MIMAP
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Project Updates

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Trade and the Environment: An Impact Multiplier Assessment*

THE PHILIPPINE GOVERNMENT has, in the past decade or so, aggressively implemented trade reforms to promote efficiency in production, achieve better and efficient allocation of resources through market mechanisms, and increase competitiveness of the local products.

Thus, through a number of Executive Orders and Legislative Acts implemented during the 1990s, the following changes can be observed (as shown in Figure 1) in the tariff structure in the Philippines:

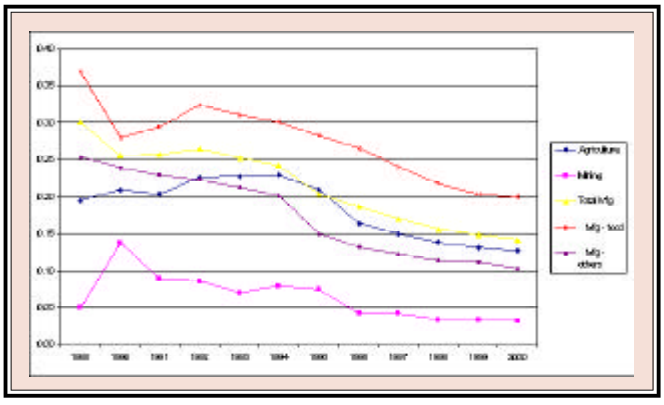
- food manufacturing has the highest implicit tariff rates while mining has the lowest,
- food manufacturing and agriculture have increasing rates until 1992,
- five major sectors, namely, agriculture, mining, food manufacturing, other food manufacturing, and total manufacturing have had declining rates starting 1995, a relatively sharp decline between 1995 and 1996, a smooth decline from 1996 to 1998 and will have an almost constant rate until 2000.

Tariff restructuring has a direct impact on resource allocation and the environment. The impact is linked to the dependence of most of the production and consumption on the resource and environment. For example, a reduction in tariff is expected to have a beneficial effect on the environment if implemented on tariffs in highly polluting industries. It would also have a beneficial effect if applied to the primary sectors such as agriculture, fishery, and mining, as this would reduce pressure on the resources. However, tariff reduction would not be favorable if applied to inputs of production such as crude oil products and imported oil products, since this would increase the generation of air pollutants.

These types of impact on the environment are analyzed and presented in a paper by Orbeta (1999) which uses an economy-wide model of the Philippines and environment impact multipliers. The results of said study are summarized in this short article.

☞ 3

Figure 1: Implicit Tariff, Major Sectors



*Based on the paper of Elvira M. Orbeta submitted to the Impacts of Macroeconomic Adjustment Policies on the Environment (IMAPE) Project, 1999.

WHAT'S INSIDE

2 Lending a Hand to Palawan's Development Planning
2 Poverty Measurement Training in Quebec
7 Third Quarter Employment Data: A Sign of Economic Recovery for the Philippines?

Lending a Hand to Palawan's Development Planning

UPON INVITATION BY THE Provincial Planning and Development Office (PPDO) of Palawan, the Project Management Office of the MIMAP-Philippines participated in the PPDO-organized workshop on August 15 to help in the assessment of the province's development plan.

During the discussion, the MIMAP-PMO raised the following crucial points:

- There is a need to set up a framework for planning and assessing the socioeconomic performance of the province. This would allow for a more detailed analysis of the various sectors in terms of changes, improvements and / or deterioration over time instead of simply a presentation of the sectors' current status; and
- There is a need to develop an indicator system that would effectively capture the performance of the different sectors. This would involve the identification of indicators for key result areas which do not have one or the assessment of the sufficiency or appropriateness of existing indicators for some of the sectors.

The workshop, which was held in Puerto Princesa City, was participated in by the different sectoral coordinators of the province as well as the Provincial Planning and Development Office staff headed by Mr. Nelson Devenadera. The MIMAP Project Team, meanwhile, was represented by Dr. Celia Reyes, Dr. Caesar Cororaton, and Ms. Bernadette Mandap, Project Director, Assistant Director, and Research Associate, respectively, together with Mr. Mario Feranil, Deputy Executive Director of the Policy and Development Foundation Inc., the implementing agency of the MIMAP-Philippines project.

Said activity is in line with MIMAP's commitment to provide technical assistance to local and provincial governments specifically in areas of policymaking and poverty monitoring. *BEM*

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Poverty Measurement Training in Quebec

ELEVEN MIMAP TEAMS FROM 11 countries participated in a three-week training from August 30 to September 17 on poverty measurement in Quebec, Canada. The training, which was held in Laval University and carried out by its economics department, was part of the overall technical assistance and capability-building program of the International Development Research Centre (IDRC) to the MIMAP member teams.

The poverty measurement training covered various aspects of two broad topics in sampling design and techniques, and poverty measurements. State-of-the-art statistical techniques were discussed and hands-on computer sessions using the software SPSS and data from actual databases were conducted. A number of sessions were also devoted to discussing the special software developed by the Laval University group which can quickly compute different kinds of poverty indices like Watts, CHU, FGT, and S-Gini. The software is called Distributive Analysis (DAD) and is designed to facilitate comparisons of social welfare, inequality, poverty, and equity across various living standards.

The Philippine MIMAP participating team was composed of Dr. Celia Reyes, Dr. Aniceto Orbeta, Jr., and Dr. Caesar Cororaton, Senior Research Fellows of the Philippine Institute for Development Studies. The other MIMAP member countries represented were Pakistan, Sri Lanka, India, Bangladesh, Morocco, Vietnam, Lao, Nepal, Benin, and Burkina Faso. *CBC*

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Trade and Environment...

From Page 1

Methodology

The study utilized a 34-sector economy-wide model of the Philippines[1] to analyze the impact of changes in the tariff structure on sectoral output and labor incomes. From these sectoral effects, the study translated the impact on the environment using environment multipliers.[2]

Results

Output Effects. Table 1 shows the sectoral output and labor income effects of changes in the tariff structure. The overall impact on production is positive, although minimal, over the period 1991-2000. However, at the sectoral level, average output effect ranges from -8.4 to 9.0 percent. The output effect on the country's traditional exports (coconut products, sugarcane and products, mineral products) is also positive. A few manufacturing sectors are affected positively by the tariff change. The lowest average annual increase in output was posted by four service sectors. Some agricultural crops and a number of manufacturing sectors, including food manufacturing, suffered a reduction in output.

Labor Income. Similarly, the overall impact of tariff changes on

Table 1: Output and Labor Income Effects: 1991-2000
(In percent)

	Industries	Output Effect 1991-2000	Labor Income Effect 1991-2000
1	Palay and corn production	-2.62	-0.03
2	Vegetables, fruits and nuts (exc. coconut) production	-1.15	-0.01
3	Coconut	5.26	0.05
4	Sugarcane	5.26	0.05
5	Other agricultural crops	-0.87	-0.01
6	Livestock, poultry and other animal production	-2.44	-0.02
7	Agriculture services	-0.87	-0.01
8	Fishery		
9	Forestry	0.96	0.01
10	Metallic ore mining	1.22	0.01
11	Nonmetallic mining and quarrying	1.22	0.01
12	Food manufacturing	-0.23	0.00
13	Beverage manufacturing	3.51	0.04
14	Tobacco manufacturing	3.51	0.04
15	Textile manufacturing	1.42	0.01
16	Wearing apparel, leather and leather products	1.36	0.01
17	Manufacture of wood and wood products including furnitures and fixtures	-8.41	-0.08
18	Manufacture of paper and paper products	2.55	0.03
19	Printing, publishing and allied products	2.55	0.03
20	Manufacture of chemicals and plastic products	3.57	0.04
21	Petroleum, refineries and miscellaneous products of petroleum and coal	1.54	0.02
22	Manufacture of rubber products	1.54	0.02
23	Manufacture of glass and glass products	-2.40	-0.02
24	Manufacture of cement	-2.40	-0.02
25	Manufacture of other nonmetallic mineral products	-2.40	-0.02
26	Basic metal industries	1.04	0.01
27	Manufacture of fabricated metal products, machinery and equipment (exc. electrical)	5.68	0.06
28	Manufacture of electrical machinery, etc.	3.69	0.04
29	Other manufacturing industries	-0.43	0.00
30	Electricity and gas	5.00	0.05
31	Waterworks and supply	5.00	0.05
32	Construction	-1.98	-0.02
33	Wholesale and retail trade	0.68	0.01
34	Transportation and storage services	0.68	0.01
35	Communication	0.68	0.01
36	Financing, insurance, real estate and business services	-1.73	-0.02
37	Public administration and defense	-1.78	-0.02
38	Education services	2.30	0.02
39	Medical, dental, other health and veterinary services	8.99	0.09
40	Other community, social and personal services	0.68	0.01
	Overall: 1991-2000	**1.03**	**0.03**
	1991-1994	**0.71**	**-0.14**
	1991-1995	**1.10**	**-0.22**
	1995-1996	**2.25**	**-0.10**
	1996-2000	**0.97**	**0.28**

4

[1]*Developed under the MIMAP project.*

[2]*These are the input-output (IO) table-based environment multipliers whose parameters were derived by updating the 1988 ENRAP (Environment and Natural Resources Accounting Project) table to 1990.*

Trade and Environment...
From Page 3

sectoral labor income is minimal. It increased by 0.03 percent from 1991 to 2000. Few variations are noticeable within the various sub-periods. For the period 1991-1995, average total labor income was 0.22 percent lower than 1990. It was still slightly lower between 1995 and 1996, but was increasing from 1995 to 1997. The overall average labor income increased between 1996 and 2000. Within the sectors, however, labor income effects vary slightly.

Natural Resource Depletion. Based on the simulation results, the impact of the changes in the structure of tariff on natural resource depletion is rather mixed. However, on the average, there are indications that the change tends to reduce the pressure from upland soils devoted to agriculture (-1.0 percent) and to increase those for forests (0.96 percent) and mineral (1.22 percent) resources over the period 1991 to 2000 (Table 2). For specific periods where significant changes in the tariff policy were noted, the simulation results indicate a reduction in the depletion rates except for mineral resources for the periods 1991-1995 and 1995-1996. For the period 1996-2000, the rates are seen to increase except for upland soils devoted to agriculture.

Natural Resource Depreciation. In terms of resource depreciation, it is seen to increase by an average of 1 percent over the period 1990-2000 as a result of changes in the tariff structure (not shown in the table). For the sub-period 1991-2000, the average depreciation is about 0.3 percent higher relative to the 1990 levels. For the period 1996-2000, natural resource depreciation is estimated to increase by 1.5 percent.

Table 2: Impacts of the Changes in the Implicit Tariff Rates on the Environmental Variables, Philippines, 1991-2000
(In percent)

Impact Variable	*1991-1994*	*1991-1995*	*Average 1995-1996*	*1996-2000*	*1991-2000*
NR (Physical)					
Agriculture	-1.03	-1.78	-1.50	-0.2	-1.01
Grassland	-0.14	-0.54	-2.55	2.5	0.96
Woodland	-0.14	-0.54	-2.55	2.5	0.96
Dipterocarps	-0.14	-0.54	-2.55	2.5	0.96
Plantation	-0.14	-0.54	-2.55	2.5	0.96
Mangroves	-0.14	-0.54	-2.55	2.5	0.96
Pine	-0.14	-0.54	-2.55	2.5	0.96
Rattan	-0.14	-0.54	-2.55	2.5	0.96
Copper	1.02	1.52	2.07	0.9	1.22
Gold	1.02	1.52	2.07	0.9	1.22
Residual:					
PM	-0.22	0.00	0.69	0.2	0.08
SOx	0.60	2.00	3.44	3.4	2.71
NOx	-0.48	0.09	1.40	0.7	0.39
VOC	-0.16	-0.20	0.01	0.3	0.06
CO	-0.23	-0.23	0.11	0.3	0.01
BOD5	-1.13	-1.01	-0.54	1.1	0.04
SS	-0.41	-0.81	-1.65	1.5	0.36
TDS	-1.74	-0.32	3.76	0.6	0.12
OIL	-1.41	-1.02	-1.26	-1.4	-1.22
N	-1.39	-1.59	-2.04	1.6	0.00
P	-0.20	-0.34	-0.45	0.6	0.11
Environmental Variables:					
NR Depn	3.50	0.28	-13.01	1.5	0.88
EWDS (Air)	-1.02	-0.46	1.44	0.0	-0.22
EWDS (Water)	-0.29	-0.39	-0.75	0.6	0.12
Air damages	-0.12	0.10	0.79	0.3	0.18
Water damages	18.14	18.02	17.91	19.7	18.87

Impact on Other Environmental Variables. The generation of air and water residuals is seen to increase over the period 1991 to 2000 due to the changes in the tariff structure. The annual average increase in air residuals is slightly higher (ranging from 0.01 to 3.0 percent) than for water residuals (ranging from negligible to 0.4 percent). For the sub-period 1991-1995, the annual generation of water residuals declined by 0.3 percent to 1.6 percent relative to the 1990 levels while those of some air residuals (specifically fuel-related pollutants such as PM, SOx and NOx)[3] increased by as much as

[3]*Please see meanings of these compounds in the Box.*

2 percent. The increase in the generation of air residuals is attributed to the increase in consumption of crude oil and oil products of industries brought about by the reduction in tariffs on imported oil products. Said reduction likewise increases the generation of water residuals such as BOD and SS.

Between 1995 and 1996, the average change in the generation rates is seen to be higher: an increase in the volume of air residuals by 0.01 to 3.4 percent and a larger average reduction for water pollutants except TDS. For the period 1996-2000, the average generation rates are seen to increase by 1 percent for air residuals and 0.7 percent for water residuals. By the year 2000, the rates are expected to increase by an average of about 1 percent and 2 percent, respectively, relative to their 1990 levels.

Table 3: Percent Distribution of Air and Water Residuals and other Environmental Variables Impacts Between Production and Household Activities

	Average				
	1991-1994	*1991-1995*	*1995-1996*	*1996-2000*	*1991-2000*
Air and Water Residual:					
Due to production activities					
PM	28.8	29.1	29.5	28.8	28.9
SOx	95.9	95.9	96.0	96.0	95.9
NOx	65.2	65.5	65.9	65.5	65.5
VOC	5.4	5.4	5.5	5.4	5.4
CO	7.7	7.7	7.9	7.7	7.7
BOD5	55.7	55.8	56.0	56.5	56.2
SS	99.7	99.7	99.7	99.7	99.7
TDS	100.0	100.0	100.0	100.0	100.0
OIL	100.0	100.0	100.0	100.0	100.0
N	87.7	87.7	87.6	88.0	87.8
P	25.3	25.2	25.0	25.2	25.4
Due to household consumption					
PM	71.2	70.9	70.5	71.2	71.1
SOx	4.1	4.1	4.0	4.0	4.1
NOx	34.8	34.5	34.1	34.5	34.5
VOC	94.6	94.6	94.5	94.6	94.6
CO	92.3	92.3	92.1	92.3	92.3
BOD5	44.3	44.2	44.0	43.5	43.8
SS	0.3	0.3	0.3	0.3	0.3
TDS	0.0	0.0	0.0	0.0	0.0
OIL	0.0	0.0	0.0	0.0	0.0
N	12.3	12.3	12.4	12.0	12.2
P	74.7	74.8	75.0	74.5	74.6
Other Environmental Variables:					
Due to production activities					
NR Depn	100.0	100.0	100.0	100.0	100.0
EWDS (Air)	59.9	60.2	60.9	60.2	60.2
EWDS (Water)	63.7	63.7	63.5	63.9	63.8
Air Damages	28.9	29.1	29.5	28.9	29.0
Water Damages	63.0	63.0	62.9	63.3	63.1
Due to household consumption					
NR Depn	0.0	0.0	0.0	0.0	0.0
EWDS (Air)	40.1	39.8	39.1	39.8	39.8
EWDS (Water)	36.3	36.3	36.5	36.1	36.2
Air Damages	71.1	70.9	70.5	71.1	71.0
Water Damages	37.0	37.0	37.1	36.7	36.9

Table 3 shows the distribution of residuals by source. There are indications that as a result of the tariff structure change, water residuals, except phosphates, result mainly from production activities. For air pollutants (PM, 71 percent; VOC, 94 percent; and CO, 92 percent), household consumption activities are shown to contribute a lot, in particular, as a result of the use of fuel for vehicles and fuelwood burning. However, SOx (96 percent) and NOx (65 percent) result mainly from the use of fuel as input in production activities.

Summary and Conclusion

In sum, the major results indicate that:

- the average depletion rates were lower for upland soils devoted to agriculture; higher for mineral and forest resources over the period 1991-2000;
- the generation of air and water residuals is higher for air than water; and
- air pollutants such as PM, VOC and CO are contributed largely by household consumption activities while SOx and NOx are mainly a result of production activities.

6

Trade and Environment...

From Page 5

Although there is still a wide room for improvement in the methodology applied here, the results could indicate areas of concern in the formulation of specific environment policies. They can also be used as basis for prioritizing problematic sectors for management and investments for pollution control. *CBC*

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Definition of Environmental Variables

NR (Physical). This refers to the depletion of natural resources in physical terms. Units used are the following: agriculture (soil) - metric tons; grassland (soil) - metric tons; woodland (soils) - metric tons; dipterocarps - cubic meters; plantation (forest) - cubic meters; mangroves - cubic meters; pine - cubic meters; rattan - lineal meters; copper - metric tons; gold - ounces.

NR Depn. This refers to the depreciation of the natural resource in monetary terms (i.e., in 1990 pesos).

EWDS (Environmental Waste Disposal Services). This refers to the amount in pesos of the "service" provided by the environment as a "sink" for industries dumping their wastes into the air and water media. It is based on the cost of abatement if the pollution were to be reduced by 90 percent.

Air and Water Damages. This refers to the health and selected nonhealth damages due to air and water pollution. Ebarvia (1994) and Cortez et al. (1997) under ENRAP estimated the values. They utilized the human capital, cost of illness, willingness to pay, and benefits transfer approaches to value the health effects of pollution. The foregone productivity and benefits transfer approaches were used to value nonhealth impacts. The latter include off-site damages to coral reefs, reservoirs, agricultural production and inland fisheries.

BOD5. Biological oxygen demand for 5 days refers to the amount of dissolved oxygen consumed by the oxidation of organic matter decomposing within the period of 5 days.

CO. Carbon monoxide is a colorless, odorless gas formed by the incomplete combustion of organic fuels primarily from motor vehicles.

N. Nitrogen is a derivative of fertilizer and treated and untreated sewage. As dissolved nitrogen, it is toxic to fish. As ammonia, it interferes with drinking water chlorination and as nitrite and nitrate, it is a plant nutrient which can lead to euthrophication.

NOx. Nitrogen Oxide is formed from the intense heat and pressure in combustion processes.

Oil. Oil is a greasy, combustible fluid that floats on the water surface. It does not only make the water unsightly but also obstructs the passage of light through the water, retarding the growth of vital plant food. It renders boiler-feed and cooling water unusable and causes trouble in conventional water-treatment processes by imparting tastes and odors to water.

P. Phosphorous occurs predominantly as phosphate and serves as plant nutrient which can lead to euthrophication, in turn producing algal blooms and other nuisance conditions.

PM. Particulate Matter refers to small solids such as sand, metallic and mineral particles and pollen, and fluids such as smoke, mist and salt spray.

SOx. Sulfur Oxide is a gaseous emission primarily composed of sulfur dioxide and sulfur trioxide. It is produced from the combustion of fuels containing sulfur such as coal, fuel oil and diesel oil.

SS. Suspended solids settle to the bottom or wash up on the banks of water bodies. These can reduce sunlight penetration and clog animal and plant surface, thus reducing biological activity. High levels can cause water bodies to have a brown or muddy appearance.

TDS. Total Dissolved Solids consist of organic and inorganic solids. The latter include, among others, chlorides, phosphates, nitrates, and certain metals. These are considered less polluting than the organic solids which are usually oxidized rapidly by the microorganisms in the receiving stream, resulting in loss of dissolved oxygen, and the accompanying ill effects of deoxygenated water.

VOC. Volatile organic compounds result from the evaporation of tanks and incomplete combustion in automobile engines and industrial boilers. VOC is sometimes referred to as TOC (total organic compounds).

Third Quarter Employment Data: A Sign of Economic Recovery for the Philippines?

Is the Philippines finally out of the financial crisis? Judging from the employment data in July 1999, crisis-hit economies like the Philippines seem to have improved a lot in recent months. Is this the start of economic recovery for the country?

One of the Highest Rates since 1997

This may very well be, as the country's employment data for the third quarter of 1999 posted positive growth rates. This is evident as the July 1999 employment rate rose to 91.6 percent as compared with the 91.1 percent level a year ago. What is perhaps even more notable is that this year's rate is one of the highest since the financial crisis started in July 1997. This resulted in a decline in the unemployment level by 79,000 or 2.9 percent from July 1998 to July 1999. Correspondingly, the unemployment rate declined by 0.5 percentage point, from 8.9 percent last year to 8.4 percent this year.

As shown in Table 1, total labor force reached 31.7 million in July 1999, about 3.7 percent higher or roughly 1.1 million higher than the July 1998 estimate. On the other hand, the employment level stood at 29.1 million, an increase of 1.2 million compared to the 27.9 million a year ago. With a much bigger improvement in the employment level, the government had managed to beef up its economic activities, thereby creating even more jobs and opportunities for the people. In terms of the underemployment rate,

Table 1: Key Employment Data

Indicators	July 1998 Both Sexes	July 1998 Male	July 1998 Female	July 1999 Both Sexes	July 1999 Male	July 1999 Female
Labor force*	**30.6**	19.2	11.4	**31.7**	19.7	12.0
Employment level*	**27.9**	17.5	10.4	**29.1**	18.1	11.0
Unemployment rate (%)	**8.9**	8.7	9.4	**8.4**	8.3	8.5
Underemployment level*	**5.8**	4.0	1.8	**6.4**	4.5	1.9
Underemployment rate (%)	**20.8**	23.2	16.9	**22.3**	25.0	17.7

*Values are expressed in millions.

Table 2: Employed Persons By Major Industry Group July 1998 and July 1999, Philippines

Industry Group	July 1998 Number*	July 1998 %	July 1999 Number*	July 1999 %	Growth Rate (%)
Agriculture	11.0	39.5	11.8	42.5	6.8
Industry	4.5	16.2	4.5	16.4	0.3
Mining and quarrying	0.1	0.5	0.1	0.4	-23.4
Manufacturing	2.6	9.5	2.7	9.9	3.6
Electricity, gas and water	0.2	0.5	0.1	0.5	-8.6
Construction	1.6	5.7	1.6	5.6	-2.5
Service	12.3	44.3	12.8	46.1	3.5
Wholesale and retail trade	4.2	15.2	4.5	16.1	4.9
Transportation, storage and communication	1.8	6.6	1.9	7.0	5.5
Financing, insurance, real estate and business services	0.7	2.4	0.7	2.7	10.1
Community, social and personal services	5.6	20.0	5.7	20.4	1.0
Total Employed	**27.9**	**100**	**29.1**	**100.0**	--

*Values are expressed in millions.

8

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Employment Data...

From Page 7

it had likewise increased from 20.8 percent a year ago to 22.3 percent in July 1999.

Sectoral and Gender Movements

Among the major sectors, Table 2 shows that agriculture registered the highest increase in employment level, with a 6.8 percent gain or an additional 750,000 workers from July 1998 to July 1999. This was followed by employment in the services sector which recorded an increase of 434,000 workers, with wholesale and retail gaining by 208,000 workers; transportation, storage and communication, by 100,000 workers; financing, insurance, real estate and business services, by 68,000 workers; and community, social and personal services, by 58,000 workers. On the other hand, the industry sector managed to increase by a measly 0.3 percent, brought about by the growth of the manufacturing subsector by 3.6 percent. This shows that the manufacturing subsector, which was greatly affected by the onslaught of the crisis, was able to bounce back in comparison with other sectors which continuously experienced a downturn like the mining and quarrying subsector which lost 30,000 workers (23.4%); electricity, gas and water, 13,000 workers (8.6%); and construction, 40,000 workers (2.5%).

In terms of gender distribution, males have dominated the employed persons both in July 1998 and July 1999. However, there is a slight decrease in the percentage of the male workers from 62.8 percent in July 1998 to 62.2 percent in July 1999. This means that there are more females entering the labor force, at a rate of 6 percent increase compared to a 3.3 percent increase of male workers. Similarly, a higher proportion of males were underemployed at 25.0 percent as compared to 17.7 percent rate for females in July 1999. *RCR* MIMAP

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