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THE EFFECTS OF IRREGULAR MARKETS ON MACROECONOMIC POLICY

Some Estimates for Belgium*

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The paper aims at evaluating the efficiency of traditional Keynesian (demand) or neo-classical (income) policies in the presence of an irregular sector. The analysis is applied to the Belgian economy for which it is shown that the objectives of increasing output and employment and reducing the importance of the irregular economy will often lead to conflicting policy prescriptions. In addition, Keynesian multipliers may be lowered by as much as 40%, though the irregular market only represents some 10 to 15% of total activity.

1. Introduction

Black, irregular or hidden activities have received increasing attention in the economic literature. Their conceptual definition and statistical measure have, in particular, been largely discussed in a number of recent papers [e.g., Smith (1981), Gaertner and Weinig (1985)]. Estimations for Belgium can be found in Mont (1982) and Pestieau (1985).

Growing awareness of the magnitude of the phenomenon in most industrial countries has, however, not been paralleled by advances in the economic analysis of its implications.[1] It might therefore be worthwhile at this point to go beyond the problems of statistical measurement and to address the question of their macroeconomic relevance.

Economic policy prescriptions constitute an obvious target for further investigation. Since policy decisions are generally based on official indicators which exclude the hidden sector of the economy, their efficiency can be

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[1]Noticeable exceptions are Feige and McGee (1982), and Schäfer and Schrage (1983).

questioned on the following grounds:

(i) Biased statistics do not allow for a correct appraisal of the over-all economic performance; they may therefore lead to an incorrect diagnosis.
(ii) Incomplete information results in inadequate policy prescriptions. Knowledge of the 'true' economic performance could have led to a more or less intensive course of action or, in some cases, to an altogether different policy mix.
(iii) Non-optimal policies will result in unsatisfactory economic effects. Reduced policy impacts and even perverse effects might be generated depending on the leakages between the regular and the irregular sector and on their relative economic performance.

The aim of this paper is to evaluate the efficiency of economic policy in the framework of a small economy (Belgium) and to give an estimate of the distortions generated by the existence of irregular activities.

Our approach is based on a simplified version of the model developed by Ginsburgh, Michel, Padoa-Schioppa and Pestieau (1985). This model applies the theory of quantity rationing equilibrium to a dual economy encompassing regular and irregular activities. An interesting feature of the model lies in the explicit recognition of the role of labor market rigidities. Beyond the fiscal factors which are traditionally incriminated in the development of parallel markets, this approach focuses on the impact of labor market imperfections such as wage stickiness, hiring and lay off regulations or working time legislation.

Quantity rationing models have furthermore stressed the importance for appropriate policy prescriptions, of a correct identification of the constraints binding the economy; they are therefore particularly suited to the analysis of policy conflicts arising from distortions between measured and actual economic performance.

In this paper we apply this basic framework to the Belgian economy, where parallel markets have been evaluated to 10 to 15% of official GNP [Mont (1982)]. From a set of alternative assumptions concerning the structure of the hidden economy, we derive the appropriate specification of the consumption and production schedules in the regular sector, and proceed to evaluate the impact of diagnosis errors on the observable policy multipliers. While accurate measurements are precluded by the simplicity of our assumptions, our basic aim is to illustrate how our comprehension of economic policy implications can be altered when irregular activities are integrated within a consistent macroeconomic framework.

The second section of the paper presents the theoretical structure of the model. The data basis and estimation technique are discussed in the third section where the main results of the empirical analysis are presented. The fourth section concludes on the impact of economic policy measures in Belgium.

2. The theoretical model

The model depicts a two-sector economy in which regular firms hire labor officially, pay taxes and face a downward rigid wage, while irregular producers escape official reporting and taxes and pay flexible wages. The irregular sector cannot provide the full range of goods available in the regular market but is limited to the production of a subset of goods. While investment goods, cars or air travel could be thought of as excluded from the subterranean economy, we will assume that most services, fresh produce, construction and other less visible activities are offered by regular and irregular producers at different prices. Following the quantity rationing tradition, we will nevertheless consider that aggregate prices on both markets are fixed within the short-run horizon of the model. Depending on consumption habits, geographical proximity and relative prices consumers spend a preferential fraction of their total expense on the regular market and resort to the irregular market for the complement. Public consumption is, however, restricted to the regular market and has priority over private consumption if there is excess demand on the regular goods market.

A fundamental assumption of our approach is that the irregular sector is never constrained on the supply side: the labor force reservoir available for shadow activities is enormous. Beyond the traditional tax evasion incentives, our assumption reflects the role of regulations and institutional rigidities in the regular labor market. The officially unemployed or retired, students and other 'non-working' population provide a fraction of the available manpower. The bulk of the irregular labor market potential might however stem from the officially employed labor force since the existing working hour legislation leaves, on a macroeconomic scale, ample room for moonlighting and second jobs. The absence of entry barriers, the characteristically low level of skill involved in hidden activities as well as the flexibility of the working hours ensure that this potential can be readily activated. At the individual level, limits to the irregular labor supply might more easily be found in stringent labor/leisure trade-offs than in fear of discovery — the latter being highly improbable for most occasional activities.

If hidden activities consist mostly of services and self employed activities, excess supply on the labor market will be identical to excess supply on the irregular goods market. We will therefore assume, in terms of quantity rationing theories, that the only regime that can be observed in the irregular sector is excess supply on both the labor and the goods market. By contrast, downward rigid wages and fixed prices imply that the regular sector can be constrained either on the demand or on the supply side: Keynesian or classical unemployment can thus prevail.

2.1. Consumer behaviour

Private consumers purchase on both markets according to consumption habits, geographical proximity, tastes, availability, etc.... Their behaviour is described by the following functions:

$$C^{\mathrm{r}} = c^{\mathrm{r}} R + \gamma^{\mathrm{r}} M_0 + \delta^{\mathrm{r}} \frac{p^{\mathrm{r}}}{p^{\mathrm{i}}} + \varepsilon^{\mathrm{r}}, \qquad 0 \leqq c^{\mathrm{r}} \leqq 1,\ 0 \leqq \gamma^{\mathrm{r}},\ -\delta^{\mathrm{r}} < \infty,$$

$$C^{\mathrm{i}} = c^{\mathrm{i}} R + \gamma^{\mathrm{i}} M_0 + \delta^{\mathrm{i}} \frac{p^{\mathrm{r}}}{p^{\mathrm{i}}} + \varepsilon^{\mathrm{i}}, \qquad 0 \leqq c^{\mathrm{i}} \leqq 1,\ 0 \leqq \gamma^{\mathrm{i}},\ \delta^{\mathrm{i}} < \infty,$$

$$\delta^{\mathrm{r}} + \delta^{\mathrm{i}} = 0,$$

where M_0 denotes real money holdings, R is total real income, p^{r} and p^{i} represent prices on the regular and irregular markets and c^{r}, c^{i}, γ^{r}, γ^{i}, δ^{r}, δ^{i}, ε^{r}, ε^{i} are the parameters of the consumption functions. Money holdings and income are deflated by the aggregate price level p, defined as a weighted average of prices on both markets:

$$p = \lambda p^{\mathrm{r}} + (1-\lambda) p^{\mathrm{i}},$$

where the weights λ and $(1-\lambda)$ represent the relative shares of regular and irregular income in the total income of the economy.

The supply of labor is assumed to be independent of the real or nominal wage level and is fixed at $\tilde{L}$. For a given working hour legislation, the regular supply of labor, $\tilde{L}^{\mathrm{r}}$, is considered to be determined by demographic factors. The labor force in the irregular sector $\tilde{L}^{\mathrm{i}}$ is assumed to be very large, potentially including the officially employed and unemployed manpower. Workers are, however, assumed to prefer jobs on the regular market when the choice is open (e.g., to collect social security benefits). While the net wage rate on the regular market w^{r} is rigid downwards the wage rate paid for irregular jobs w^{i} is flexible within the following bounds:

$$w^{\mathrm{i}}_{\mathrm{min}} \leqq w^{\mathrm{i}} \leqq w^{\mathrm{r}}.$$

The upper bound w^{r} is linked to the existence of a large supply of labor on the parallel market. The lower bound $w^{\mathrm{i}}_{\mathrm{min}}$ can be considered to represent the marginal utility of leisure.

2.2. Producers behaviour

Regular firms face a rigid net wage w^r and a fixed output price p^r. Production possibilities Y^r are characterized by a well behaved production function $Y^r = F^r(\tilde{K}^r, L^r)$ where the capital stock $\tilde{K}^r$ is also fixed within the short-run horizon of the model. A pay-roll tax is paid on the labor L^r at the rate τ.[2] Firms maximize profits π^r:

$$\pi^r = p^r Y^r - (1+\tau) w^r L^r - q^r \tilde{K}^r, \tag{1}$$

subject to the constraint

$$Y^r = F^r(\tilde{K}^r, L^r), \tag{2}$$

which leads to the first order condition

$$F^r_L(\tilde{K}^r, L^r) = (1+\tau)\frac{w^r}{p^r},$$

where F^r_L is the marginal productivity of labor. The notional demand for labor in the regular sector can thus be derived from this implicit equation. $q^r\tilde{K}^r$ represents capital income which is fixed in the short run.

Producers in the irregular sector exhibit a similar profit maximizing behaviour:

$$\pi^i = p^i Y^i - w^i L^i - q^i \tilde{K}^i, \tag{3}$$

subject to

$$Y^i = F^i(\tilde{K}^i, L^i), \tag{4}$$

which leads them to hire labor to the point where the marginal productivity of labor F^i_L is equalized to the real wage rate. This defines the notional demand for labor L^i:

$$F^i_L(\tilde{K}^i, L^i) = \frac{w^i}{p^i}.$$

In the particular case of the self employed agent offering a specific type of service or good on the irregular market, an excess supply of labor amounts to an excess supply of the commodity. The wage rate w^i disappears from the analysis and the (fixed) price of the good or service becomes the only

[2]An alternative model where profits are taxed, instead of labor, leads to similar conclusions.

relevant variable. This simpler case is interesting to the extent that it probably represents, in most industrialized countries, the overwhelming majority of the black labor force. While retaining the more general formalization given by (3) and (4) in the subsequent analysis, we will integrate the fact that a large proportion of irregular firms are self employed agents through the assumption that in the aggregate, excess supply prevails on the irregular goods market.

From the profit functions (1) and (3) we can define total income R as including net labor wages $(w^r L^r + w^i L^i)$, capital income $(q^r \tilde{K}^r + q^i \tilde{K}^i)$ and profits, which are assumed to be entirely redistributed $(p^r Y^r - (1+\tau) w^r L^r - q^r \tilde{K}^r + p^i Y^i - w^i L^i - q^i \tilde{K}^i)$. R can thus be written as

$$R = Y^r + Y^i - T^*,$$

where $T^* = (\tau w^r L^r + T) p^r$; T represents exogenous taxes net of transfers.

2.3. Other agents

The public sector collects taxes $p^r T^*$ and spends $p^r G$ on the regular goods market. While the government only buys regular goods, other agents (net exporters, investors) may address their demand to both the regular sector $(p^r D^r)$ or to the irregular sector $(p^i D^i)$. D^r is assumed to be served on a priority basis if the regular sector is constrained on the supply side. Money is never rationed and balances the budget of every agent so that

$$p^r(G - T) = S - p^r D^r - p^i D^i = p \Delta M - B,$$

where $\Delta M = M_1 - M_0$, S represents savings and B represents the current account balance.

2.4. Alternative regimes and adjustment to equilibrium

Our basic assumption is a regime of excess supply in the irregular goods market, whereas in the regular goods market, two types of situations can arise.

(*a*) *Keynesian unemployment.* At the current price level and wage rate, notional supply by regular firms exceeds demand:

$$C^r + G + D^r < F^r(\tilde{K}^r, L^r). \qquad (5)$$

By assumption, the same holds for the irregular market so that:

$$C^{i}+D^{i}<F^{i}(\tilde{K}^{i},L^{i}), \tag{6}$$

and adding (5) and (6) also leads to an overall excess supply regime.

On both markets, supply will be rationed, and the demands for labor $\bar{\bar{L}}^{r}$ and $\bar{\bar{L}}^{i}$ will be implicitly determined by

$$C^{r}+G+D^{r}=F^{r}(\tilde{K}^{r},\bar{\bar{L}}^{r}) \quad \text{and} \quad C^{i}+D^{i}=F^{i}(\tilde{K}^{i},\bar{\bar{L}}^{i}).$$

(*b*) *Classical unemployment.* At the current price level and wage rate, firms are not willing to satisfy demand, and

$$C^{r}+G+D^{r}>F^{r}(\tilde{K}^{r},L^{r}),$$

so that effective private consumption will be restricted to

$$\bar{\bar{C}}^{r}=F^{r}(\tilde{K}^{r},L^{r})-G-D^{r}, \tag{7}$$

and the difference between notional and effective consumption $C^{r}-\bar{\bar{C}}^{r}$ will, at least in a proportion $\alpha(0\leqq\alpha\leqq 1)$, spill over to the irregular market. The remainder $(1-\alpha)(C^{r}-\bar{\bar{C}}^{r})$ will be saved.[3] Accordingly the irregular sector will supply

$$\alpha(C^{r}-\bar{\bar{C}}^{r})+C^{i}+D^{i}<F^{i}(\tilde{K}^{i},L^{i}), \tag{8}$$

where the strict inequality derives from the assumption of permanent excess capacity in that market.

Adding (7) and (8) we obtain

$$(1-\alpha)\bar{\bar{C}}^{r}+\alpha C^{r}+G+D^{r}+C^{i}+D^{i}<F^{r}(\tilde{K}^{r},L^{r})+F^{i}(\tilde{K}^{i},L^{i}),$$

which shows that for the whole economy, a regime of excess supply prevails.

Labor demand by the regular sector $\bar{L}^{r}$ is determined by the first order condition $F^{r}_{L}(\tilde{K}^{r},\bar{L}^{r})=(1+\tau)(w^{r}/p^{r})$, while $\bar{L}^{i}$ is implicitly defined by $\alpha(C^{r}-\bar{\bar{C}}^{r})+C^{i}+D^{i}=F^{i}(\tilde{K}^{i},\bar{L}^{i})$.

[3]Theoretically, α could have been derived from a microeconomic utility maximization framework and become variable. The way it is done here is somewhat easier and does probably not lead to very different conclusions. Note also that imports provide another channel for these spillovers. This also would have complicated the model.

The model can thus be summarized as follows:

(*a*) Under *Keynesian unemployment* in the regular sector, notional supply in both sectors exceeds demand and is constrained to

$$Y^r = C^r + G + D^r, \quad \text{and} \tag{9}$$

$$Y^i = C^i + D^i, \tag{10}$$

where C^r and C^i are determined by

$$C^r = c^r R + \gamma^r M_0 + \delta^r \frac{p^r}{p^i} + \varepsilon^r, \tag{11}$$

$$C^i = c^i R + \gamma^i M_0 + \delta^i \frac{p^r}{p^i} + \varepsilon^i, \quad \text{and} \tag{12}$$

$$R = Y^r + Y^i - T^*. \tag{13}$$

Substituting (11)–(13) in (9) and (10) and solving for Y^r and Y^i leads to the following reduced form:

$$Y^r = (1 - c^r - c^i)^{-1}[(1 - c^i)A^r + c^r A^i], \tag{14}$$

$$Y^i = (1 - c^r - c^i)^{-1}[c^i A^r + (1 - c^r)A^i], \tag{15}$$

where A^r and A^i represent exogenous elements:

$$A^r = \gamma^r M_0 + \delta^r \frac{p^r}{p^i} + \varepsilon^r + G + D^r - c^r T^*, \tag{16}$$

$$A^i = \gamma^i M_0 + \delta^i \frac{p^r}{p^i} + \varepsilon^i + D^i - c^i T^*. \tag{17}$$

Let us compare this to the situation in which there is no irregular sector so that exogenous final demand and private consumption are totally addressed to the regular sector and are equal to

$$G + D^r + D^i, \quad \text{and}$$

$$C^r + C^i = (c^r + c^i)R + (\gamma^r + \gamma^i)M_0 + \psi^r.$$

Then, (14) reduces to

$$Y^{r}=(1-c^{r}-c^{i})^{-1}[(\gamma^{r}+\gamma^{i})M_{0}+\psi^{r}+G+D^{r}+D^{i}-(c^{r}+c^{i})T^{*}]. \tag{18}$$

(*b*) Under *classical unemployment* in the regular sector, output is constrained at $Y^{r}=F^{r}(\tilde{K}^{r},L^{r})$; L^{r} satisfies then the profit maximizing condition $F_{L}^{r}(.)=(1+\tau)(w^{r}/p^{r})$. Private consumption is constrained at $\bar{\bar{C}}^{r}=F^{r}(\tilde{K}^{r},L^{r})-G-D^{r}$, where G and D^{r} are given. In the irregular sector, total output will be determined by

$$Y^{i}=C^{i}+D^{i}+\alpha(C^{r}-\bar{\bar{C}}^{r}), \tag{19}$$

where D^{i} is given, and the consumption levels C^{r} and C^{i} are defined by eqs. (11) and (12). Replacing (11)–(13) in (19), leads to

$$Y^{i}=[1-(c^{i}+\alpha c^{r})]^{-1}[(c^{i}+\alpha c^{r}-\alpha)F^{r}(\tilde{K}^{r},L^{r})+\alpha A^{r}+A^{i}], \tag{20}$$

where A^{r} and A^{i} are given by (16) and (17).

3. Estimation of the model

3.1. Data basis

Statistical data on the irregular sector of the economy are, for obvious reasons, unavailable in Belgium as elsewhere. But in addition, the Belgian Institute of Statistics (INS) introduces, into national accounts, a certain number of 'adjustments' to account for irregular activities. This means that we cannot even rely on a precise statistical measurement of the regular sector.

Since our aim is to evaluate the order of magnitude of the policy distortions described above, rather than to provide precise absolute figures, we will proceed on the basis of the following heroic assumptions:

(a) National account statistics cover regular activities.
(b) The output of the irregular sector corresponds to Mont's (1982) estimations. Mont's approach, based on Tanzi's (1980) monetary method, evaluates the size of the irregular sector at 15% of the Belgian official GNP in 1980.[4]
(c) Three alternative assumptions are considered to describe the composition of output in the irregular sector:
   (c.1) total output is equal to total consumption ($C^{i}=Y^{i}$),
   (c.2) 75% of the irregular output is consumed by the private sector and the remaining 25% consist of investment and net trade activities.

[4]Mont's estimates of the Belgian irregular sector range from 0.10 in 1966 to 0.15 in 1980; they are used as an illustration in this context.

(c.3) the average propensity to consume is identical in both sectors ($C^i/Y^i = C^r/Y^r$). This is only valid in the case of overall excess supply.

(d) The unobservable price index on the irregular market can be approximated as follows:

(d.1) either one may assume that irregular activities consist of services only and are paid like regular services, except for taxes and social security contributions, so that

$$p^s = (1+\tau^*)p^i,$$

where τ^* is a measure of fiscal pressure (including social security) and p^s is the observed price of regular services, so that

$$p^r/p^i = (1+\tau^*)(p^r/p^s),$$

(d.2) alternatively, one may set

$$p^r = (1+\tau^*)p^i \quad \text{so that} \quad p^r/p^i = (1+\tau^*).$$

The average price index p can then be computed as

$$p = \lambda + (1-\lambda)(1+\tau^*)^{-1}.$$

where λ is the share of regular output in total output and $p^r = 1$ by normalization.

3.2. Estimation method

From the considerations developed in section 2 we know that measured output in the regular sector is given by

$$Y^r = \min\{F^r(\tilde{K}^r, L^r),\ C^r + G + D^r\},$$

where $Y^r = F^r(\tilde{K}^r, L^r)$ if there is excess demand (classical regime) and $Y^r = C^r + G + D^r$ if there is excess supply (Keynesian regime).

It thus follows from the theoretical analysis that the production function $Y^r = F^r(\tilde{K}^r, L^r)$ must be estimated from 'classical' observations whereas the consumption function $C^r = c^r R + \gamma^r M_0 + \delta^r(p^r/p^i) + \varepsilon^r$ must be estimated from a Keynesian data basis.

We have furthermore assumed that the irregular sector is always characterized by excess capacity. Accordingly, output in the irregular sector is always given by $Y^i = C^i + D^i$ with $C^i = c^i R + \gamma^i M_0 + \delta^i(p^r/p^i) + \varepsilon^i$ if a Keynesian regime prevails on the regular sector and $C^{\mathrm{i}}=\alpha(C^{\mathrm{r}}-\bar{\bar{C}}^{\mathrm{r}})+c^{\mathrm{i}}R+\gamma^{\mathrm{i}}M_0+\delta^{\mathrm{i}}(p^{\mathrm{r}}/p^{\mathrm{i}})+\varepsilon^{\mathrm{i}}$ if a classical regime characterizes the regular sector. This means that the parameters of the irregular consumption function can only be estimated in those periods where the regular sector exhibits Keynesian unemployment. Note that the estimation of both consumption functions has to be carried out under the constraint $\delta^{\mathrm{r}}+\delta^{\mathrm{i}}=0$.

To avoid going into estimation of markets in disequilibrium, we decided to split our sample period into classical and Keynesian observations on the basis of the well-known studies by Sneessens (1981, 1983) for Belgium. Our sample period, 1953–1980, is subdivided as follows:[5]

classical observations: 1953 to 1956 and 1969 to 1974,
Keynesian observations: 1957 to 1963, 1966 to 1968 and 1975 to 1980.

However, since Mont's evaluation of the Belgian irregular market is only available from 1966 on, we estimate the consumption functions in the regular and irregular sectors over the shorter sample period 1966–1968/1975–1980. Two-stage least squares are used to avoid simultaneity biases.

3.3. Estimation results

We assume that the technology of the regular sector is given by a Cobb–Douglas function with constant returns to scale:

$$Y^{\mathrm{r}}=A(K^{\mathrm{r}})^{\theta}(L^{\mathrm{r}})^{1-\theta}\mathrm{e}^{\gamma t}. \tag{21}$$

If regular firms minimize costs subject to the production function, labor demand in the regular sector can be expressed as

$$L^{\mathrm{r}}=A^{-1}\left(\frac{\theta}{1-\theta}\right)^{-\theta}\left(\frac{q}{w}\right)^{\theta}\mathrm{e}^{-\gamma t}Y^{\mathrm{r}}. \tag{22}$$

This relation was estimated over the sample period when the production constraint was binding, i.e., over the 'classical' period 1953–1956/1969–1974. We find

$$\underset{(0.605)}{\log L^{\mathrm{r}}=3.005}+\underset{(0.097)}{0.116}\log\frac{q}{w}-\underset{(0.004)}{0.067}\,t+\log Y^{\mathrm{r}}. \tag{23}$$

[5]The years 1964 and 1965, which are characterized by excess demand on both markets (repressed inflation) are excluded from our sample. However, following Sneessens' discussion on his results we assimilated the data from 1969 to 1972 to the regime of classical unemployment. The sample period was, in addition, extended from 1978 to 1980 assuming that the two last years belong to the Keynesian unemployment regime.

The capital coefficient θ (0.116) exhibits a lower value than the traditional coefficients presented in the literature. It has to be noted, however, that traditional results are derived from data samples pooling Keynesian and classical observations. Indeed, proceeding along these lines and regressing the labor demand function over the whole period (1953–1980) allows us to obtain a higher value of $\theta(0.346)$ with a similar impact of the technical progress (0.057).

The parameters of the consumption functions under the alternative assumptions (c.1), (c.2) and (c.3) are presented in table 1. The price index proxy used in table 1 corresponds to the assumption $p^r=(1+\tau^*)p^i$; the other assumption led systematically to perverse price effects and to an overall deterioration of the regression results due to multi-collinearity.

Table 1
Consumption functions.[a]

	c^r	γ^r	δ^r	ε^r	c^i	γ^i	δ^i	ε^i
Assumption (c.1)	0.590	0.026	−462.7	173.0	0.106	0.015	462.7	−208.2
$C^i=Y^i$	(0.051)	(0.006)	(448.2)	(80.1)	(0.048)	(0.004)	(448.2)	(79.1)
Assumption (c.2)	0.596	0.026	−515.5	182.1	0.062	0.011	515.5	−185.5
$C^i=0.75Y^i$	(0.044)	(0.006)	(326.6)	(59.7)	(0.035)	(0.003)	(326.6)	(57.7)
Assumption (c.3)	0.595	0.026	−519.9	182.9	0.045	0.019	519.9	−201.9
$C^i=(C^r/Y^r)Y^i$	(0.041)	(0.006)	(366.1)	(66.3)	(0.039)	(0.004)	(366.1)	(64.6)

[a]Standard deviations are presented under the coefficients.

4. Policy implications

Policy prescriptions will be based on what can be inferred about the regular sector. We have thus to distinguish two situations, according to the regime which prevails in the regular sector.[6]

4.1. Keynesian unemployment in the regular sector

The equations which hold in this case are (14) and (15), and the policies which will lead to an increase in employment are fiscal policies. From (14) it is easy to see that the multipliers in the regular sector are

$$(1-c^r-c^i)^{-1}(1-c^i), \tag{24}$$

for a unit increase in the exogenous final demand addressed to the regular

[6]In these comparative statics exercises, we have to assume that we do not switch from one regime to another; if this were the case, the conclusions we derive would be invalid.

sector $(G+D^r)$ and

$$(1-c^r-c^i)^{-1}c^r, \tag{25}$$

for a unit increase in D^i.

These multipliers can be compared to the one which would prevail in an all-regular economy, derived from (18):

$$(1-c^r-c^i)^{-1}. \tag{26}$$

Both multipliers (24) and (25) will thus be smaller than (26), the all-regular economy multiplier. The multipliers in the irregular sector can be similarly derived from eq. (15) as

$$(1-c^r-c^i)^{-1}c^i, \quad \text{and} \tag{27}$$

$$(1-c^r-c^i)^{-1}(1-c^r), \tag{28}$$

for a unit increase in $G+D^r$ and D^i respectively.

In a regime of generalized excess supply in both sectors, an expansionary fiscal policy will thus benefit both sectors. Table 2 reproduces the multipliers corresponding to an increase in the final demand addressed to the regular sector.[7] These are computed from (24) and (27). The last column of table 2 gives the all-regular economy multiplier (26). As can be noted, the regular sector multipliers are reduced by 5 to 12%, depending on the assumptions,

Table 2
Regular and irregular final demand multipliers (resulting from an increase in regular final demand).

	Impact in a two-sector economy		Impact in an all-regular economy
	on the regular sector	on the irregular sector	
Assumption (c.1) $C^i=Y^i$	2.94	0.35	3.29
Assumption (c.2) $C^i=0.75\,Y^i$	2.74	0.18	2.92
Assumption (c.3) $C^i=(C^r/Y^r)Y^i$	2.65	0.13	2.78

[7]The final demand multipliers are unrealistically large since investment and foreign trade are exogenous and there is no monetary sector. The interesting information in the tables rests on the difference between the multipliers and not on their absolute values. Note also that wealth effects are derived hereafter under the simplifying assumption that the weights λ and $(1-\lambda)$ in the price index p are constant. Relaxing this assumption leads numerically to very small changes but renders the analytical derivation of the multipliers untractable.

Table 3
Regular and irregular final demand multipliers (resulting from an increase in irregular final demand).

	Impact in a two-sector economy	
	on the regular sector	on the irregular sector
Assumption (c.1)[a] $C^i = Y^i$	1.94	1.35
Assumption (c.2) $C^i = 0.75\, Y^i$	1.74	1.18
Assumption (c.3) $C^i = (C^r/Y^r)\, Y^i$	1.65	1.13

[a]Since in this case the marginal propensities to consume have been estimated under the assumption $C^i = Y^i$ this result measures the impact of the development of 'new' final demand activities on the irregular market.

when they are compared to the multipliers prevailing in an all-regular economy.

In table 3 we have reproduced the multipliers derived when there is an increase of final demand addressed to the irregular sector [formulae (25) and (28)]. As can be checked, this has far from negligible effects on the regular sector, though the impact is of course much smaller than the average multiplier of 3 which prevails in an all-regular economy. It is interesting to note that in this case, an irregular sector evaluated at 10 to 15% of official GNP leads to a dampening effect of 40% on the regular sector multipliers.

Tables 2 and 3 show that the effects of Keynesian policies are favorable to both the regular and the irregular sector, and thus to the economy as a whole.

4.2. Classical unemployment in the regular sector

Three equations hold under this regime: in the regular sector, labor demand L^r is determined implicitly by

$$F^r_L(\tilde{K}^r, L^r) = (1+\tau)(w^r/p^r), \tag{29}$$

and labor demand determines the level of output

$$Y^r = F^r(\tilde{K}^r, L^r). \tag{30}$$

On the irregular market, output is determined by (20):

$$Y^{\mathrm{i}}=[1-(c^{\mathrm{i}}+\alpha c^{\mathrm{r}})]^{-1}[(c^{\mathrm{i}}+\alpha c^{\mathrm{r}}-\alpha)Y^{\mathrm{r}}+\alpha A^{\mathrm{r}}+A^{\mathrm{i}}], \tag{31}$$

where α is the proportion of rationed regular consumer demand which spills over to the irregular sector and where A^{r} and A^{i} are given by (16) and (17).

It is easy to see that the benefits of expansionary fiscal policies accrue exclusively to the irregular sector. The Keynesian multiplier is indeed equal to zero: increasing G results in a further reduction of private consumption $\bar{\bar{C}}^{\mathrm{r}}$ while Y^{r} and L^{r} cannot be modified. The expansionary impact of the policy will thus crowd out to the irregular sector, in a proportion $0 \leqq \alpha \leqq 1$.

From (31), one obtains the multipliers

$$\alpha[1-(c^{\mathrm{i}}+\alpha c^{\mathrm{r}})]^{-1}, \quad \text{and} \tag{32}$$

$$[1-(c^{\mathrm{i}}+\alpha c^{\mathrm{r}})]^{-1}, \tag{33}$$

for an increase in $G+D^{\mathrm{r}}$ and D^{i} respectively.

Using Assumption (c.1), together with $\lambda=0.86$, $\tau^*=0.43$, (32) and (33) leads to

$$\alpha(0.894-0.59\alpha)^{-1} \quad \text{and} \quad (0.894-0.59\alpha)^{-1}.$$

Both are non-negative for $0 \leqq \alpha \leqq 1$. Table 4 illustrates this for various values of α.

Classical policies involving a price increase or a wage cut in the regular sector, as well as a decrease in the tax rate will result in an increase in the regular output and labor demand. The irregular sector will however be reduced to the extent of the decrease in the consumption transfer from the regular sector $\alpha(C^{\mathrm{r}}-\bar{\bar{C}}^{\mathrm{r}})$. Since effects on the regular sector compensate impacts on the parallel market, these policies will result in distributional effects but will not necessarily result in an expansion of the overall output.

To analyze the effects of such policies, we need to differentiate (29), (30) and (31).

Total differentiation of (29) and (30) leads, after some simple manipula-

Table 4
Regular and irregular final demand multipliers on the irregular sector, when classical unemployment prevails in the regular sector.

	$\alpha=0$	$\alpha=0.50$	$\alpha=1.0$
Increase in $G+D^{\mathrm{r}}$	0.0	0.83	3.29
Increase in D^{i}	1.12	1.67	3.29

tions, to

$$\mathrm{d}Y^{\mathrm{r}}=\frac{(F_{\mathrm{L}}^{\mathrm{r}})^2}{F_{\mathrm{LL}}^{\mathrm{r}}}\left(\frac{\mathrm{d}\tau}{1+\tau}+\frac{\mathrm{d}w^{\mathrm{r}}}{w^{\mathrm{r}}}-\frac{\mathrm{d}p^{\mathrm{r}}}{p^{\mathrm{r}}}\right), \tag{34}$$

where $F_{\mathrm{L}}^{\mathrm{r}}$ and $F_{\mathrm{LL}}^{\mathrm{r}}$ are the first and second derivatives of $F^{\mathrm{r}}(\tilde{K}^{\mathrm{r}}, L^{\mathrm{r}})$.

To compute the total differential of (31), we need to replace A^{r} by (16), A^{i} by (17) and p by $\lambda p^{\mathrm{r}}+(1-\lambda)p^{\mathrm{i}}$. We next assume that $\mathrm{d}\lambda=\mathrm{d}M_0=\mathrm{d}p^{\mathrm{i}}=\mathrm{d}G=\mathrm{d}D^{\mathrm{r}}=\mathrm{d}D^{\mathrm{i}}=0$; since $p^{\mathrm{r}}T^*=\tau w^{\mathrm{r}}L^{\mathrm{r}}+T$, small changes of the payroll tax τ, the wage rate w^{r} and regular labor L^{r} will affect T^*; however, to simplify the algebra, we assume that a change of $\tau w^{\mathrm{r}}L^{\mathrm{r}}$ is compensated by an exogenous change of T, so that $\mathrm{d}T^*=0$ also. We then have the following expression for $\mathrm{d}Y^{\mathrm{i}}$:

$$\mathrm{d}Y^{\mathrm{i}}=[1-(c^{\mathrm{i}}+\alpha c^{\mathrm{r}})]^{-1}\left\{(c^{\mathrm{i}}+\alpha c^{\mathrm{r}}-\alpha)\,\mathrm{d}Y^{\mathrm{r}}+(\delta^{\mathrm{i}}+\alpha\delta^{\mathrm{r}})\frac{\mathrm{d}p^{\mathrm{r}}}{p_{\mathrm{i}}}\right\}. \tag{35}$$

In (35), the first term is the effect on Y^{i} of a change in Y^{r}; the second term is the relative price effect. Let us replace c^{i}, c^{r}, δ^{i} and δ^{r} by their values [Assumption (c.1)] and set $\tau^*=0.43$, $Y^{\mathrm{r}}=2670$ (values in 1980).

From (34), it can be seen that reductions of the payroll tax or of the regular wage rate have a positive impact on Y^{r} (since $F_{\mathrm{LL}}^{\mathrm{r}}<0$); the first term of (35) shows that this impact is transferred on Y^{i}, the irregular sector's output, in a proportion

$$\xi_1(\alpha)=[1-(c^{\mathrm{i}}+\alpha c^{\mathrm{r}})]^{-1}[c^{\mathrm{i}}+\alpha c^{\mathrm{r}}-\alpha)$$

$$=(0.894-0.59\alpha)^{-1}(0.106-0.41\alpha),$$

for $0\leqq\alpha\leqq 1$, the denominator of $\xi_1(\alpha)$ is always positive and as long as $0\leqq\alpha<0.259$, decreases of τ or w^{r} have a positive impact on the irregular output as well. For $0.259<\alpha<1$, the importance of the irregular sector decreases as Y^{r} increases, but the overall output increases: the decrease of Y^{i} is always smaller than the increase of Y^{r} since $\min\xi_1(\alpha)=-1$ for $\alpha=1$. The overall effect is thus zero only when there is complete crowding out to the irregular sector ($\alpha=1$).

The effect of an increase of p^{r} is a little more difficult to analyze; set $\mathrm{d}\tau=\mathrm{d}w^{\mathrm{r}}=0$ in (34); using the fact that $(F_{\mathrm{L}}^{\mathrm{r}})^2/F_{\mathrm{LL}}^{\mathrm{r}}=-((1-\theta)/\theta)\,Y^{\mathrm{r}}$, (35) can be written

$$\mathrm{d}Y^{\mathrm{i}}=[1-(c^{\mathrm{i}}+\alpha c^{\mathrm{r}})]^{-1}\left\{+\frac{1-\theta}{\theta}\,Y^{\mathrm{r}}(c^{\mathrm{i}}+\alpha c^{\mathrm{r}}-\alpha)\frac{1}{p^{\mathrm{r}}}+(\delta^{\mathrm{i}}+\alpha\delta^{\mathrm{r}})\frac{1}{p^{\mathrm{i}}}\right\}\mathrm{d}p^{\mathrm{r}}.$$

Evaluating this expression for 1980 leads to

$$dY^i = (0.894 - 0.59\alpha)^{-1}(2818 - 9003\alpha)\,dp^r.$$

We have thus to analyse the sign of

$$\xi_2(\alpha) = (0.894 - 0.59\alpha)^{-1}(2818 - 9003\alpha).$$

The denominator is positive for $0 \leqq \alpha \leqq 1$: $\xi_2(\alpha)$ will be positive for $0 \leqq \alpha \leqq 0.31$ and negative for $0.31 < \alpha \leqq 1$. This shows that a price increase in the regular sector will benefit the irregular sector as long as $\alpha < 0.31$ while it will hurt Y^i for $\alpha > 0.31$. It can however be checked that, even for $\alpha = 1$, a value for which $\xi_2(\alpha)$ is maximal, the total effect on Y^r and Y^i combined is slightly positive.

In table 5, we summarize the effects of (erroneously made) Keynesian and classical policies when the regular sector faces classical unemployment.

Table 5 shows that Keynesian policies only affect the irregular sector, and that, globally, they are effective in increasing output and employment. Classical policies always have positive effects on the regular economy; they hurt in some cases the irregular sector, but here also, the overall effects are almost always positive.

Table 5
Effects of Keynesian and classical policies when the regular sector faces classical unemployment.

Increase of government consumption	$0 \leqq \alpha \leqq 1$	
on Y^r	0	
on Y^i	+	
Total	+	
Decrease of the payroll tax or of the regular wage rate	$\alpha < 0.26$	$\alpha > 0.26$
on Y^r	+	+
on Y^i	+	−
Total	+	+[a]
Increase of the regular price	$\alpha < 0.31$	$\alpha > 0.31$
on Y^r	+	+
on Y^i	+	−
Total	+	+

[a]Zero for $\alpha = 1$.

5. Conclusions

Several conclusions can be derived from the simple approach described in this paper:

(a) The irregular sector is always stimulated by fiscal policies; the corresponding multipliers range from 0.2 (Keynesian regime in the regular sector) to 1 (classical regime in the regular sector).

(b) The impact on the regular sector of an increase in final demand is reduced by 5 to 12% of the impact to be expected in an overall regular economy, when demand is addressed to the official market.

(c) However, if the increase in final demand is directed towards the irregular sector, the corresponding reduction in the regular sector multipliers can reach 40% of the total impact.

(d) When the regular sector is at full capacity at the existing real wage the benefits of an expansionary fiscal policy will be entirely transferred to the irregular sector. Keynesian policies will accordingly be effective in increasing overall output and employment.

(e) In contrast, classical policies 'correctly' applied when the regular sector exhibits classical unemployment will always exert positive effects on the regular economy and hurt, in some cases, the irregular sector. The overall effects on the economy will however be positive except if there is complete crowding out from the regular to the irregular sector.

These results suggest that the policy makers' plight will be aggravated in the presence of irregular activities: the objectives of increasing output and employment and reducing the importance of the irregular economy will often lead to conflicting policy prescriptions.

Two caveats and suggestions for further research can be offered at this stage. First, the model is very simple; Belgium is an open economy and the model should endogenize the trade balance to allow for more sophisticated spillover mechanisms. Second, the figures presented in sections 2 and 3 are orders of magnitude, based on rough assumptions about the irregular sector. The necessary statistical basis is unavailable and the mechanical 'adjustments' introduced by national statistical offices to account for fiscal evasion do simply not allow for an adequate understanding of the actual evolution of the sectors. Beyond the obvious need for a better apprehension of irregular activities, it can thus be suggested that statistical offices should publish unadjusted versions of national accounts to provide at least a clear view of the official economy. Our main conclusion is indeed that only a correct understanding of the interactions between parallel and official activities can ensure a minimal adequacy between economic policies and their objectives and provide a reasonable basis to measure their effects.

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