Unemployment and Labor Market Institutions: Theory and Evidence from the GCC

Nabi, Mahmoud Sami and Suliman, Mohamed Osman
Arab Planning Institute

December 2008

UNEMPLOYMENT AND LABOR MARKET INSTITUTIONS:THEORY AND EVIDENCE FROM THE GCC

Mohamed Suliman

Mahmoud Nabi

API/WPS 0806

Correspondence

Mohamed Osman Suliman, University of Sharjah, Sharjah, UAE, MohamedS@ Sharjah.ac.ae
Mahmoud Sami Nabi, LEGI-Polytechnic School of Tunisia, IHEC – Sousse – Tunisia, nabi@univ-paris1.fr

Unemployment and Labor Market Institutions: Theory and Evidence from the GCC

Mohamed Osman Suliman

Mahmoud Sami Nabi

Abstract

The theoretical model delves into the relationship between labor market institutions and unemployment by proving two propositions: (1) allowing informal activity bolsters job creation, and (2) if the institutional environment is initially, sufficiently, weak, then mitigating it will lower unemployment. Simulating the model with the GCC's unemployment for the period 1990-2007 allows us to decipher the validity of the model. The institutional environment is represented in this simulation by social insurance which is captured through oil prices. Hence, an increase in oil prices is assumed to lead to higher social insurance and, therefore ,to higher cost of hiring labour . The parameters are selected with the objective of minimizing the error gap between the effective unemployment rate and the simulated unemployment rate . The effective unemployment rate is constructed as a weighted average of the unemployment rate of nationals and non-nationals. The weights are the shares of national and non-national labour-force in the GCC countries. Expositional simulations verified the second proposition. Thus, improving labor market institutions, that are initially weak may discernibly alleviate unemployment problems in the GCC.

البطالة ومؤسسات سوق العمل: النظرية والتطبيق في دول مجلس التعاون الخليجي

ملخص

تشتمل هذه الورقة على أربعة أقسام هي:المقدمة و النموذج و المحاكاة و الاستنتاجات.في المقدمة تعرض الباحثان لترافق ارتفاع أسعار النفط في دول مجلس التعاون مع ارتفاع في معدلات البطالة في هذه الدول.كما تم عرض بعض الأدبيات المتعلقة بسوق العمل في منطقة الخليج.وحدد الباحثان الهدف من الورقة بدراسة العلاقة بين البطالة ومؤسسات سوق العمل في دول مجلس التعاون الخليجي.في قسم النموذج: يحاول الباحثان استكشاف العلاقة بين مؤسسات سوق العمل والبطالة من خلال افتراضين الأول: السماح للأنشطة غير الرسمية بمساندة خلق فرص العمل، والثاني: إذا ما كانت البيئة المؤسسية ضعيفة مبدئياً، فإن تحسينها سيخفض من معدلات البطالة. وتسمح محاكاة النموذج، باستخدام معدلات البطالة في دول مجلس التعاون الخليجي للفترة 1990-2007، باكتشاف صلاحية النموذج.ويمثل البيئة المؤسسية في هذه المحاكاة التأمين الاجتماعي، الذي يمكن تقديره من خلال أسعار النفط. وبذلك يفترض أن تقود أي زيادة في أسعار النفط إلى تأمين اجتماعي أعلى وبالنتيجة إلى كلفة أعلى لتشغيل العمالة.وقد أثبتت المحاكاة للنموذج أن تحسين مؤسسات سوق العمل، الضعيفة مبدئيا، يقود إلى تخفيض ملموس في مشكلة البطالة في دول مجلس التعاون الخليجي.

1. Introduction

The gush of oil prices in the seventies bolstered the Gulf Cooperation Countries Council (GCC) economies. The resulting ubiquitous growth of the GCC paved the way for an influx of foreign workers in their labor markets. However, oil prices tumbled sharply in the mid-eighties. The results were manifestly grave on the segmented labor market of the GCC. Unemployment for both national citizens of the Gulf and non-nationals, drastically, rose to unprecedented levels ,reaching over 15 percent , for nationals, in some of these countries (Central Department of Statistics, Saudi Arabia, 2000). The policy implications of these shifts in the GCC's labor markets were far-reaching. The Gulf countries had to change their labor laws to protect their national citizens against foreign labor competition.

Numerous articles have been written on the nuances of the market segmentation issue of labor markets in the GCC and elsewhere. Piore (1979) delved the segmented market for migrant workers in industrial societies. Borjas (1994) discussed the economic aspects of immigration, with emphasis on the impact of Hispanic workers on the United States economy. Bartram (1998) wrote on the historical situation of foreign workers in Israel. Hiebert (1999) highlighted the influence of geographical localities on market segmentation in Canada. Said (2001) , succinctly, explored the tendency of the Arab countries to reserve public sector employment to national citizens. Ali (2002) examined the relationship between education and the labor market, with special emphasis on the measurement of the returns to human capital. Albuainain (2004) reported that , despite the protection of domestic laws to nationals, their unemployment rate is actually higher than what the official reports show in Abu Dhabi. The market segmentation issue in the Arab world has been talked , among others, by Zind (2002) and Al-khouli (2007) who investigated the labor market in Saudi Arabia.

This paper examines the relationship of the labor market institutions and unemployment in the GCC. The paper deviates from previous work in several ways. It connects the market segmentation idea to the development of formal and informal markets. Empirically, this study simulates the theoretical model with GCC's unemployment for the period 1990-2007.

The next section presents the theoretical model. Section three examines the simulation results. The last section offers some concluding remarks.

2. The Model

The model is a modified version of Helpman and Itskhoki (2007). It enables the institutional environment to affect job creation and therefore the unemployment level.

A. Agents

Agents are of two types: workers and stockholders. To present their consumption behavior we represent them by a representative agent who consumes a continuum [0,1] of goods and which preferences are characterized by the following utility function

$$U = \left[\int_0^1 C(i)^{\beta} di \right]^{\frac{1}{\beta}}, o < \beta < 1 \quad (1)$$

where C(i) denotes the consumption of good i and β is a parameter that controls the elasticity of substitution between varieties. The problem of the representative agent is to maximize (1) subject to the budget constraint

$$\int_0^1 P(i)C(i)di = PC \quad (2)$$

where p(i) is the price of the variety i, C is the total consumption if the differentiated good and P the price index defined as follows

$$P = \left[\int_0^1 P(i)^{-\frac{\beta}{1-\beta}} di \right]^{-\frac{1-\beta}{\beta}} \quad (3)$$

Denoting R as the revenue of the representative agent we have PC=R, and the demand function representing the solution to the consumer maximization problem will be

$$C(i) = \frac{R}{P}\left(\frac{P(i)}{P} \right)^{-\frac{1}{1-\beta}} \quad (4)$$

which implies that the demand for each variety depends on the total expenditure and on the relative price of the good p(i)/P.

B. Firms

The economy contains a continuum of mass 1 monopolistically competitive firms distributed on [0,1]. A firm that seeks to supply a good of variety i bears an entry cost which covers the technology cost. After bearing this cost, the firm learns how productive its technology is, as measured by a parameter θ_i distributed with a density $f(\theta_i)$ over $\left[\underline{\theta}, \overline{\theta}\right]$ where $\underline{\theta} > 0$. For simplicity we consider a uniform distribution so that we have $f(\theta_i) = 1/(\overline{\theta} - \underline{\theta})$. If the technology productivity is not sufficiently high some firms find it optimal to move to the informal sector of the economy in order to reduce the labour cost. The proportion of formal and informal firms will be endogenously determined. Before, we present the production technology. A good i producing firm uses labour in quantity h_i to produce a quantity y(i) according to the following production technology

$$y(i) = \theta_i h_i \tag{5}$$

and is constrained by the demand function

$$y(i) = C(i) \tag{6}$$

In order to rewrite this constraint in equivalent manner note that the representative agent's income R is equal to the production value of firms. Indeed, this production value is distributed to workers and stockholders. Hence, we have R= Py where P is the price index given by (3) and y is the production index given by

$$y = C = \left[\int_0^1 y(i)^{\beta} di \right]^{\frac{1}{\beta}} \tag{7}$$

Using (4) and (7) the demand constraint (6) becomes

$$y(i) = y\left(\frac{p(i)}{P} \right)^{-\frac{1}{1-\beta}}$$

B.1 <u>The formal firms</u>

The formal firms face hiring costs of labor. A firm i that seeks to employ h_i workers bears the hiring cost bh_i where $b > 0$ is a constant term which measures the degree of frictions in the labor market. Higher values of b correspond to countries having low efficient labor market institutions. Workers hired by formal firms have a bargaining power in the wage determination process. Following Stole and Zwiebel (1996), bargaining between the workers and the formal firm leads to the following distribution of revenue: the firm gets a share $1/(1+\beta)$ and the workers get a share $\beta/(1+\beta)$. This result is derived under the assumption that at the bargaining stage a worker's outside option is unemployment, and the value of unemployment is normalized to zero (no unemployment benefits). Note that since $\beta<1$ the share of workers never exceeds the half of the revenue. A firm chooses an employment level that maximizes its share of revenue minus hiring costs. That is, it chooses h_i to maximize

$$\pi_i = \frac{P(i) y_i}{1+\beta} - b h_i$$

Therefore, the formal firm problem is

$$\begin{cases} \max \pi_i = \dfrac{p(i) y_i}{1+\beta} - b h_i \\ h_i \\ SC \\ y(i) = \theta_i h_i \\ y(i) = y\left(\dfrac{p(i)}{P} \right)^{-\frac{1}{1-\beta}} \end{cases}$$

The solution is characterized by

$$h_i^* = \theta_i^{\frac{\beta}{1-\beta}} \left(\frac{\beta P}{b(1+\beta)} \right)^{\frac{1}{1-\beta}} y \tag{8}$$

$$y^*(i) = \theta_i h_i^* \tag{9}$$

$$\pi_i^* = \frac{b(1-\beta)}{\beta} h_i^* \tag{10}$$

Since the workers receive the fraction β/(1+β) of $p(i)y^*(i)$ out of wages w, we have $\frac{\beta}{1+\beta} p(i) y^*(i) = h_i^* w$ which yields w = b.

B.2 <u>The informal firms</u>

When the technology productivity is not sufficiently high some firms have an incentive to move to the informal sector of the economy. Informal firms don't support the hiring costs of labor. Besides, they have an infinite bargaining power that forces workers to accept a predetermined wage $\underline{w}$ which is lower than the wage offered in the formal sector $\underline{w} < w = b$. Indeed, workers are not organized in unions when they are hired by informal firms. However, becoming an informal firm lowers the technology productivity to its minimum level $\underline{\theta}$. This can be justified by the denied access to some public services for informal firms or by the necessity to support delocalization and additional transport costs. The informal firm chooses an employment level that maximizes its profit and its maximisation problem is given by

$$\begin{cases} \max \pi_i = \pi_i = p(i) y_i - \underline{w} h_i \\ h_i \\ SC \\ y(i) = \underline{\theta} h_i \\ y(i) = y \left(\frac{p(i)}{P} \right)^{-\frac{1}{1-\beta}} \end{cases}$$

The solution is characterized by

$$\tilde{h}_i^* = \tilde{h}^* = \underline{\theta}^{\frac{\beta}{1-\beta}} \left(\frac{\beta P}{\underline{w}} \right)^{\frac{1}{1-\beta}} y \tag{11}$$

$$\tilde{y}^* = \tilde{y}^* = \underline{\theta} h^* \tag{12}$$

$$\tilde{\pi}_i^* = \frac{\underline{w}(1-\beta)}{\beta} \tilde{h}^* \tag{13}$$

A firm decides to move to informal activity if it provides it with a higher profit i.e. if $\widetilde{\pi}_i^* > \pi_i^*$. Using (10) and (13) it is simple to show that this the case if the technology productivity is below a threshold $\widetilde{\theta}$ given by

$$\widetilde{\theta} = \underline{\theta}\left(\frac{b}{\underline{w}}\right)(1+\beta)^{1/\beta} > \underline{\theta}$$

Hence, all firms with a productivity in $\left[\underline{\theta}, \widetilde{\theta}\right]$ become informal whereas firms having a productivity in $\left[\widetilde{\theta}, \overline{\theta}\right]$ choose to be formal. Note that $\partial\widetilde{\theta} / \partial b > 0$ which signifies that countries with weaker labor market institutions have larger informal sector.

C. Labor market institutions and unemployment

Proposition 1

For a given institutional environment, allowing informal activity increases job creation.

Proof

Using equations (8) and (11) it is easy to show the following equation

$$h_i^* = \widetilde{h}^* = \left(\theta_i / \hat{\theta}\right)^{\beta/1-\beta} \tag{14}$$

where

$$\hat{\theta} = \underline{\theta}\left(\frac{b}{\underline{w}}\right)^{1/\beta}(1+\beta)^{1/\beta} > \widetilde{\theta}$$

Hence, a firm i that belongs to the informal sector $\theta_i < \widetilde{\theta}$ creates more jobs compared to a situation where it has no choice but producing as a formal firm. Indeed, from (14) we have $\widetilde{h}^* > h_i^*$ //

$$H = \int_{\underline{\theta}}^{\widetilde{\theta}} \widetilde{h}^* f(\theta_i) d\theta_i + \int_{\widetilde{\theta}}^{\overline{\theta}} h_i^* f(\theta_i) d\theta_i$$

Proposition 2

i) *If the institutional environment is initially sufficiently weak:*

$$b > \overline{b} = \frac{\overline{w}}{\beta(1+\beta)^{1/\beta}}$$

then improving it (a reduction of b) enhances job creation ($\partial H / \partial b$)<0 and reduces unemployment (for a given number of potential workers).

ii) *If the institutional environment is initially sufficiently developed* $b < \bar{b}$ *then reducing it (an increase of b) increases job creation (* $\partial H / \partial b) > 0$ *and reduces unemployment (for a given number of potential workers).*

Proof: see the appendix.

3. Simulations

Calibrating the model using the unemployment data in the GCC countries between 1990 and 2007 enables us to compare the results of the model to the effective evolution of the unemployment rate. The sample countries and the data sources are presented in tables 1 and 2, respectively. We will present the methodology of the parameters calibration.

The institutional environment is represented in this simulation by social insurance which is captured through oil prices. Hence, an increase in oil prices is assumed to lead to higher social insurance and therefore to higher cost of hiring labour (b). We choose the parameters in order to minimize the error between the effective unemployment rate (U) and the simulated unemployment rate (U'). The effective unemployment rate is constructed as a weighted average of the unemployment rate of nationals and non-nationals. The weights are the shares of national and non-national labour-force in the GCC countries which are respectively assumed to equal 26% and 74%[1].

Assuming that the labour supply is fixed (N) the simulated unemployment rate is given by

$$U^t = 1 - \frac{H}{N}$$

Where H, as proved in the appendix of proposition 2, is given by

$$H = \frac{\beta\tilde{\theta} - \underline{\theta} + (1-\beta)\hat{\theta}^{\beta/\beta-1}(\bar{\theta}^{1/1-\beta} - \tilde{\theta}^{1/1-\beta})}{\underline{w}\tilde{\theta} - \underline{\theta} + (1-\beta)\hat{\hat{\theta}}^{\beta/\beta-1}(\bar{\theta}^{1/1-\beta} - \tilde{\theta}^{1/1-\beta})}$$

The parameters of the model are calculated to minimize the error U – U'. The results are the following:

[1] GCC, STATISTICAL BULLETIN VOLUME-TWELVE, 2003;

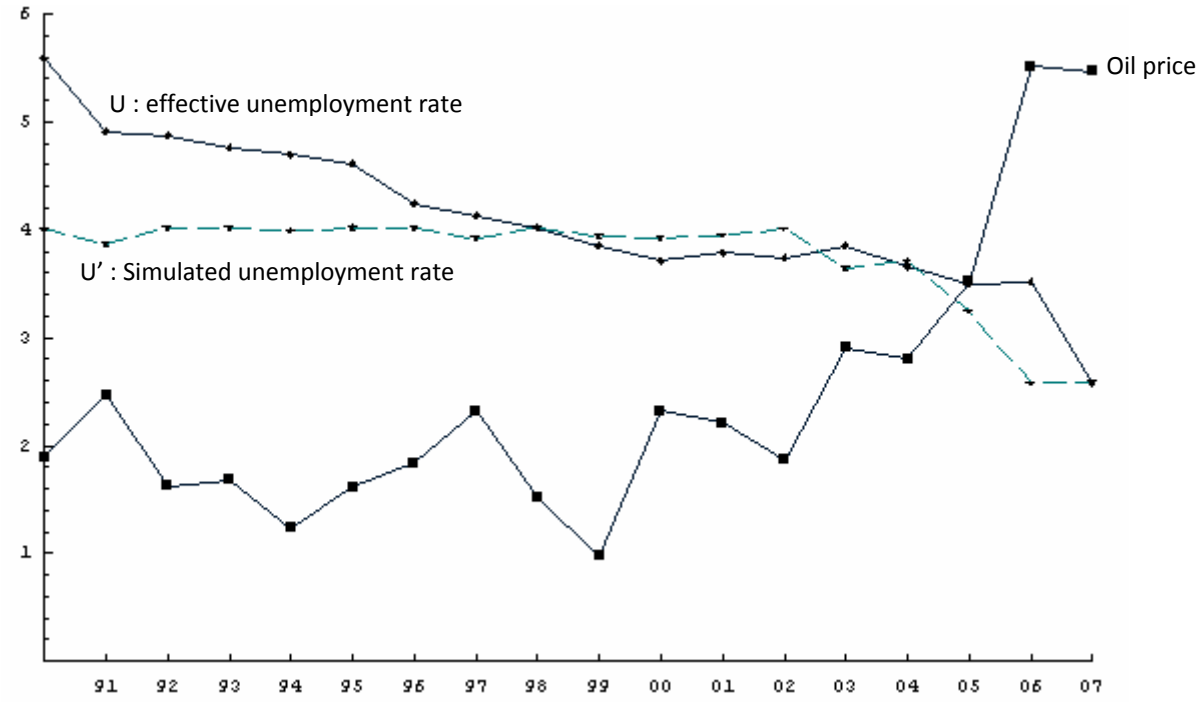
```
<<Statistics`LinearRegression`
β = 0.81;
vb = 4;
θmin = 10;
θmax = 200;

Regress[TDD, {1, β/vb * (θmin * (1+β)^(1/β) * (x/vb) - θmin) / (θmin * (1+β)^(1/β) * (x/vb) - θmin + (1-β) * ((θmin * (1+β) * (x/vb))^(β/(β-1))) ((θmax)^(1/(-β+1)) - (θmin * (1+β)^(1/β) * (x/vb))^(1/(-β+1)))}, x]

{ParameterTable →
 1
 ------------------------------------------------------------------------
 -10+5.2007 x + 0.000204613 (1.29028×10^12 - 5871.46 x^5.26316) / x^4.26316
 0.2025 (-10+5.2007 x)

 Estimate    SE          TStat      PValue
 3.41475     0.142838    23.9064    6.01741×10^-14
 -4.36368    1.3056      -3.34229   0.00413397
, RSquared → 0.411134,
AdjustedRSquared → 0.37433, EstimatedVariance → 0.250483, ANOVATable →
          DF   SumOfSq    MeanSq     FRatio    PValue
 Model    1    2.79812    2.79812    11.1709   0.00413397
 Error    16   4.00773    0.250483
 Total    17   6.80584
}
```

The following figure presents the effective and the simulated unemployment rate with the oil price (divided by 10).



The figure shows that our model captures the effect of higher variation of the oil price on the unemployment rate. Indeed, it replicates very well the decline in unemployment rate after the acceleration of oil price during the period 2002-2007. However, it is not very insightful before this period which means that other factors have caused unemployment to decrease. The

paucity of the labor market data in the GCC makes the empirical investigation of these other variables difficult.

Such simulation results amplify our second theoretical proposition 2. Interpreting, cautiously , proposition two, it elucidates that if social insurance is initially weak, then its increase reduces the formal sector and enlarges the informal sector. The increase in Informal firms creates more jobs than those lost by the remaining formal firms.

4. Concluding Remarks

This paper examines theoretically and empirically the relationship between social insurance, an important labor market institution, and unemployment in the GCC. In the theoretical section the model elucidates the relationship the relationship between labor market institutions and unemployment in the formal and informal sectors of the economy. Two propositions are pondered: (1) allowing informal activity bolsters job creation, and (2) If the institutional environment is initially, sufficiently, weak, then mitigating it will lower unemployment. Simulating the model with the GCC's unemployment for the period 1990-2007 allows us to decipher the validity of the model. The institutional environment is represented in this simulation by social insurance which is captured through oil prices. Hence, an increase in oil prices is assumed to lead to higher social insurance and, therefore ,to higher cost of hiring labour. The parameters are selected with the objective of minimizing the error gap between the effective unemployment rate and the simulated unemployment rate . The effective unemployment rate is constructed as a weighted average of the unemployment rate of nationals and non-nationals. The weights are the shares of national and non-national labour-force in the GCC countries. Expositional simulations verified the second proposition. Thus, improving labor market institutions, that are initially weak may discernibly alleviate unemployment problems in the GCC.

References

Albuainain, Reem M., Unemployment Rate in the United Arab Emirates: The Case of Abu Dhabi, Economic Research Forum, Working Paper 0404, 2004.

Ali, A.A., On the Relationship between Education , the Labor Market and the Measurement of Returns to Human Capital, in Al-Kawaz, Enhancing link between Education and Labor Market in the Arab Countries, Ch.2, 2002.

Al-Khouli, Sayid F. Ahmed, Labor Shortages, Migration and Segmentation: The Case of Saudi Labour Market 2007; http://inmgard-conix-shifting.de/fileadmin/user-upload/pdf/roundtable07/mahdi.pdf.

Arellano M, Bond S. Some Test of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. Review of Economic Studies 1991; 58; 277-297.

Bartram, D.V., Foreign Workers in Israel: History and Theory, International Migration Review 1998; 32,2;303-325.

Borjas, George, The Economics of Immigration ,Journal of Economic Literature 1994;32.

Central Department Of Statistics CDs, Bulletin of Labor Force, 2000.

Hansen , L.P. and K.J. Singleton, Generalized Instrumental Variable Estimation of Nonlinear Rational Expectation Models, Econometrica, 50; 1269-1286.

Helpman, E. and O. Itskhoki (2007), "Labor Market Rigidities, Trade and unemployment," NBER Working Paper 13365.

Hiebert, Daniel, Local Geographies of Labor Market Segmentation: Motreal, Toronto, and Vancouver, Economic Geography, 1991;75,4;339-369.

Holtz-Eaken D, Newey W, Rosen H. Estimating Vector Autoregressions with Panel Data. Econometrica 1988;56,6

Montagna, C. (1995), "Monopolistic Competition with Firm-Specific Costs," Oxford Economic Papers, New Series, Vol. 47, No. 2., pp. 318-328.

Nair-Reichert U, Weinhold D. Causality Tests for Cross-Country Panels: New Look at FDI and Economic Growth in Developing Countries. Oxford Bulletin of Economics and Statistics 2001;63,2; 153-71

Piore, Michal J., Birds of Passage : Migrant Labor and Industrial Societies, 1979, Cambridge University Press, London.

Said, M, Public Sector Employment and Labor Market in the Arab Countries, in Djavad Salehi-Ishfahani, Labor and Human Capital in the Middle East , Ithaca Press in Association with the Economic Research Forum, 2001, Cairo.

Stole, L. A. and J. Zwiebel (1996), " Intra-Firm Bargaining Under Non- Binding Contracts," Review of Economic Studies 63,pp.375-410

Zind, Richard G, Characteristics and Gaps in the GCC Labor Market, in Al-Kawaz, Enhancing link between Education and Labor Market in the Arab Countries, Ch.4, 2002.

Table 1 List of Countries

Countries
Bahrain
Kuwait
Oman
Qatar
Saudi Arabia
UAE

Table 2 Definitions of Variables

Variable Name	Definition	Source
Unemployment (U)	Overall unemployment in the nation	Ministries of planning and labor of the respective countries
Social welfare (insurance) (SI)	Social insurance proxied by oil prices	See oil prices
Oil prices	Used as an instrumental variable and a proxy for social insurance	U.S. Energy information Agency
COL	Cost of living Index	World Bank Development Indicators (WB)
GI	Gini Index, Consumption or income Distribution	WB
INC	Income (GNI) per capita	WB
Ed	Education (Adult Literacy)	WB
Prod	productivity	WB

Appendix

The production index can be written as following

$$y = \left(\int_{\underline{\theta}}^{\widetilde{\theta}} [\widetilde{y}^*(i)]^{\beta} f(\theta_i) d\theta_i + \int_{\widetilde{\theta}}^{\overline{\theta}} [y^*(i)]^{\beta} f(\theta_i) d\theta_i \right)^{1/\beta}$$

Using (8), (9), (11) et (12) and normalizing the revenue R to 1 (which yields P^{-1}=y) we obtain

$$y = \left(\int_{\underline{\theta}}^{\widetilde{\theta}} \left(\frac{\beta\underline{\theta}}{\underline{w}} \right)^{\frac{\beta}{1-\beta}} f(\theta_i) d\theta_i + \int_{\widetilde{\theta}}^{\overline{\theta}} \left(\frac{\beta\theta_i}{b(1+\beta)} \right)^{\frac{\beta}{1-\beta}} f(\theta_i) d\theta_i \right)^{\frac{1-\beta}{\beta}} \quad (19)$$

From equation (14) we have

$$\begin{aligned} H &= \widetilde{h}^* \left[\int_{\underline{\theta}}^{\widetilde{\theta}} f(\theta_i) d\theta_i + \int_{\widetilde{\theta}}^{\overline{\theta}} \left(\theta_i / \widehat{\theta} \right)^{\beta/1-\beta} f(\theta_i) d\theta_i \right] \\ &= \underline{\theta}^{\frac{\beta}{1-\beta}} \left(\frac{\beta}{\underline{w}} \right)^{\frac{1}{1-\beta}} y^{\frac{-\beta}{1-\beta}} \left[\int_{\underline{\theta}}^{\widetilde{\theta}} f(\theta_i) d\theta_i + \int_{\widetilde{\theta}}^{\overline{\theta}} \left(\theta_i / \widehat{\theta} \right)^{\beta/1-\beta} f(\theta_i) d\theta_i \right] \end{aligned}$$

replacing y by the expression given by (15) we obtain

$$H = \frac{\int_{\underline{\theta}}^{\widetilde{\theta}} f(\theta_i) d\theta_i + \int_{\widetilde{\theta}}^{\overline{\theta}} \left(\frac{\theta_i}{\widehat{\theta}} \right)^{\beta/1-\beta} f(\theta_i) d\theta_i}{\left[\int_{\underline{\theta}}^{\widetilde{\theta}} f(\theta_i) d\theta_i + \int_{\widetilde{\theta}}^{\overline{\theta}} \left(\frac{\theta_i}{\widehat{\widehat{\theta}}} \right)^{\frac{\beta}{1-\beta}} f(\theta_i) d\theta_i \right]} \left(\frac{\beta}{\underline{w}} \right)$$

where

$$\widehat{\widehat{\theta}} = \underline{\theta}(\tfrac{b}{\underline{w}})(1+\beta) < \widehat{\theta}$$

Using the assumption that the distribution function is uniform over $\left[\underline{\theta}, \overline{\theta}\right]$ we obtain

$$H = \frac{\beta}{\underline{w}} \frac{\frac{\widetilde{\theta}-\underline{\theta}}{\overline{\theta}-\underline{\theta}} + (1-\beta)\widehat{\theta}^{\beta/\beta-1} \frac{\overline{\theta}^{1/1-\beta} - \widetilde{\theta}^{1/1-\beta}}{\overline{\theta}-\underline{\theta}}}{\frac{\widetilde{\theta}-\underline{\theta}}{\overline{\theta}-\underline{\theta}} + (1-\beta)\widehat{\widehat{\theta}}^{\beta/\beta-1} \frac{\overline{\theta}^{1/1-\beta} - \widetilde{\theta}^{1/1-\beta}}{\overline{\theta}-\underline{\theta}}}$$

Or equivalently

$$H = \frac{\beta}{\underline{w}} \frac{\widetilde{\theta}-\underline{\theta} + (1-\beta)\widehat{\theta}^{\beta/\beta-1} \left(\overline{\theta}^{1/1-\beta} - \widetilde{\theta}^{1/1-\beta} \right)}{\widetilde{\theta}-\underline{\theta} + (1-\beta)\widehat{\widehat{\theta}}^{\beta/\beta-1} \left(\overline{\theta}^{1/1-\beta} - \widetilde{\theta}^{1/1-\beta} \right)}$$

Using the following relation

$$\hat{\theta}^{\beta/\beta-1} = \underline{\theta}\hat{\hat{\theta}}^{1/\beta-1} = \frac{\theta}{\hat{\theta}}\hat{\hat{\theta}}^{\beta/\beta-1}$$

H can be rewritten as follows

$$H = \frac{\beta}{\underline{w}} \frac{\tilde{\theta} - \underline{\theta} + \frac{\theta}{\hat{\theta}} g}{\tilde{\theta} - \underline{\theta} + g}$$

Where g is defined by

$$g = (1-\beta)\hat{\hat{\theta}}^{\beta/\beta-1}\left(\bar{\theta}^{1/1-\beta} - \tilde{\theta}^{1/1-\beta}\right)$$

Note that g and $\frac{\theta}{\hat{\theta}}$ are decreasing with b whereas $\tilde{\theta} - \underline{\theta}$ is increasing with b. Analysing $\tilde{\theta} - \underline{\theta} + g$ it is simple to show that it is increasing in b if $b > \bar{b} = \frac{\bar{w}}{\beta(1+\beta)^{1/\beta}}$. Note also that in this case, the numerator of H increases more with b due to the brake effect of $\frac{\theta}{\hat{\theta}}$ on g. Therefore we have all elements necessarily to show that H is decreasing with b ($\partial H/\partial b$)<0. Similarly if $b < \bar{b}$ we obtain ($\partial H/\partial b$)>0. Finally, if the number of potential workers is given for example equal to N then the unemployment is given by U=N-H and ($\partial U/\partial b$)= - ($\partial H/\partial b$).

Previous Publications

No	Author	Title
API/WPS 9701	جميل طاهر	النفط والتنمية المستديمة في الأقطار العربية : الفرص والتحديات
API/WPS 9702	Riad Dahel	Project Financing and Risk Analysis
API/WPS 9801	Imed Limam	A SOCIO-ECONOMIC TAXONOMY OF ARAB COUNTRIES
API/WPS 9802	محمد عدنان وديع بلقاسم العباس	منظومات المعلومات لأسواق العمل لخليجية
API/WPS 9803	Adil Abdalla	The Impact of Euro-Mediterranean Partnerships on Trade Interests of the OIC Countries
API/WPS 9804	رياض دهال حسن الحاج	حول طرق الخصخصة
API/WPS 9805	Ujjayant Chakravorty Fereidun Fesharaki Shuoying Zhou	DOMESTIC DEMAMD FOR PETROLEUM PRODUCTS IN OPEC
API/WPS 9806	Imed Limam Adil Abdalla	Inter-Arab Trade and the Potential Success of AFTA
API/WPS 9901	Karima Aly Korayem	Priorities of Social Policy Measures and the Interset of Low-Income People; the Egyptian Case
API/WPS 9902	Sami Bibi	A Welfare Analysis of the Price System Reforms' Effects on Poverty in Tunisia
API/WPS 9903	Samy Ben Naceur Mohamed Goaied	The Value Creation Process in The Tunisia Stock Exchange
API/WPS 9904	نجاة النيش	تكاليف التدهور البيئي وشحة الموارد الطبيعية: بين النظرية وقابلية التطبيق في الدول العربية
API/WPS 9905	Riad Dahel	Volatility in Arab Stock Markets
API/WPS 9906	Yousef Al-Ebraheem Bassim Shebeb	IMPORTED INTERMEDIATE INPUTS: IMPACT ON ECONOMIC GROWTH
API/WPS 9907	Magda Kandil	Determinants and Implications of Asymmetric Fluctuations: Empirical Evidence and Policy Implications Across MENA Countries
API/WPS 9908	M. Nagy Eltony	Oil Price Fluctuations and their Impact on the Macroeconomic Variables of Kuwait: A Case Study Using a VAR Model
API/WPS 9909	علي عبد القادر	إعادة رؤوس الأموال العربية إلى الوطن العربي بين الأماني والواقع
API/WPS 0001	محمد عدنان وديع	التنمية البشرية ، تنمية الموارد البشرية والإحلال في الدول الخليجية
API/WPS 0002	محمد ناجي التوني	برامج الأفست : بعض التجارب العربية
API/WPS 0003	Riad Dahel	On the Predictability of Currency Crises: The Use of Indicators in the Case of Arab Countries
API/WPS 0004	نسرين بركات عـادل العلـــي	مفهوم التنافسية والتجارب الناجحة في النفاذ إلى الأسواق الدولية

No	Author	Title
API/WPS 0101	Imed Limam	Measuring Technical Efficiency Of Kuwaiti Banks
API/WPS 0102	Ali Abdel Gadir Ali	Internal Sustainability And Economic Growth In The Arab States
API/WPS 0103	Belkacem Laabas	Poverty Dynamics In Algeria
API/WPS 0104	محمد عدنان وديع	حالة الكويت–التعليم وسوق العمل : ضرورات الاصلاح
API/WPS 0105	محمد ناجي التوني	دور وآفاق القطاع السياحي في اقتصادات الأقطار العربية
API/WPS 0106	نجاة النيش	الطاقة والبيئة والتنمية المستديمة : آفاق ومستجدات
API/WPS 0107	Riad Dahel	Telecommunications Privatization in Arab Countries: An Overview
API/WPS 0108	علي عبد القادر	أسس العلاقة بين التعليم وسوق العمل وقياس عوائد الاستثمار البشري
API/WPS 0201	أحمد الكواز	مناهج تقدير المداخيل المختلطة في الأقطار العربية
API/WPS 0202	سليمان شعبان القدسي	الكفاءة التوزيعية لشبكات التكافل الاجتماعي في الاقتصاد العربي
API/WPS 0203	Belkacem Laabas and Imed Limam	Are GCC Countries Ready for Currency Union?
API/WPS 0204	محمد ناجي التوني	سياسات العمل والتنمية البشرية في الأقطار العربية : تحليل للتجربة الكويتية
API/WPS 0205	Mustafa Babiker	Taxation and Labor Supply Decisions: The Implications of Human Capital Accumulation
API/WPS 0206	Ibrahim A. Elbadawi	Reviving Growth in the Arab World
API/WPS 0207	M. Nagy Eltony	The Determinants of Tax Effort in Arab Countries
API/WPS 0208	أحمد الكواز	السياسات الاقتصادية ورأس المال البشري
API/WPS 0209	Mustafa Babiker	The Impact of Environmental Regulations on Exports: A Case Study of Kuwait Chemical and Petrochemical Industry
API/WPS 0301	Samir Makdisi, Zeki Fattah and Imed Limam	Determinants Of Growth In The Mena Countries
API/WPS 0302	طارق نوير	دور الحكومة الداعم للتنافسية "حالة مصر"
API/WPS 0303	M. Nagy Eltony	Quantitative Measures of Financial Sector Reform in the Arab Countries
API/WPS 0304	Ali Abdel Gadir Ali	Can the Sudan Reduce Poverty by Half by the Year 2015?
API/WPS 0305	Ali Abdel Gadir Ali	Conflict Resolution and Wealth Sharing in Sudan: Towards an Allocation Formula
API/WPS 0306	Mustafa Babiker	Environment and Development in Arab Countries: Economic Impacts of Climate Change Policies in the GCC Region
API/WPS 0307	Ali Abdel Gadir Ali	Globalization and Inequality in the Arab Region
API/WPS 0308	علي‌علي عبد القادر	تقييم سياسات وإستراتيجيات الإقلال من الفقر في عينة من الدول العربية

No	Author	Title
API/WPS 0401	Belkacem Laabas and Imed Limam	Impact of Public Policies on Poverty, Income Distribution and Growth
API/WPS 0402	Ali Abdel Gadir Ali	Poverty in the Arab Region: A Selective Review
API/WPS 0403	Mustafa Babiker	Impacts of Public Policy on Poverty in Arab Countries: Review of the CGE Literature
API/WPS 0404	Ali Abdel Gadir Ali	On Financing Post-Conflict Development in Sudan
API/WPS 0501	Ali Abdel Gadir Ali	On the Challenges of Economic Development in Post-Conflict Sudan
API/WPS 0601	Ali Abdel Gadir Ali	Growth, Poverty and Institutions: Is there a Missing Link?
API/WPS 0602	Ali Abdel Gadir Ali	On Human Capital in Post-Conflict Sudan: Some Exploratory Results
API/WPS 0603	Ahmad Telfah	Optimal Asset Allocation in Stochastic Environment: Evidence on the Horizon and Hedging Effects
API/WPS 0604	Ahmad Telfah	Do Financial Planners Take Financial Crashes In Their Advice: Dynamic Asset Allocation under Thick Tails and Fast volatility Updating
API/WPS 0701	Ali Abdel Gadir Ali	Child Poverty: Concept and Measurement
API/WPS 0702	حاتم مهران	التضخم في دول مجلس التعاون الخليجي ودور صناديق النفط في الاستقرار الاقتصادي
API/WPS 0801	Weshah Razzak	In the Middle of the Heat The GCC Countries Between Rising Oil Prices and the Sliding Greenback
API/WPS 0802	Rabie Nasser	Could New Growth Cross-Country Empirics Explain the Single Country Growth of Syria During 1965-2004?
API/WPS 0803	Sufian Eltayeb Mohamed	Finance-Growth Nexus in Sudan: Empirical Assessment Based on an Application of the Autoregressive Distributed Lag (ARDL) Model
API/WPS 0804	Weshah Razzak	Self Selection versus Learning-by-Exporting Four Arab Economies
API/WPS 0805	رشا مصطفى	اتفاقية أغادير: نحو بيئة أعمال أفضل