

UAE Economy More Dualistic Than Other GCC

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Abstract: This paper attempts to draw up and apply an analytical framework for tracing and understanding duality features in the resource rich labour short developing country. The focus is on UAE and GCC, The framework is guided by (a) a simple model at the macro level that highlights duality tendencies in terms of the composition of high skilled and low skilled labour and their diverging productivities, and (b) an inter-industry analysis at the sector level. The paper elaborates further on whether dualistic development matters; and if it matters, what can be described as the optimal degree of dualism in a given context. As there is no simple answer to this issue an empiricist approach is followed by which various comparative indicators relating to duality are reviewed, rescaled and aggregated for UAE and GCC. The indicators show a significantly higher duality of UAE than in neighbouring countries. Duality in UAE is explained in terms of a more open market for foreign labour and capital that reinforce each other, and which have highly contrasting and opposite effects on factor productivity; next to built-in inter-industry mechanisms that work in the same direction.

Key words: migrant labour; new economy; dualistic; Arab Gulf

JEL codes: J4, M2, O3, P5

1. Introduction

By a dualistic economy is meant a highly structured economy containing a relatively concentrated modern segment with high and rising factor productivities, next to a traditional segment covering many workers in tiny enterprises with low and declining productivities. The notion has wide application to developing countries with poor natural resources and an oversupply of labour, and is basic to theorizing and understanding the process of development in these countries, Kelly et al. (1089).

In general, there has been little attention devoted to the emergence of duality features and problems in developing countries with rich natural resources and an undersupply of labour such as the GCC. Focusing on UAE in particular, this paper attempts to draw up and apply a framework for tracing and understanding duality features in the resource rich labour short developing country. The framework is guided by (a) a simple model at the macro level that highlights duality tendencies in terms of the composition of more skilled and less skilled labour and their diverging productivities, and (b) an analysis at the sector level that identifies sectors behind the increasing dualities.

The paper elaborates further on whether a dualistic development matters; and if it matters, what should be the optimal degree of dualism in a given context. As there is no simple answer to this issue an empiricist approach is

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followed by which various comparative indicators relating to duality are reviewed, rescaled and aggregated for UAE and GCC. The indicators show a significantly higher duality of UAE than in neighbouring countries.

2. A Macro Level Analysis of Dualistic Development in GCC Type Countries

Dualistic models, developed by Lewis and Ranis in the 1950's, were rightly applied to the classic case of a resource poor surplus labour developing country. The premises of the model are (a) a large population in the traditional agriculture sector earning an income above marginal productivity, so that an outflow of labour will not affect production; (b) firms in the modern industrial sector, working with increasing capital intensity, will hire and train this labour surplus and pay a wage equal to their marginal productivity. The development process is then seen as a transfer of labour from the low productivity sector to the high productivity sector, with a likely widening of the dualistic gap between the two sectors, other things remaining the same. Due to this duality, economic growth may not necessarily signal a general improvement in welfare for all participants. Under favourable conditions and over time counter transfers and linked markets can occur, thus contributing to an integration of the economy and a more equitably distributed welfare.

In the last five decades dualistic analysis was extended to cover the division between the formal and informal sectors, as well as emphasis on marginalization tendencies, and urban bias, Cf. Sethuraman (1981), Soto (1989), and Lipton (1977), respectively. But the main contours distinguishing dualism in the overpopulated poor developing country remained intact: the coexistence of a low productivity lagging sector housing the larger portion of a less skilled labour force, next to a high productivity growth sector with skilled labour.

We attempt here to formulate an analytical framework for dualistic development for the case of the resource rich labour short developing country, for example the UAE, or generally the GCC. The formal-informal dichotomy and its manifestations are also common in this rich region, though the mechanisms behind this dualism are totally different from the classical case of the poor country.

To start with, a simplified macro model of dualistic development in GCC context in six equations is displayed. This is a conceptual model meant to catch the very basic features. These are (a) the exogenous effects of favourable oil revenues on the modern economy, in particular higher consumption, higher capital intensive investment, and often outward growth in invisible services, requiring import of foreign high productivity skilled manpower at world market clearance rates whereby remuneration equals marginal productivity; (b) the modern economy imports as well foreign unskilled labour with a lower opportunity cost than its marginal productivity; (c) this foreign unskilled labour falls back on an informal economy for their consumption needs given their low levels of remuneration and high remittances; and (d) this creating furthermore a multiplier demand effect for more foreign unskilled labour in the informal economy to satisfy its increased consumption demands .

The result of (a) to (d) is a heightened expansion of both the modern and traditional economies, more foreign labour inflow, and relatively more so of low skills than high skills, coupled with a growth in wage discrepancies between the high and low productivity labour types.

Equation (1) gives the GDP of the modern economy (non-oil), V_m , as the sum of consumption, investment and exports less imports. Consumption and investment depend on the GDP of oil and non-oil. This equation determines V_m from the demand side. Equation (2) determines the stock of capital in the modern economy K_m . Equation (3) determines the input of low skills in the modern economy, L_m , which is a wage bill divided by a sort of exogenous minimum wage W_l that is equivalent to the opportunity cost of low skilled in the migrants' countries.

Equation (4) is a production function. With V_m , K_m and L_m solved, the input of high skills H_m is derived from this production function.¹ Turning to the traditional economy, Equation (5) specifies the composition of its GDP, V_n , as consisting of some consumption demand by the modern economy; consumption demand by low skills who are assumed to spend their disposable income on traditional goods; and some investment in the traditional sector. In Equation (6), employment in the traditional economy, L_n , is found from the wage share and the exogenous minimum wage, and by adding up other exogenously known categories of informal workers consisting of household helpers and unregistered workers, L_{n1} and L_{n2} , respectively.

Box 1. Model highlighting dualistic features in a resource rich labour short developing country

<i>Indices:</i> o, m, n are subscripts for oil, modern and traditional sectors, respectively.	
<i>Endogenous variables:</i> V = Value added, K = Capital, H = High skilled labour,	
L = Low skilled labour (L_m in modern sector and L_n in traditional sector)	
<i>Exogenous variables:</i> V_o = value added of oil sector, E_m = exports less imports of modern sector, W_l = wage low skilled, L_{n1} , L_{n2} = Informal sector household helpers and unregistered workers	
<i>Coefficients:</i> α , β = marginal productivities of capital and high skilled labour	
γ , ι = functional parameters for consumption and investment, δ = depreciation rate of capital	
ρ = remittance share in labour income, π = profit share in value added	
Equations:	
$V_m = \gamma_m (V_m + V_o) + \iota_m (V_m + V_o) + E_m$	(1)
$K_m = (1 - \delta_m) K_{m, t-1} + \iota_m (V_m + V_o)$	(2)
$L_m = (1 - \alpha - \beta) V_m / W_l$	(3)
$V_m = A_m K_m^\alpha H_m^\beta L_m^{(1-\alpha-\beta)}$	(4)
$V_n = \gamma_n V_m + (1 - \rho_n) W_l (L_m + L_n) + \iota_n V_n$	(5)
$L_n = (1 + \lambda_n) (\pi_n V_n / W_l) + L_{n1} + L_{n2}$	(6)

3. A Macro Interpretation of Recent Trends in Terms of Dual Sectors

An indication of an increasing duality can be derived from the model in various ways. One way is to examine a simple comparison between the trend of the wage rate of the high productivity labour that can be denoted by W_h and that can be derived from Equation (1), and the wage rate of the low productivity labour W_l . The ratio of W_h to W_l tended to increase in recent years in the UAE, indicating a rise in duality. This is the result of a wage rate paid to the high skill that is equal to its marginal productivity, while the wage rate for the low skill is settled at a value equal to the opportunity cost of the low skilled in neighbouring countries that supply this labour, increased by the transaction costs required to travel and obtain a work license. As this opportunity cost tended to fall in recent years, the wage rate of the low skilled W_l has also fallen in real terms and well their below marginal productivity.

Another measure of the increasing duality can be found in weighing the growth rates of W_h and W_l by the changing shares of H and L in the total labour force. This gives a measure of the changing concentration of income shares. In UAE, and for many years, there has been a greater growth in the number of low skilled L than in that of high skilled H; and given the widened gap between W_l and W_h , it can be postulated that the income distribution in UAE is likely to be more skew over time, implying an increase in duality.

Of course, a shortcut for tracing duality would be simply to relate the growth of labour productivity in the modern to the traditional sectors. The problem is that it is not operationally feasible at the macro level to separate

¹ This equation can generate also the remuneration rate of high skills, W_h , based on competitive assumptions that assure that the remuneration rate equals marginal productivity in case of H_m .

and estimate the production of the two sectors apart, and that is why the sketched macro model is basically a conceptual tool. However, an indirect indication of the increasing duality can be obtained from an aggregate picture combined with other observed facts. Table 1 shows for six recent years a decline in the aggregate labour productivity to 70% of its initial value, or an average decline of about 0.7% per year. Given the earlier mentioned positive growth in labour productivity in the modern sector as reflected by the increasing remuneration rate of the high skilled and their marginal productivity, then the labour productivity in the traditional sector must have diminished appreciably over the years, to allow for this aggregate annual decline in labour productivity of 0.7%.

Table 1 Trends in Labour Productivity, UAE

	1993	1994	1995	1996	1997	1998	1998/93
GDP non-oil, mlnaed	137659	140913	148679	164256	166884	154804	1.12
Labour 000s	859717	940844	1216854	1273750	1329503	1378495	1.60
Labour productivity	0.160	0.150	0.122	0.129	0.126	0.112	0.70
Growth of lab. productivity		0.935	0.816	1.055	0.973	0.895	0.935 (av)

Source: Compiled from Annual Economic Reports, Ministry of Planning.

GDP at factor cost constant prices of 1990.

There is a net addition of about 514000 workers in the six years, practically all of them are migrant workers, with most of them absorbed by the traditional sector. The figures would imply that a large part of the inflow of migrant workers in recent years did not bring an added value to the economy, and must have gone to activities of lower productivity such as usually spread in the traditional sector.

How to justify and unify analytically the highly contrasting pictures on labour productivity in UAE? On the one hand, there are the trends showing deterioration in productivity. On the other hand, there is observed evidence on a healthy and growing economy. How can these contrasting pictures be unified? The logical harmonization of these contrasting facts is in recognizing that economic activities in UAE consist of highly heterogeneous types of employed labour and capital, and that disaggregation of these activities into a leaping commercially-run modern segment and a lagging traditional segment will uncover important realities. The lion's share of the declining labour productivity occurs in the lagging segment, which has attracted significant inflows of foreign workers that are not matched with corresponding increases in the value added. High degrees of overcrowding and underutilization are among the manifestations. Several mechanisms are described below.

The modern economy. High growth due to oil revenues, high investment and increased invisible exports lead to a pattern of capital intensive investment that raises demand for high skills but also substitutes capital for labour, with the net effect being a positive demand for high skills H_m , Equations (1), (2), (4). What is the case for low skills L_m ? In the eighties and early nineties the country's labour market was relatively tight leading to higher wages and lower returns on capital. With a more open labour market since then, there has been a significant influx of cheap labour from low-income neighbouring countries, which producers appreciate. There is a large stock of labour in neighbouring countries with low opportunity costs and they are prepared to pay a premium to be allowed to migrate, enter the labour force and earn a basic income. One and the other have lead to a decline in the general level of low skilled wages and a rise in profits. While labour productivity is falling, business profitability has increased because of the intensified wage competition among the lower skills leading to more employment L_m^2 ,

² While this can be advantageous from the private point of view in the short run, it may discourage labour-saving technological investments and curb economic growth in the long run.

Equation (3). The greater use of Lm may have substituted for some Hm as well, Equation (4), causing a further relative downgrading of the skill profile.

The traditional economy. All workers in the traditional economy Ln can be assumed to be of a low productivity equivalent to Lm. Note that Lm is low productivity but they are aligned with the modern segment, while Equations (5) and (6) deal with other low skill in the traditional segment, Ln. There are several common things about these categories apart from having the same low skill description. All L categories receive W per worker which is equivalent to a low opportunity cost that applies in the countries of migration. All L categories remit a substantial share of their income, r, back to the migrant country. All L categories spend their consumption on low productivity goods and services provided by the informal sector.

Among the low skilled informal workers, a distinction can be made between Ln1, Ln2, Ln3. These are household helpers, unregistered workers, and the core informal workers in tiny enterprises catering for production and services to low income earners.³ They are discussed below.

One category of informal workers is that of foreign housemaids, cooks, gardeners, and drivers. This group increased appreciably due to the increased demand by higher income households and the modern business sector for these household services. According to the population census of 1995, household helpers counted 104 thousands, good for about 10% of foreign employment.⁴ The importing household head submits a request to the authorities to fetch a household helper, which request is granted. There is no formal market for these transactions and the household head assumes legal and residential responsibilities for the imported labour. To some extent, there may not be a realizable conversion of the earned income of these informal workers into an additional value added to the GDP. It is also less likely that the spending households would increase their own productivity appreciably and fully as a result of the personal service. Under these circumstances a substantial part of these informal earnings can as well be interpreted as a redistribution of income from spender to receiver, or as being a leaking expenditure on imports from abroad, which are physically delivered and consumed in the importing country. The case of an informal worker who does not contribute to production, but via his spending, generates demand for more labour inputs of other to maintain his living, would lead to a further artificial surge of labour supply in the traditional sector, falling labour productivity and rising duality.

Another category of foreign workers, which can be considered informal in a regulatory sense, consists of foreign workers who are permitted to earn an income without registering as an establishment, mostly in agriculture, fishing and transport. According to the population census of 1995, workers without establishments counted 119 thousands, which is another 10% of foreign employment.⁵ The profile of these workers is for more than 90% unskilled. However, these are capable of generating a value added; though it can be expected that in most cases such a value added is not much above what is necessary to cover basic needs.

The two categories above are not subjected to the usual clearance procedures that apply to other foreign workers, which require issue of business licenses, by municipal authorities, and subsequently granting of work

³ Migrant workers whose labour contract expired and stay illegally in the country may form from 15% to 30% of the labour force. They belong mostly to the low productivity skill. Since they are by definition distributed on categories Lm, and Ln1, Ln2, and Ln3, they are thus indirectly accounted for in the model.

⁴ Citizens from India, Sri Lanka, Philippines and Pakistan supply this category. Household helpers are distributed as follows: Abu Dhabi 40%, and Dubai 26%, among others.

⁵ Foreign workers from Pakistan, about 45%, dominate this category. Farmers and fisherman are the major occupations, about 50%, followed by production and service workers in transport and trade. The over majority of the category is unskilled, about 92%, with the skilled forming only 8%. The foreign workers without establishments are mostly in Abu Dhabi, 50%, followed by Dubai, 22%.

permits by Ministry of Labour. The nature of their work is different and the corresponding policies towards them differ from those for other foreign workers. But the more lenient procedures towards admission has enhanced their inflow and contributed to an accentuation of the productivity gap and dualistic development.

A more important category of informal workers are those manning tiny enterprises engaged in the production of low cost goods and services that are predominantly consumed by the low productivity labour who have an equally low purchasing power. These are enterprises that are governed by a combination of economic motivations and social ties, and that can afford to increase employment of unpaid or partially paid family dependants, relatives and close relations, cheaply brought from neighbouring countries at little extra cost for the proprietor. In the context of a small family-run business, once the proprietor/head of the family has succeeded in securing a business license and in setting an establishment site, it becomes more attractive for the proprietor to fetch dependants from overseas, cover their living expenses, allocate work to them, and enhance the proprietor's esteem, than to engage in periodical income transfers via remittances abroad. The types of activities and occupations typical of the traditional segment are handicrafts, simple manufacturing processes, and retail and food kiosks. The enterprises have very little capital, are highly labour intensive, have low turnovers and their clients have a low purchasing power. This bleak perspective in mind induced some, i.e., Soto (1989), to brand the informal segment as the marginalized segment, obviously, this segment, by importing more foreign labour at the same level of activity, will be a cause for a diminishing labour productivity and increased dualism.

There is more information on the profile of the informal sector from a sample survey organized by MOL among 407 establishments of 1 to 10 workers in 1998; these were appropriately scrutinized to separate those in the traditional sector from those that are oriented towards the modern sector. The stratification yielded slightly more than 40% of the establishments classified as informal and about 60% for modern.⁶ The survey shows the traditional sector to be a cradle for the low and decreasing productivity performance, which characterized the economy in recent years. The over majority of the low productivity establishments, 76%, had an initial capital well below the minimum required for listed companies, 40% experienced a decreasing turnover, and the establishments reported on average more than one obstacle for future growth. The traditional sector depended predominantly on family labour, mostly unpaid, and brought in from abroad. The skill profile of the remunerated workers is remarkably low.

Another interesting detail is that the survey contained another 81 establishments run by nationals. Application of the same stratification procedures to these divided national establishments into a traditional segment of only 9%, while the modern profile accounted for 91%, testifying to a much lower performance configuration among the foreign as compared to the national.

There is supplementary evidence that indicates a strong bias of small firms to attract foreign workers from abroad, as compared to larger firms. Another survey conducted an inquiry about the required inflow of additional foreign workers in the three years following 1996.⁷ The results show that the small firms (below 10 workers) quote a required increase of 151% on their base employment; while it is evident ex-post that there are no prospective economic grounds for justifying such excessive increases. The intentions can be partly understood in the light of non-economic motives to boost the demand for family related foreign workers. The above figure can be compared with the more realistic required increase that firms with more than 10 workers have projected: only

⁶ The survey is reported upon in various reports issued by TANMIA, see references.

⁷ Cf. A Strategy for Emiratization, published by UAE University, 1997.

55%. The bias of small firms to overuse foreign labour is likely to be a major cause of the low labour productivity and duality tendencies.

One final point concerns the UAE economy as a whole. The profile of the inflow of attracted foreign labour in terms of education, skill and economic activity is remarkably lower than that of the stock to which the flow is added, and this result in a further reduction of the labour productivity in skill equivalent terms. In Table 2, the comparative educational profiles for several categories of active labour are shown. For instance, the ratio of low to high education among male expatriates working in production is 9.8, roughly 10 to 1. The ratio for nationals is 3.7. The educational gap between expatriates and nationals is less for workers in services and is significantly reversed for government. In general, a low turnover of migrant workers⁸ tends to downgrade the educational profile further.

Table 2 Ratio of Workers with Low Education to Those with High Education, by Nationality and Gender, UAE, 1995

Nationality	Gender	Production	Services	Government
Nationals N	Male M	3.73	2.88	8.69
	Female F	0.79	0.42	1.48
Expatriates E	Male M	9.83	3.69	4.74
	Female F	6.99	2.32	0.99

Source: The ratios are calculated from a Human Resource Development Matrix for 1995, in Cohen (2000). Low education is secondary and below, high education is college and above.

4. An Inter-industry Analysis of Dualistic Accents in UAE

Insight into duality tendencies can be gained also from a multiplier analysis of an updated input-output table for UAE. The input-output table, which was constructed for Abu Dhabi for 1995, cf. UNDP-UN-DESA (1999), has been updated using the RAS method so as to represent the whole economy of UAE for 2003.

The I.O. table allows calculating technical coefficients that give the deliveries of intermediate goods of sector *i* to sector *j* as a proportion of the total production of the purchasing sector *j*. These coefficients form the *A* matrix in Equation (7). The equation is an accounting identity stating that sectoral production *q* is equal to the intermediate deliveries *A q* plus final demand *f*. The equation can be used to predict an endogenous vector of sectoral production, *q*, from an appropriately inverted matrix of technical coefficients, $(I - A)^{-1}$, and a vector of exogenous final demand, *f*.

$$q = Aq + f = (I - A)^{-1}f = Mf \quad (7)$$

The inverted matrix is the multiplier matrix, and is denoted by *M*.

Table 3 gives the multiplier matrix for UAE in 2003. Each column shows the effects of an injection of one unit of final demand in one sector on that sector and on other sectors. An injection of 1 unit in agriculture generates 1.016 in agriculture and 0.227 in other sectors leading to a total multiplier for agriculture of 1.243. The highest multiplier happens to be that of public utilities giving 1.673, the lowest is that of oil giving 1.089, which is due to a greater detachment of the oil sector from the circular flow of the economy.

⁸ A greater number staying longer hinders mobility and upgrading of skills. Several sources estimate that 53.7% of the migrant population and 51.1% of the migrant labour force of 1995 had been staying in UAE for five years or more. Comparable percentages for those who stayed for ten years or more were, respectively, 30.7% and 29.6%. Stickiness of migrant workers is also manifested in their response to a controlled expulsion in late 1996 when the authorities expelled around 200 thousand immigrants without valid visas. However, many of them returned through official channels after a six-month embargo.

To identify the sectors to which the growth of the economy is geared to, some additional analysis of the multipliers is required. Besides comparing the levels of the multipliers, it is also important to study the distribution of the multiplier effects on the respective sectors and households and assess the underlying structural bias. For instance, one should ask how the output multipliers of an injection in sector s' distribute themselves on the individual sectors s . Equation (8) develops such a Relative Distributive Measure of sector on sector effects ss' , denoted by $RDM_{ss'}$, from multipliers matrix M , in Table 3;

$$RDM_{ss'} = \frac{(M_{a,ss'} - d_{ss'})}{\left(\sum_s M_{a,ss'}, -1\right)} / \frac{Output_{s,0}}{\sum_s Output_{s,0}} \quad (8)$$

Where the individual multiplier effect of s' on s , $M_{a,ss'}$, is divided by the column sum of multipliers of s after deducting the initial injection. Here we use $d_{ss'}$ for the Kronecker symbol that equals 1 if $s = s'$ and 0 in other cases. The result is divided by the actual output share of sector s in year 0, as found in the input output table for the base year, Table 3, last column. For values of $RDM_{ss'} > 1$, < 1 , and $= 1$, there are positive, negative and neutral redistributive effects. For instance, values of $RDM_{ss'} = 1$ mean that sectoral injections would reproduce exactly the sectoral distribution pattern of the base year. Values of $RDM_{hs'} = 1$ mean that sectoral injections would reproduce exactly the initial distribution pattern of the base year. A positive value for a particular sector s would mean an increase in its output share relative to the base year; a negative value would mean deterioration.⁹

It can then be calculated what is the RDM in UAE of uniform injections on all sectors on each sector. This is shown in the last column of Table 3. The results show that sectors that succeed in gaining a higher share than their actual are manufacturing, electricity, construction, wholesale, and transport. Of these construction is the highest. All other remaining sectors are oriented towards losing their shares s in the economy.¹⁰

These RDM multiplier results can now be combined with recent tendencies in the use of labour in the various sectors, as shown in Table 4. The construction sector, which has the highest positive production growth bias in the multiplier analysis, is found also to manifest the highest decline in labour productivity; and thus accentuating the dualistic character of economic development. This feature is also shared by the manufacturing sector and the wholesale and retail trade sector. All three sectors are drivers of economic growth and contain significant portions of the modern economy, but these sectors are also inclined to absorb increasingly more labour and cause a decline in the aggregate labour productivity. Most of the labour absorbed is less skilled, so that the decline in labour productivity in equivalent terms is greater. The only sector that counteracts these dualistic tendencies is the transport, storage and communications sector, having a positive growth bias and a rising labour productivity. All other sectors appear to play lesser prominent roles in the dualistic tendencies.¹¹

⁹ To demonstrate the case of an injection in agriculture on agriculture, Equation (8) will give $\{(1.016-1.0)/(1.243 - 1.0)\}/.0254 = (.016/.243)/.0254 = .0658/.0254 = 2.59$. The case for an injection in agriculture on oil gives $RDM = \{(.001)/.243\}/.237 = .017$. For an injection in agriculture on wholesale RDM is 2.69.

¹⁰ The declining share of the government sector is due to the specific formulation whereby indirect taxes paid by the sectors to the government are not considered in the input-output analysis.

¹¹ Needless to say, the above results need to be qualified to the extent of the known limitations to an I.O. analysis and the available data for UAE.

Table 3 UAE Multipliers

	1. agr	2.cro	3.man	4.ele	5.con	6.trd	7.trn	8.fin	9.psr	10.gsr	sum	rank	RDM
1.agriculture	1.016	0.001	0.010	0.002	0.007	0.017	0.008	0.000	0.002	0.008	1.072	(viii)	0.812
2.crude oil	0.001	1.001	0.014	0.213	0.006	0.003	0.003	0.001	0.006	0.004	1.251	(v)	0.303
3.manufacture	0.036	0.018	1.082	0.078	0.310	0.068	0.073	0.020	0.053	0.112	1.848	(ii)	1.449
4.electricity	0.005	0.002	0.007	1.033	0.011	0.011	0.012	0.002	0.025	0.013	1.122	(vii)	1.421
5.construction	0.015	0.054	0.030	0.211	1.036	0.074	0.119	0.063	0.030	0.297	1.928	(i)	2.051
6. trade	0.137	0.005	0.234	0.022	0.079	1.023	0.052	0.006	0.015	0.029	1.603	(iii)	1.423
7.transport	0.020	0.004	0.038	0.056	0.024	0.017	1.171	0.004	0.008	0.012	1.353	(iv)	1.248
8.finance	0.010	0.004	0.019	0.044	0.024	0.060	0.027	1.023	0.011	0.028	1.249	(vi)	0.675
9.pers services	0.000	0.000	0.001	0.001	0.000	0.001	0.014	0.001	1.009	0.000	1.027	(x)	0.395
10.gvrn services	0.003	0.000	0.003	0.014	0.003	0.004	0.007	0.001	0.004	1.003	1.043	(ix)	0.138
sum	1.243	1.089	1.437	1.673	1.502	1.279	1.487	1.121	1.162	1.506	13.498		
rank	(vii)	(x)	(v)	(i)	(iii)	(vi)	(iv)	(ix)	(viii)	(ii)			

Table 4 Multiplier Growth Bias and Labour Productivity Growth Features by Sector, UAE

sector	RDM 1995-2003	RDM rank	Av. annual growth of labour productivity	Growth of labour productivity rank
1. agriculture	0.81170	Declining, (vi)	1.012	Stable, (iii)
2. crude oil and natural gas	0.30287	Not applicable	0.826	Not applicable
3. manufacturing industries	1.44906	Rising, (ii)	0.942	Declining, (x)
4. electricity, gas and water	1.42090	Rising, (iv)	0.989	Stable, (vii)
5. construction	2.05128	Rising, (i)	0.939	Declining, (xii)
6. wholesale, retail trade (a)	1.42271	Rising, (iii)	0.942	Declining, (xi)
(restaurants, hotels) (a)	1.42271	Rising, (iii)	0.997	Stable, (v)
7. transports, storage, communic.	1.24807	Rising, (v)	1.038	Rising, (ii)
8. finance, insurance (b)	0.67502	Declining, (vii)	1.049	Rising, (i)
(real estate, business serv.) (b)	0.67502	Declining, (vii)	0.979	Stable, (viii)
9. personal services (c)	0.39518	Declining, (viii)	1.008	Stable, (iv)
(domestic services) (c)	0.39518	Declining, (viii)	0.990	Stable, (vi)
10. government services	0.13845	Declining, (ix)	0.973	Stable, (ix)

Sources: RDM from input output multipliers. Several sectors are combined in the input output table. This applies to sectors indicated by a, b, and c. Column 4 is from TANMIA reports in References.

5. On the Optimal Degrees of Dualistic Development and Open Economy

The duality tendencies displayed in the previous sections are the result of the liberal policy towards granting work licenses, and admitting foreign labour, which is further strengthened by the multi-level decentralized system of granting work permits, and the exclusion of minimum educational levels as conditions for admission. The duality tendencies are also due to built-in mechanisms at the sector level.

However, it can be rightly questioned: If the oversupply of low productivity labour drags the statistical profile of productivity downwards but does not affect the higher branch of the economy in real terms, so why worry? Besides, the welfare gains in UAE are permitted to be shared by enterprising migrant workers from the region and this is an esteemed goal by itself, which can be seen to have positive externalities for UAE as an attractive and a stabilizing partner in the region. The open door strategy has worked in the past, brought welfare, and if it can be prolonged, why not?

So, does duality matter? And if it matters, what is the trade-off between an open-ended liberal economy, and a reduced duality. Economically speaking, as long as there is a large supply of low productivity labour in neighbouring countries that is prepared to migrate to GCC and earn a wage lower than its marginal productivity, there is economically no harm in letting the low and the high productivity segments grow independently of each other, and thus manifesting an increasing statistical duality, so as to say on paper. The need for and the advantages of integrating the two segments arises when the low productivity labour becomes scarce. Under scarcity, less dualism and more integration will bring about advantages of economies of scale and scope. Of course, more arguments are readily found from demographic, sociological and political perspectives that favour integrative processes on dualistic processes.

Accepting that at some point in time dualism matters, then what is the optimal degree of duality in the light of a liberal policy towards the inflow and outflow of manpower. Some conceptual reflections can be made on the issue, making use of Figure 1 below. Curve A shows how the total cost of prospective damage due to duality decreases as the degree of control and economic integration between the two segments increase. Curve B shows how a greater degree of control and a less liberal policy towards labour mobility will bring more cost on the community more in terms of foregone economic welfare. By adding the two curves together curve C is obtained. The optimum balance between costs and benefits is achieved by a degree of control that will minimize the total cost to the community. This optimum degree of control, the minimum point in curve C, does not eliminate all the bad side effects of a dualism; there is thus such a conceptual thing as an optimum degree of dualism. The degree of control may expand for as long as the total benefits exceed the total costs. The optimum degree of control is reached as soon as the total cost is equal to the total benefit. The optimum degree of control is therefore that which minimizes the total costs of control and damage.

In the real world it is hardly possible to draw the above curves. Policy makers dealing with a certain issue and alternative paths try often to make a judgement as to where their countries are positioned regarding the alternatives vis a vis other comparable countries. Most often the policy makers of country A will try to close ranks with the set of countries to which country A belongs, and would follow policies that converge and convert towards the median position and empirical norms.

Given the above, the next section examines dualities in UAE in the context of the GCC, with the purpose of reflecting on median positions.

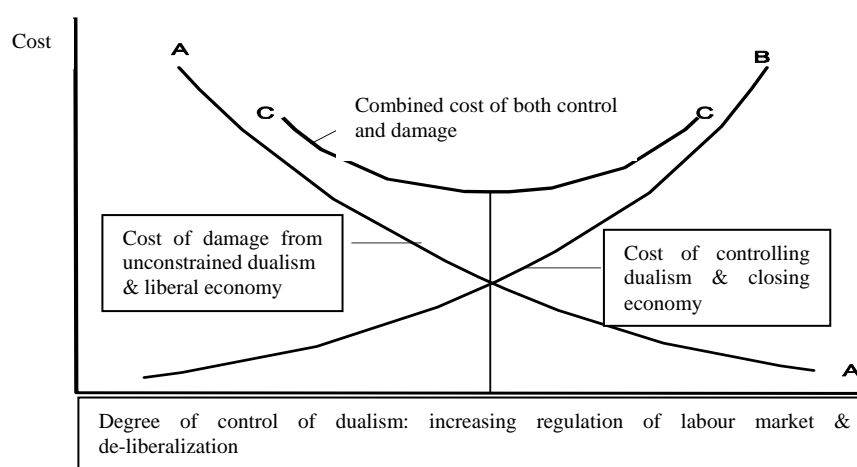


Figure 1 Optimal Mix of Costs and Benefits from Dualism

6. Clues on Optimality: Comparative Dualities in UAE and GCC Countries

It is generally recognized that the achievement pace in industrial development in the UAE is ahead of the GCC. While the absolute number of industrial establishments in UAE and Saudi Arabia are close to each other, Table 5; in relative terms the number of industrial establishments per capita is much higher in UAE than in Saudi Arabia or the other GCC.

Table 5 Number of Industrial Operating Establishments in GCC Countries in 1998

{PRIVATE}	Bahrain	Kuwait	Oman	Qatar	S. Arabia	UAE	Total
Total	327	725	751	382	3,004	2,054	7,243

Source: Gulf Organization for Industrial Consulting: "Industrial Data Bank" GOIC: <http://www.goic.org.qa/>

In spite of the higher industrial development of UAE it will be shown below that UAE appears to have a more dualistic structure than the other GCC countries, with indeed a significant low productivity segment next to a significant high productivity modern segment. The plan of this section is to take up a number of indicators with readily available data and compare their values for UAE and the average or total for GCC as a whole, including UAE. We discuss first indicators relating to the lagging traditional segment, and second take up those relating to the leaping modern segment.

Indicators of structures, inputs and outputs in traditional activities. Comparative figures in the next two tables reveal a greater prominence of phenomena that lead to lower productivities in UAE than in GCC taken as a whole, the underlying cause behind this being the. Table 6 shows a relatively greater occurrence of small firms in the manufacturing sector in UAE as compared to GCC. About 44% of manufacturing fall in the category of small firms in UAE; the figure for GCC is 39%. The medium and large together account for 56% in UAE and 61% in GCC. To the extent that small firms are associated with lower productivities and the informal sector this will show itself up in a greater duality in UAE as compared to GCC.

Table 6 Manufacturing: Distribution of the Number of Firms by Size, 1998

	Small	Medium & large	Total	% small in total	% medium & large in total
UAE	806	1040	1846	43.7%	56.3%
GCC	2766	4322	7088	39.0%	61.0%

Source: Shiha M. (2000), p. 22. Base of size distribution is the number of workers in the firm.

In Table 7 we present data on the number of firms in the manufacturing, their capital investment and their employed labour. In manufacturing it is generally the case that the higher the capital/labour intensity the greater is the productivity of the activity. The results for manufacturing show that the intensity amounts to 56,306 US dollars of capital per worker in UAE, as compared to 145,467 in GCC; reflecting the greater share of tiny and small enterprises in UAE referred to earlier as a cause of the low productivity.

Table 7 Manufacturing: Number of Firms, Capital Invested, Labour Employed, and Capital/Labour Intensity, 1998

Country	Number of firms	%	capital invested mil US\$	%	Number of labour employed	%	Capital/labour in US\$
UAE	1846	26.0	8362	10.3	148509	26.6	56306
GCC	7088	100	81367	100	559352	100	145467

Source: Shiha M. (2000), p. 21

The relatively greater occurrence of low productivity activities in UAE than GCC correlate with the relative magnitude of foreign labour inflow in UAE and GCC as can be seen from Table 8. In 1985-1995 foreign workers grew annually by 6.2% in UAE as compared to 4.5% in GCC. The result is a labour force with 88% expatriates in UAE as compared to 74% in GCC. As this inflow puts a downward pressure on the labour productivity, this pressure is bound to be greater in UAE than in GCC.

Table 8 National and Foreign Labour Force (Millions), Distribution and Growth (%), 1985-1995

Country	National	Foreign	Total	National/total	Foreign/total	National growth p.a.	Foreign Growth p.a.
UAE	0.11	0.85	0.96	11.6 %	88.4%	5.5%	6.2%
GCC	2.53	7.04	9.57	26.4%	73.6%	2.1%	4.5%

Source: Girgis, 2000.

Indicators of structures, inputs and outputs in modern activities. The next four brief tables give an idea on the magnitude and shape of inputs that determine productivity performance in the modern economy, in particular the high tech. Table 9 gives expenditure on higher education per capita in UAE and GCC. The figures show that UAE devotes about half the resources per capita compared to GCC, i.e., 63 US\$ compared to 102 US\$.

Table 9 Expenditures on Higher Education in Million US\$, Expenditure Per Capita in US\$, 1996

Country	Min. of higher education	Gov universities	Non-gov. universities	Gov. Technical Institutes	Non-gov. Technical Institutes	Total spending higher education	Per capita spending higher education
UAE	6.2	103	23.1	11.8	6.1	150.2	63
GCC	98.2	2 827.9	37.3	125	6.1	3094.5	102

Source: Adapted from ESCWA-UNESCO, Research and Development System in the Arab States: Development of Science and Technology Indicators, 1998 (E/ESCWA/TECH/1998/Rev. 1)

Going a step further by focusing on science and technology (S and T) within higher education, it is apparent from Table 10 that UAE focuses slightly more on these disciplines than GCC, with 38% studying these topics in UAE as compared to 34% in GCC. The general picture of relatively less resources put in higher education in UAE, applies to R and D as well, as shown in Table 11.

Table 10 Number of Students According to Level, and Percentage of These Students Studying a Science and Technology Discipline (S and T), 1996

Country	Bachelor's	Master's	Ph.D.	Higher diplomas	Technical institutes	Total
UAE						
Total number	14 691	213	294	0	2 952	18 150
% of S and T	33.3	54.5	55.4	0	59.4	38.1
GCC						
Total number	282 835	7 069	2 915	1 634	30 067	324520
% of S and T	31.67	46.78	53.13	14.73	56.97	33.88

Source: Adapted from ESCWA-UNESCO, Research and Development System in the Arab States: Development of Science and Technology Indicators, 1998 (E/ESCWA/TECH/1998/Rev. 1)

Table 11 R&D Expenditure and Number of Full-time Equivalent Researchers and Support Staff, 1996

Country	R & D spending mil US\$	R & D spending per capita	FTE researchers	FTE researchers per 100,000 persons	R & D support personnel	R & D support pers. per 100,000 persons	R & D spending per FTE researcher
UAE	10.89	4.64	107	4.5	206	8.6	101.7
GCC	294.05	11.52	1 595	6.1	2 868	11	184.4

Source: Adapted from ESCWA-UNESCO, Research and Development System in the Arab States: Development of Science and Technology Indicators 1998 (E/ESCWA/TECH/1998/3)

The staffing of R&D in public institutions appears to be less experienced in UAE than in GCC as shown Table 12, with more MSc than PhD degrees held in UAE. These are evenly divided in GCC.

Table 12 Distribution of Full-time Equivalent Researchers (FTER), 1996

Country	PhD FTER	MSc FTER	Total FTER
UAE			
number	38	69	107
%distribution	35.5	64.5	100
GCC			
number	781	814	1595
% distribution	48.97	51.03	100

Source: Adapted from ESCWA-UNESCO, Research and Development System in the Arab States: Development of Science and Technology Indicators 1998 (E/ESCWA/TECH/1998/3)

So much for direct and indirect statistics on productivity enhancing inputs in higher education and in R and D, which are evidently directed to and focused on the modern segment. The publicly financed input in UAE is on average lower than in GCC. There is no data to compliment the picture with private and corporate sources of finance for R and D, though this may be substantial in UAE.

The next set of indicators deals with outcomes as a result of the above documented input effort. There are in total ten different indicators pertaining to various activities in the high tech modern segment that will be reviewed below. They relate in various ways to different factor productivities and productivity performance. Practically all these indicators will be shown to point to higher performance levels of UAE as compared to GCC.

Table 13 shows the extent of published papers in S and T disciplines, and those that were jointly co-authored with foreign institutions. Two productivity indicators can be calculated. The number of papers per full time equivalent researcher shows UAE performing less than GCC in 1990 but is catching up in 1995, with about 1.3 publication per FTER, compared to 1.7 for GCC. Notwithstanding, the international exposure of the research effort in UAE is greater than in GCC, with twice as much international exposure. The table shows the joint percentage for UAE at 40% and for GCC at 21%.

Table 13 Publications: Productivity Indicators of Papers per FTER and the Share of Joint Papers, 1990 and 1995

Country	1990				1995			
	Total No. of papers	Productivity papers/FTER	Joint papers	Joint %	Total No. of papers	Productivity papers/FTER	Joint papers	Joint %
UAE	49	0.46	33	67.3	137	1.28	55	40.1
GCC	1,722	1.08	468	27.2	2, 716	1.70	568	20.9

Source: ESCWA (1999), "Science and Technology Policies and Strategies for the Twenty First Century", p. 13.

Table 14 presents electronically published data on patents originating from a number of the GCC countries that registered in the United States during the period 1990-1999. While no information is available on the patent title or area of application, the small number of patents registered by operators in the GCC is noteworthy. The comparatively small number of 170 patents generated, probably by foreign institutions operating in the Gulf countries, indicates the initially low level of innovative activity taking place in the region compared with other developing countries with a longer experience in technological development such as Korea, Chile, and others, with ranges between 356 and 1343 patents during the same period. Calculating the number of patents per billion

dollars of invested capital gives a productivity index for UAE of 1.8 patents, which is not far from that for the GCC of 2.1 patents. In interpreting patent figures, it is important to keep in mind that innovative firms may prefer not to file for patent rights for their innovations, such a decision being part of its competitive strategy. There is no information on this aspect in UAE and GCC.

Table 14 Number of Registered United States Patents Originating from the Gulf, 1990-1999

Country	1990-1994	1995-1999	Total patents	Capital investment bil. \$	Patents/capital investment
UAE	7	8	15	8.36	1.79
GCC	50	120	170	81.37	2.09

Source: United States Patent and Trademark office website: <http://www.uspto.gov>.

Table 15 provides an overview of technology transfer activities undertaken by GCC countries in areas that relate to information and telecommunication technologies during the period 1992 and 1998. The highest value of contracts in information technologies is achieved by UAE, followed by Saudi Arabia, Kuwait. The highest value of contracts in telecommunication technologies are achieved by Saudi Arabia followed by UAE, Kuwait. On the average, the figures of contract values per capita show UAE to be three times as much as the GCC, compare 694 US\$ for UAE with 229 US\$ for GCC. This supports the argument that as far as productive performance in the high tech modern sector is concerned, the UAE performs remarkably much better than the GCC.

Table 15 Contracts Involving Technology Transfer in Information Technology and Telecommunications, in Millions of US Dollars, 1992-1998

Country	Population millions	Information technology		Telecommunications		Information technology plus telecommunication	
		Value	US\$ p.c.	Value	US\$ p.c.	Value	US\$ p.c.
UAE	2.345	46.0	20	1587.6	674	1633.6	694
GCC	25.533	132.3	14	4468.5	215	4600.8	229

Source: Middle East Economic Digest: MEED 1992-1998.

Table 16 provides data on advanced methods of information technology and communication networks in the Gulf countries. In terms of internet subscribers per 1,000 people, the UAE has the highest number. The same applies for internet users. In terms of internet host per 10,000 people, the highest number was registered in UAE as well. The highest number of top level domain names was registered in UAE. The largest number of personal computer per 1,000 people was registered in Qatar, followed directly by UAE. Finally, the largest number of cellular subscribers was registered again in UAE. These were six indicators relating to productivity in the modern segment, in particular those relating to the "new economy". All indicators show that UAE occupies the top position in the GCC region, suggesting that the modern segment in UAE is performing at a higher level of productivity than the GCC region.

Table 16 Performance Indicators of Advanced Methods of Information Technology and Communication Networks, around 2000, Facilities per 1,000 Persons, Except Domain Names

UAE	66.8	166.9	822	106.2	2.1	19.718
GCC	12.3	32.4	98	57.9	6.3	28.441

Sources: Internet Arab World Magazine 2000, ITU web site <http://www.itu.int> 2000, Internet Software Consortium domain surveys of January 2000, <http://www.isc.org>.

7. Consolidation of the Comparative Results

The results of the above indicators can be consolidated to give a more compact standpoint as regards the extent of dualities in UAE and the GCC. We treat first the (old) traditional economy, and take up later the (new) modern economy.

The old traditional economy. We distinguish here between two outcome indicators X. The value of an indicator for a country is indexed to fall between 0 and 1, as it is divided by, or expressed in terms of, the highest value among the two countries. The obtained indexed values of the two indicators are then averaged to give Avg that can be seen as a summary norm. In Figure 2, the indexed values of the two X variables are plotted for UAE and GCC, as well as their AVG. Figure 2 demonstrates the inferiority of UAE when compared to GCC as regards outcome performance of the lagging old economy segment.

X1 = percentage of firms with medium and large labour size, from Table 6, col. 6.

X2 = capital labour intensity, from Table 7, col. 8.

The new modern economy. There is more data available on this segment that allows considering more indicators. Take several Z indicators as indicative of outputs and obtain their indexed values as was explained. The list of Z indicators, previously examined in section 6, is below. In Figure 3 the indexed values are plotted for the “new economy”. Here one sees opposite results to those obtained in Figure 2 for the “old economy”. UAE is better off than GCC. Results show superiority of UAE in the new economy. The picture for UAE is that of a highly dualistic economy-lagging in the old economy but leaping in the modern economy.

Z1 = research papers published per full-time equivalent researcher, (Table 13, col. 7)

Z2 = percentage of joint papers published with international scientists, (Table 13, col. 9)

Z3 = patents issued per billion\$ of capital investment, (Table 14, col. 6)

Z4 = Contracts of ICT in dollars per capita, (Table 15, col. 8)

Z5 to Z10 = indicators of computer use, internet, cellular etc. (Table 16, col. 2 to col. 7)

Average = simple average of all ten indices.

Another category of indicators for the new economy is Y. These indicators relate to inputs, are indexed as explained earlier, and were examined in section 6 also. The indicators are listed below. In Figure 4 the indexed values are plotted, showing what is already very well known: there are relatively less public inputs in scientific education in the UAE than in GCC.

Y1 = Per capita expenditure on higher education in US \$, (Table 9, col. 8)

Y2 = R & D expenditure per capita in US \$, (Table 11, col. 3)

Y3 = |Number of FTER per 100,000 population, (Table 11, col 5) Y4 = Number of R & D support personnel per 100,000 population (Source Table 11, col. 7)

Avg = simple average of all four input variables.

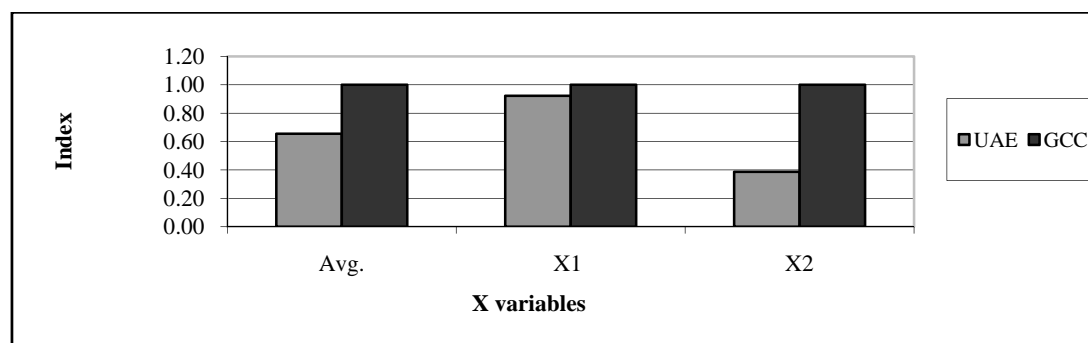


Figure 2 X Variables

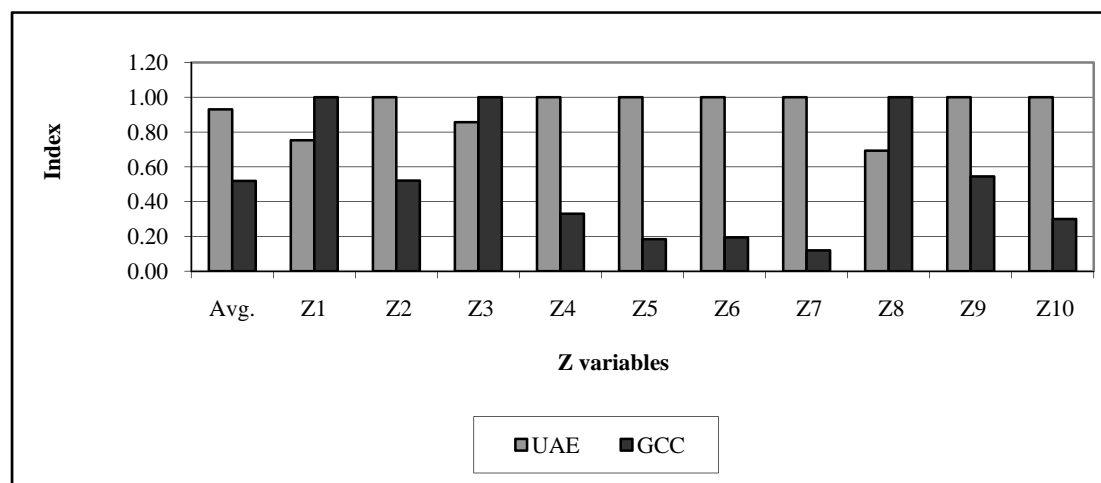


Figure 3 Z Variables

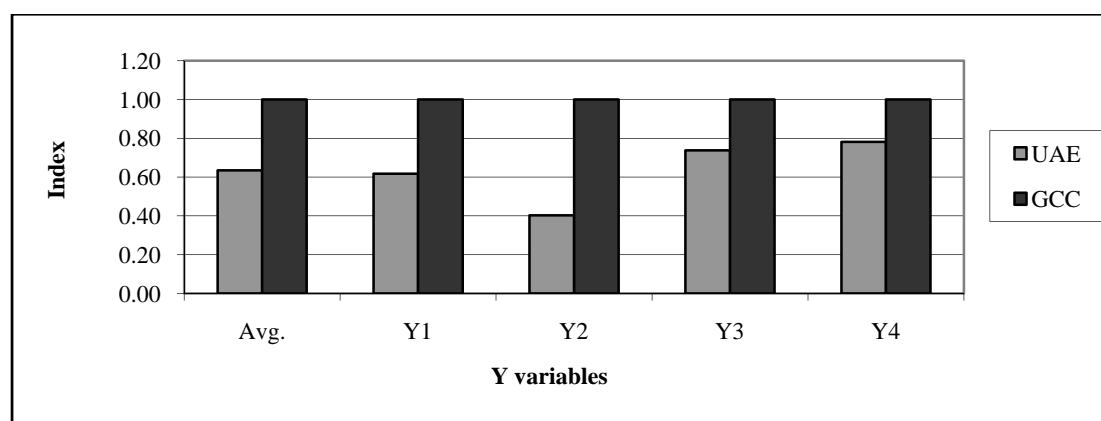


Figure 4 Y Variables

Now that the average results, AVG, for outputs and inputs indicators for the new economy are calculated, it can be further investigated in which country the relationship between outputs and inputs would appear to be more efficient in the new economy. An important conclusion is that in spite of the relatively lower inputs there is on average higher outputs in UAE than in GCC, as can be gathered from a division of the average outputs of Z by the average inputs of Y. An indicator of overall productivity in the new economy is obtainable by dividing output by input, as is done below. The output /input ratio, expressed as Z/Y , is 1.47 for UAE , as compared to 0.52 for GCC; giving an indication of a higher efficiency in managing resources and reaching higher levels in UAE.

8. Concluding Remarks

If there is a prospective cost of a greater duality, such a cost needs to be weighed against the economic welfare advantages accruing to nationals and expatriates from a liberal policy towards human resource mobility that encourages duality. In the longer run, and under increasing economic scarcity and other demographic, sociological and political considerations greater degrees of integration between dual segments can be more optimal than no integration.

Given the complexity of the issues it is understandable that policy directions are retrieved from the comparative experiences of neighbouring countries. The conclusion from a comparative empirical review of GCC is that the divergence in productivity levels in the UAE economy is significantly greater than in the other GCC economies. The lagging traditional activities in UAE lag more when compared to GCC. In contrast, the leaping modern activities leap even much more in UAE than in GCC, and are likely to be more efficiently managed in terms of a ratio of outputs to inputs. The proposition that UAE economy is more dualistic than GCC is correct.

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