to school facilities is estimated to cost the state US\$107 million in rehabilitation and targeted support. Around 25,000 children will need to be transported to different school facilities for double shift classroom instruction in existing facilities that remain operational. Rehabilitation of the estimated 22 primary and 21 secondary schools damaged by the earthquake is assessed at US\$46 million. In addition, support for text books, uniforms, food, and supplemental payments to teachers are estimated to cost an additional US\$55 million through the 1999-2000 school year.

56. **Health Infrastructure.** From field visits and interviews with officials in the affected districts, the MEER team health specialists estimated that 28 health centers and 10 hospitals sustained damage from the earthquake. Rehabilitation costs include reconstruction of severely damaged sites, repair work, deployment of temporary prefab units, and replacement of damaged medical equipment. Costs for this work are estimated to total US\$19 million, 60 percent of which will be disbursed during 2000.

57. **Municipal Infrastructure.** Damage to municipal infrastructure includes office buildings, water supplies, wastewater treatment, streets, and other structures. Careful survey work to estimate the total damage to these facilities is underway, but preliminary estimates by local offices (as reported to the SPO) suggests total damage of around US\$70 million. Most of these expenditures are assumed to be made during the 2000 fiscal year.

58. **Social Assistance Costs.** In the immediate wake of the earthquake there has been a tremendous demand for immediate emergency assistance to the affected population. An estimated four to six hundred thousand people have been rendered homeless, at least fifteen thousand fatalities have occurred, and a further 24,000 people were injured. It is estimated that the cost of emergency assistance to the population for tents, food, sanitation services, health care and other immediate needs will total US\$107 million. Further assistance will be provided to individuals and families that have suffered fatalities or injuries. Compensation for loss of life and disability is estimated to total US\$30 million provided the Government adopts the lump-sum payments to victims proposed by SPO (see section D).

59. **Temporary Housing Costs.** The largest component of immediate social assistance costs is the estimated US\$391 million that arises from provision of temporary housing pending reconstruction and repair of destroyed housing stock. There is a wide range of cost estimates for these outlays due to the cost variance of options facing government. The estimate used here is based on a mixture of reliance on highly costly temporary housing units (US\$8,000/unit) and less costly relocation options to existing facilities in nearby areas (US\$2,160/unit equivalent). It is estimated that 30,000 temporary housing units would cost a minimum of US\$240 million and accommodate around 120,000 people. This cost does not include additional infrastructure requirements, such as heating which could significantly raise costs. Use of existing buildings would