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Small firms in Portugal: a selective survey of stylized facts, economic analysis, and policy implications

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Abstract I survey a number of stylized facts pertaining to the dynamics of firm entry, growth, and exit in competitive industries. I focus particularly on data for Portugal, although I also consider, for comparison purposes, data from other countries. I then present a series of theoretical models that attempt to explain the stylized facts and evaluate the welfare impact of market distortions. Finally, I derive a number of policy implications, all centered around the notion of economic mobility.

JEL Classification L11

Keywords Small firms · Firm dynamics · Public policy

1 Introduction

Discussions about microeconomic policy in Portugal are fraught with lack of consensus, not only with respect to what should be done but also with respect to basic facts about the Portuguese economy microstructure. Some complain that small firms fail and exit too often; but others complain that the government policies of different sorts maintain many firms artificially alive. Many insist that Portuguese firms have very low productivity levels; but at the same time,

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we celebrate the success stories of Portuguese firms that are nothing short of European and world leaders. Some say that there are too many small firms or that there are not enough large firms (as there are in neighboring Spain, for example). When it comes to diagnosing the microeconomic problems faced by the Portugal, the list invariably includes high barriers to entry and growth, financing constraints, bureaucracy, high levels of taxation, and labor market imperfections (too difficult to lay off workers); but there is no clear consensus as to what factors are relatively more important.

This paper has the ambitious goal of adding clarity to this debate. I propose to do so in three steps. First, I survey a series of stylized facts about entry, exit, and growth rates, and about the industry distributions of firm size and productivity level. Although my primary interest is in the Portuguese economy, I consider data from a variety of countries. In fact, one of the striking empirical observations is how regular the main stylized facts are across countries. Next, I briefly survey some of the theoretical developments that address these stylized facts, mostly in a competitive (price taking) dynamic context. I stress the implications of these models in terms of welfare, specifically the welfare cost of market distortions. Finally, I derive implications for microeconomic policy. In particular, I stress the importance of economic mobility, a broad concept that denotes the absence of distortions to the activity of small firms.

For readers less familiar with recent developments in industrial organization, this paper may seem a bit off the industrial organization-beaten (IO) track. In fact, most of the study of industrial organization over the past few decades has focused on concentrated industries and firms with market power.[1] To some extent, the influx of game theory into industrial organization, for all its benefits, has created a bias away from industries where market power is of secondary importance. Moreover, from our study of the perfect competition model, there would seem to be very little more to say about industry dynamics and the properties of the long-run equilibrium beyond what we learn in an economics principles course.[2] In fact, firm behavior under the perfect competition model is almost trivial: remain active if price is higher than the minimum of average cost; and, conditionally on remaining active, choose output so that price equals marginal cost. What else is there to study?

The striking empirical regularities of competitive industry dynamics, as well as the interesting theoretical results that they imply, suggest that there is a lot to study. In particular, there is a lot to be said regarding public policy. The common wisdom holds that competition policy is needed primarily in industries with market power. By contrast, I will argue that competition policy also plays a central role in so-called "competitive industries."

Before proceeding, it might be appropriate to repeat the disclaimer contained in the title: this paper is a selective survey. In particular, I should stress that the recent theoretical and empirical literature has blossomed beyond the limits of a short survey paper. My main purpose in summarizing recent

[1] See, for example, Tirole (1988).

[2] See Cabral (2005) for a discussion of this point.

research is simply to provide support for the microeconomic policy claims, not to offer a complete picture of the extent to which the literature has progressed.

2 Industry dynamics: stylized facts

In this section, I present a series of stylized facts regarding firm dynamics: entry, growth, and exit rates (Section 2.1), firm size (Section 2.2), productivity (Section 2.3), and distortions to economic activity (Section 3.4).

2.1 Entry, growth, and exit

One of the most robust stylized facts of competitive industry dynamics is that, in any given year, entry and exit occur simultaneously. To put it differently, net entry rates are a small fraction of gross entry rates. Moreover, one finds that entry and exit rates are highly correlated across industries; that is, industries with higher than average entry rates also exhibit higher than average exit rates.

Cable and Schwalbach (1991) developed one of the earliest surveys of studies on entry and exit in different countries. Table 1 includes some of the results in their Tables 14.1 and 14.2. As can be seen, entry and exit rates are much higher than net entry rates (the difference between gross entry and gross exit rates). One possible interpretation for this phenomenon might be that it is an artifact of aggregation: Some industries might have high entry rates, whereas other industries have high exit rates. However, the data on cross-industry correlation between entry and exit rates suggest that this is not the case. Notice moreover that the results persist at the 3-, 4-, and 5-digit industry classification level. Portugal, interestingly, exhibits some of the higher values of entry and exit rates.

Table 2 presents data from a more recent source. The second column, turnover rate, corresponds to the sum of entry and exit rates in term of

Table 1 Annual gross entry and exit rates (in %) and correlation

Country	Entry	Exit	Corr.	Period	Data[a]
Portugal	12.3	9.5	0.030	1983–1986	234/5/E/E
Belgium/Man	5.8	6.3	0.660	1980–1984	130/3/E/E
Belgium/Serv	13.0	12.2		1980–1984	79/3/E/E
Canada	4.0	4.8	0.039	1971–1979	167/4/E/S
FRG	3.8	4.6	0.342	1983–1985	183/4/F/S
Korea	3.3	5.7	[b]	1976–1981	62/4, 5/F/S
Norway	8.2	8.7	0.488	1980–1985	80/4/F/S
UK	6.5	5.1	0.318	1974–1979	114/4/F/S
US	7.7	7.0	0.270	1963–1982	387/4/F/S

Source: Cable and Schwalbach (1991)

[a] Number of industries/aggregation level (no. digit industries)/firm or establishment level/ employment or sales data

[b] −0.409 in 1976–1978, +0.350 in 1979–1981

Table 2 Turnover rate (employment-weighted) and correlation between entry and exit rates

Country	Turnover	Correlation
Portugal	9.3	0.64
US	7.0	0.86
Western Germany	3.9	0.87
France	7.0	0.73
Italy	8.6	0.53
Denmark	10.2	0.75
Finland	11.9	0.75

Sources: Bartelsman et al. (2004, 2003)

employment. The entry rate, for example, is given by the total number of new jobs created by entrants divided by the total number of workers in the industry. The correlation rates between entry and exit are also weighted by employment level.

Notice that turnover rates are quite different in Tables 1 and 2. For example, Table 1 implies a turnover rate (in terms of number of firms) of 21.8% for Portugal, whereas Table 2 shows a much lower value, 9.3%. The main reason for the discrepancy is that Table 2 presents employment-weighted rates, whereas Table 1 refers only to the number of firms.

The lower rates in Table 2, compared to Table 1, suggest that entrants and exiters are of smaller size than incumbent firms. In fact, a second important stylized fact is that market penetration rates are a small fraction of entry rates. Table 3 includes data on entrants and exiters relative size in different countries. In all countries, the entrants initial size is less than one half the industry average size. In six of eight countries, it is less than one quarter. Except for the US, Portugal has the lowest ratio of entrant and exiter size with respect to industry average size.

Turning to the dynamics of each individual firm, a third stylized fact is that survival rates tend to be increasing in firm size and in firm age. For Portugal, Mata and Portugal (1994) estimate baseline hazard rates (that is, conditional probabilities of exit) after t years of 0.19, 0.14, 0.12, and 0.11 for the first 4 years. Based on the same dataset, Mata et al. (1994) also show that the probability of survival is increasing in current size. As with the previous stylized facts, similar results have been obtained for other countries. For the US, Evans (1987) estimates that a 1% change in firm size and a 1% change in firm age

Table 3 Entrants and exiters relative size (as a percentage of incumbent firms)

Country	Entrants	Exiters
Portugal	8.0	11.8
Belgium/Manufacturing	28.5	21.3
Belgium/Services	32.8	32.2
Canada	9.6	7.8
FRG	22.1	18.8
Korea	12.1	
Norway	12.6	11.3
UK	44.9	61.2
US	6.7	6.9

Source: Cable and Schwalbach (1991)

lead, respectively, to a 7 and a 13% change in the probability of survival over a 5-year period.

To conclude this subsection, I present a stylized fact regarding firm growth: Growth rates are typically decreasing in size, especially for small size levels; and decreasing with age. For Portugal, Mata and Portugal (1994) present some evidence to this effect. Newborn domestic firms have an expected growth rate of 22.5%, whereas 7-year-old firm only expect a 6.7% growth rate. Mata and Portugal do not explicitly explain the effects of age controlling for size and size controlling for age. For the US, Evans (1987) does so. He estimates that, over a 10-year period, a 1% increase in initial size leads to a 0.68% increase in ending-period size, that is, growth is considerably less than proportionate. He also finds that, over the same period, a 1% increase in initial age implies a 1.42% decrease in final size. Hall (1987) derives qualitatively similar results based on a different sample of US firms. Dunne and Hughes (2002) estimate that, over a 5-year period, a 1% increase in initial size leads to a 0.93% increase in ending-period size (this would correspond to $0.93^2 \approx 0.86$ over a period of 10 years; compare with Evans' results). Finally, studies for other countries find results that are broadly consistent. See, for example, Fagiolo and Luzzi (2004) on data from Italy.

To summarize, this subsection depicts a typical industry as having many entrants and exiters each period. A typical entrant is smaller than the industry average and grows faster than the industry average. Entrants are more likely to exit than older entrants, especially when they remain small in size. Finally, these facts are fairly robust both across industries and across countries. In particular, Portugal seems fairly typical.

2.2 Firm size

The patterns of the firm size distribution depend critically on the type of data source one considers. Cabral and Mata (2003) show that, when considering the universe of Portuguese manufacturing firms, the size distribution is skewed to the right. This contrasts with the distribution of firms from commonly used

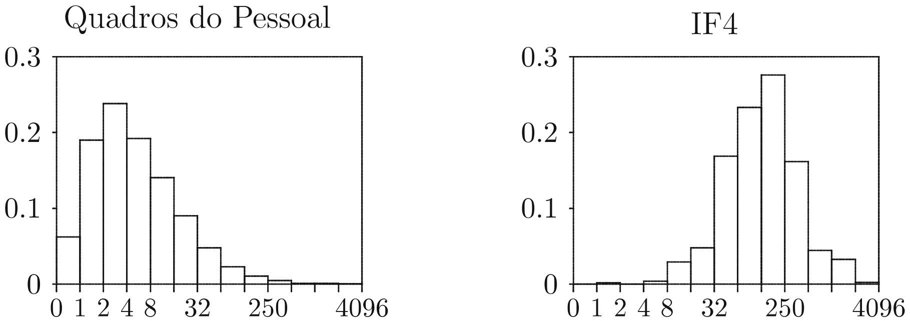


Fig. 1 Firm size distribution in Portugal based on two different datasets. Source: Cabral and Mata (2003)

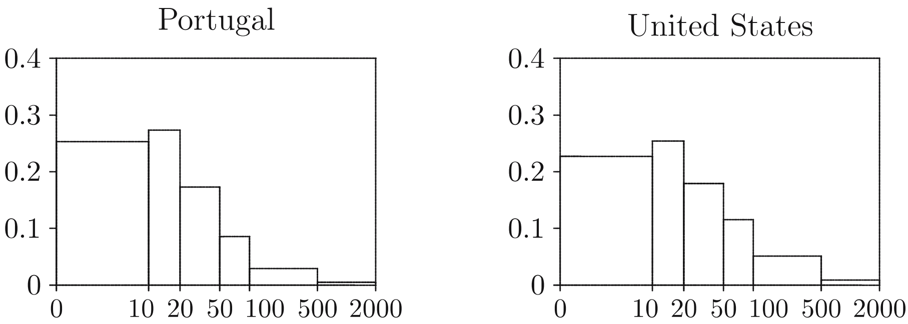


Fig. 2 Firm size distribution in Portugal and in the US. Source: Cabral and Mata (2003)

databases, such as Compustat or Amadeus, for which the lognormal is a better approximation. Figure 1 illustrates this contrast. On the left, we have the size distribution based on a comprehensive dataset (from *Quadros do Pessoal*). On the right, the distribution from a dataset with similar characteristics to Compustat and Amadeus. One cannot reject that the right-hand distribution is lognormal, but the one on the left is certainly more right-skewed than a lognormal.

The lognormal distribution has traditionally played an important role in the study of the firm size distribution. Empirically, the distribution seems to fit well data from Compustat and similar databases. Theoretically, the lognormal is the limiting distribution of a firm growth process such that growth rates are independent of firm size.[3] When one looks at more comprehensive datasets, including small and micro firms, then lognormality is no longer the rule; nor are growth rates independent of size (see the previous section).

The pattern of right-skewness, with proportionately more small firms than large firms (with respect to the lognormal distribution), is not unique to Portugal. Figure 2 depicts the distribution of firm size for manufacturing firms in Portugal and the US. Despite the significant differences in size and level of economic development, the distributions are relatively similar.

A related stylized fact documented by Cabral and Mata (2003) for Portuguese firms is the *evolution* of the firm size distribution. They show that the distribution of log size of a given cohort of firms is very skewed at birth but gradually becomes more symmetric. Once again, similar results have been obtained for other countries, namely, Ireland and Italy.[4]

In recent research, Bartelsman et al. (2003) present some systematic evidence on firm size and firm size distribution across a series of countries. Table 4 presents the relative weight of firms with fewer than 20 employees. As can be seen, the number of firms in that category is virtually identical in Portugal and the US (consistently with Fig. 2). However, when we consider the fraction

[3]See Gibrat (1931) and Sutton (1997).

[4]See Angelini and Generale (2005); Barrios et al. (2005); Lotti and Santarelli (2004). However, Fagiolo and Luzzi (2004) fail to detect such evolution in the skewness of the firm size distribution.

Table 4 Relative importance of firms with fewer than 20 employees: fraction of total economy (%)

	Number of firms	Number of employees
Portugal	86.3	27.7
US	86.7	16.6
Western Germany	87.9	23.6
France	78.6	34.4
Italy	93.1	38.1
Denmark	90.0	30.2
Finland	92.6	25.8
The Netherlands	95.8	31.2

Source: Bartelsman et al. (2003)

of employees accounted for by firms with fewer than 20 employees, then the number is much lower for the US. This reflects the fact that the right tail of the US distribution of firm size is much thicker.

Table 5 presents data on average firm size in various countries. Again, Portugal seems broadly in line with other European countries. Table 5 also presents data on the subcategories Manufacturing and Services. The cross-country patterns of firm size seem broadly robust with respect to the type of firms considered. In fact, Bartelsman et al. (2003) show that industry composition accounts for a small fraction of the cross-country differences in firm size.

The results from Table 5 may seem puzzling. After all, Portugal's largest firms pale in size when compared to their European counterparts; and accordingly, one might expect average firm size to be smaller in Portugal (and the employment share of small firms to be larger). The solution to this apparent puzzle, at least to some extent, is to be found in what we might call the extreme-statistic fallacy. Consider two random variables, X and Y. Let $E(X, m, n)$ be the average value of the m highest values of x out of a sample of n values. Then, even if the distributions of X and Y were the same, we would inevitably obtain $E(X, m, n_X) > E(Y, m, n_Y)$ so long as $n_X > n_Y$. So, the fact that the five largest German firms are greater than the five largest Portuguese firms does not necessarily imply that German firms are on average greater than Portuguese firms; just like the fact the five tallest German men are taller than the five tallest Portuguese men does not imply Germans are on average taller.

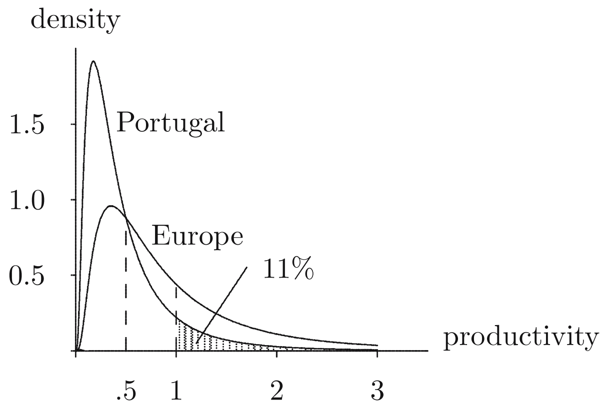
In summary, Portugal does not seem to be an outlier in terms of firm size and the firm size distribution. It is often said that there are too many small firms

Table 5 Average firm size (number of employees)

	Economy	Manufacturing	Services
Portugal	16.8	31.0	11.4
US	26.4	80.3	21.4
Western Germany	17.0	39.1	11.5
France	33.5	32.1	35.7
Italy	10.5	15.3	6.8
Canada	12.7	40.5	12.0
Denmark	13.3	30.4	12.7
Finland	13.0	27.8	9.9
The Netherlands	6.5	18.3	5.3

Source: Bartelsman et al. (2003)

Fig. 3 Distribution of productivity levels: an example



in Portugal and that average firm size is too small. However, when looking at small and medium-sized enterprises (SME), it is hard to find a significant difference between Portugal and the average OECD country.

2.3 Productivity

There is extensive evidence, although not extensive systematic evidence, that productivity in Portugal is substantially lower than the average of all European countries. A report by McKinsey benchmarks Portugal with reference to a group of four other European countries and estimates a productivity gap of about 30%.

I am not aware of any systematic estimate of the distribution of productivity levels by industry in Portugal. Estimates for the US indicate high indices of variability. Considering how similar different countries are on other dimensions, it seems reasonable to expect Portuguese industries to exhibit similar levels of dispersion of productivity levels.

An estimate based on a survey of Portuguese innovators indicates a coefficient of variation greater than 1.[5] Such high value of the coefficient of variation has important implications. In particular, it makes little sense to use the difference in means and generalize that Portuguese firms are not productive: the fallacy of the average.

A simple calculation will help make the point. Assume that the distribution of productivity levels is lognormal (which makes sense based on the distributions in other countries). Assume moreover that the standard deviation is equal to the mean. Then even if Portuguese firms have an average productivity 50% lower than the European average, 20% of Portuguese firms have a productivity level higher than the European median, or 11% above European average.

[5] Pedro Conceição (personal communication).

Table 6 Gap between weighted and un-weighted labor productivity (1990s) and share of informal economy

Country	Productivity gap	Informal economy
Portugal	0.45	22.6
US	0.60	8.8
Western Germany	0.34	16.3
France	0.30	15.3
UK	0.20	12.6
Finland	0.27	18.3
The Netherlands	0.28	13.0
Argentina	0.21	25.4
Chile	0.46	19.8
Colombia	0.47	39.1
Taiwan	0.58	19.6
Korea	0.60	27.5
Indonesia	0.62	19.4
Slovenia	−0.05	27.1
Latvia	0.02	39.3
Romania	0.05	34.4
Hungary	0.15	25.1
Estonia	0.33	N/A

Source: Bartelsman et al. (2005) and World Bank, respectively

These calculations are illustrated in Fig. 3. In this figure, I normalize units so that the average productivity level of European firms is 1. I assume that both distributions are lognormal with a coefficient of variation of 1. As can be seen, about 10% of the mass of Portuguese firms lies to the right of 1 (the average). Because the median of the lognormal is lower than the average, the percentage of Portuguese firms above the median is even higher.

One of the benefits of competition is that it leads to an efficient allocation of resources across firms within an industry. In particular, firms with higher productivity levels will tend to increase in size, whereas firms with lower productivity level will tend to decrease in size or exit. In this regard, it is useful to measure the gap between weighted and un-weighted productivity. If this gap is zero, we conclude that there is little correlation between productivity and size. If this gap is positive, however, we conclude that firms with higher productivity levels are larger, reflecting the benefits of competitive selection.

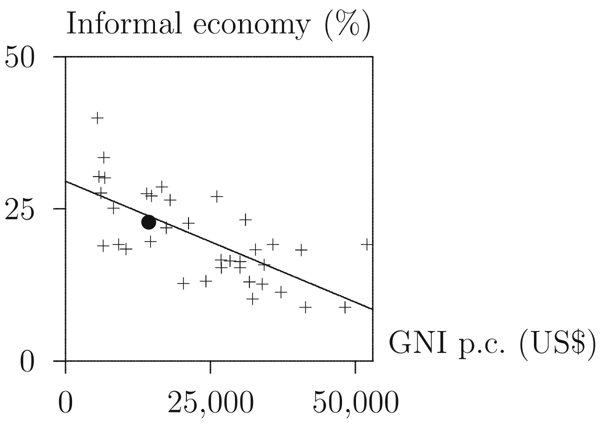


Fig. 4 Informal economy and per-capita GNI (countries with per-capita GNI greater than $5,000). The data point for Portugal is represented by a *bullet point*. Source: World Bank

Table 7 Barriers to economic activity

Index	Unit	Best	Portugal	Worst	Rank
Proc. enforce contract	Number	0	22	62	72/142
Time to enforce contract	Days	7	365	1,460	104/141
Time to resolve insolvency	Years	0	2.6	11.3	54/126
Time to start a business	Days	2	95	215	126/146
Per capita Gross Domestic Product (GDP)	1995 $	54,652	16,039	483	45/186

Source: World Bank Indicators (2003)

Table 6 displays the values of this index. Specifically, I follow Olley and Pakes (1996) in defining the gap as

$$G = \left(\sum_i s_i \, P_i \right) \Big/ \left(\frac{1}{N} \sum_i P_i \right) - 1,$$

where s_i is firm i's share (in number of employees), P_i is firm i's productivity level, and N is the number of firms.

Considering the values for other OECD countries, the value for Portugal is fairly high, although smaller than in the US. Two other noticeable differences are the very high values for southeast Asian countries and the very small (even negative) values for eastern European transition economies. This suggests that, particularly in these countries, there is much to gain from reallocating resources across firms within each industry.

2.4 Data quality: a digression

At this point, it is worth noting an important caveat: the numbers I present are based on official statistics, and thus miss much of the informal economy. This is important in many respects, namely, when estimating the distribution of productivity levels and the correlation between productivity and size. In fact, insofar as "informal" firms have lower than average productivity, the real gap is lower than the one reported in the previous subsection (Table 6). Because Portugal exhibits a higher fraction of informal economy activity, the difference between the productivity gap for Portugal and other European countries may not be so high—in fact, it may well be negative.

More generally, a question that needs to be asked is: How good is the available data on industry dynamics? Figure 4 plots the values of the share of the informal economy and the level of Gross National Income (GNI) for all countries with a per-capita GNI greater than US$5,000. The figure suggests that Portugal is not particularly different from other countries. In fact, correcting for GNI p.c. level, Portugal seems to be right on average.[6] Insofar

[6]The line corresponds to the regression of the share of the informal economy with respect to GNI per capita. The regression has an R^2 of 0.49; the GNI per capita coefficient has a p value of 1.4E−06.

Table 8 Entry costs

Description	Portugal	Sample average
Number of procedures to obtain legal status, by category:		
Safety and health	12	10.48
Environment	0	0.34
Taxes	2	2.04
Labor	2	1.94
Screening	8	6.04
Time to obtain legal status (days)	76	47.7
Cost of obtaining legal status	0.1844	0.4708
Total cost	0.4884	0.6598
GDP per capita	10,600	8,226

Source: Djankov et al. (2002)

as we compare Portugal to developing countries (as I do for the most part in this paper), then we should be aware of the potential bias introduced by the informal economy, about 23% in Portugal vs 18% for countries with per-capita GNI greater than US$10,000.

2.5 Distortions to economic activity

It is common wisdom that the Portuguese economy is subject to myriad economic distortions, and that Portuguese firms must overcome numerous barriers to succeed. In Table 7, I summarize some of the information from the World Bank's World Economic Indicators on indices that refer to the economic environment in which firms operate.

One must take these numbers with a grain of salt. For example, the number of days to enforce a contract in Portugal, 365, suggests that the number was not calculated with great precision; another suspicious example is that the lowest number of procedures to enforce a contract is Indonesia at zero (Australia follows with 11), and so forth.

I also include in Table 7, *pro memoria*, the level of GDP per capita. It is noticeable that Portugal is an outlier in the sense that the ranking in terms of barrier indices is significantly lower than that in terms of per capita GDP.

An alternative source of data on entry barriers is the World Bank's database on doing business. Table 8 presents a few variables of interest, both for Portugal and for the remaining countries in the sample.[7]

To investigate the possibility that Portugal is an outlier in terms of distortions to economic activity, I consider two graphs, Figs. 5 and 6. In these graphs, I select countries with a GNI higher than $5,000 and plot the cost of starting a

[7] See Djankov et al. (2002) for various notes on this dataset. Note that there are some discrepancies between Tables 7 and 8 regarding the data for Portugal. First, the values of GDP per capita are different; however, one must consider that the value is measured for different years and in different units. Second, the time to start a business is lower in Table 8; but here, the measure is in business days, not calendar days, so the difference is not that great.

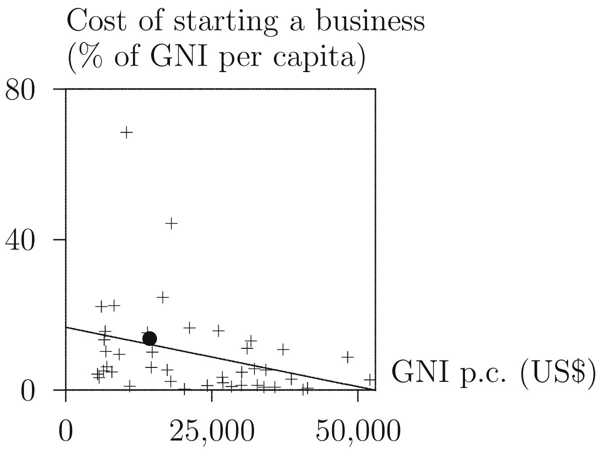


Fig. 5 Cost of starting a business and per-capita GNI (countries with per-capita GNI greater than $5,000). The data point for Portugal is represented by a *bullet point*. Source: World Bank

new business (Fig. 5) and time to start a business (Fig. 6), as well as the level of each country's GNI. I also plot the regression line between the two variables.

Both figures suggest that barriers to entry tend to be smaller in more developed countries. Regarding the cost of entry, Portugal seems to be right on average.[8] However, regarding time to start a business, Portugal is very much on the outer edge of the distribution. In summary, bureaucratic barriers to entry are very large in Portugal, even when controlling for the level of economic development.

Similar calculations can be performed on the sample of 85 countries considered by Djankov et al. (2002). Table 8 presents some summary statistics. Broadly speaking, the numbers for Portugal do not seem too far off the sample average. What is particularly striking, however, is the fact the total cost in Portugal is 2.64 times higher than the monetary cost of entry, whereas the ratio of the averages is only 1.40. In other words, the entry cost in Portugal seems disproportionate due to the cost of time in getting the necessary approvals for entry.

A separate and very different source of data is the OECD dataset on product market regulation.[9] Table 9 presents values for the overall index (Product Market Regulation) as well as a component index, "Barriers to Entrepreneurship," which has a weight of approximately 30% in the overall index. Two facts stand out from the table: first, the recent trend towards a lower degree of regulation.[10] Second, the relatively small difference between Portugal and the OECD average.[11]

[8]The lines in each figure are the estimated value from regressing the vertical-axis variable on the horizontal-axis variable. The values of R^2 are 30 and 10%, respectively; the coefficients relating the two variables in each graph have p values of 0.003 and 0.000, respectively.

[9]See Conway et al. (2003).

[10]This tendency is marginally more pronounced in the component "state control."

[11]In 2003, the standard deviation of the product market regulations (PMR) and BTE indices was 0.43 and 0.42, respectively, so the differences 0.1 and 0.2 are economically and statistically small.

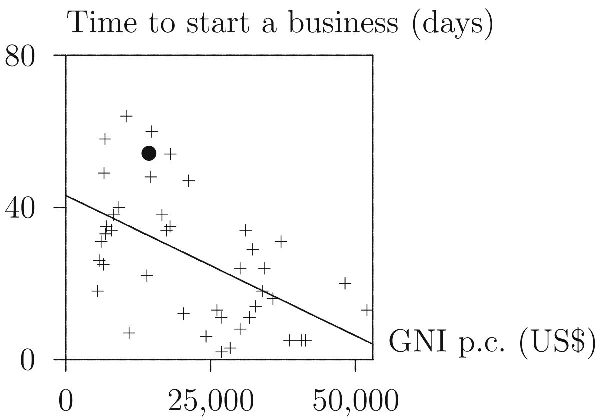


Fig. 6 Time to start a business and per-capita GNI (countries with per-capita GNI greater than $5,000). The data point for Portugal is represented by a *bullet point*. Source: World Bank

3 Industry dynamics: economic analysis

Good policy analysis must be based on good knowledge of data and stylized facts; but it must also be grounded on a coherent model of reality. In this section, I summarize some of the recent developments in the economic analysis of industry dynamics, especially as it addresses the stylized facts presented in the previous section: industry turnover, firm size, and productivity. I will conclude with the analysis of how market distortions impact the dynamics of firm entry and exit.

3.1 Explaining industry turnover

To explain the stylized facts described in the previous section, we need to relax some of the assumptions of the model of perfect competition. I will maintain that (1) firms are price takers, (2) the product is homogeneous, and (3) information about prices is perfect. However, in contrast with the perfect competition model, I now suppose that: (4) firms must pay a sunk cost to enter and (5) not all firms have access to the same technology. The framework I present next is due to Jovanovic (1982). I will later also make reference to alternative models that imply similar observable patterns.

Suppose that *different firms have different degrees of efficiency*, which in turn correspond to different cost functions: More efficient firms have a lower marginal cost schedule. These differences may result from a variety of factors. For example, some managers are more efficient in organizing resources than others (more on this below).

Table 9 Indices of Product Market Regulation and Barriers to Entrepreneurship

Concept	Country	1998	2003
PMR index	Portugal	2.1	1.6
	OECD average	2.1	1.5
BTE	Portugal	1.8	1.3
	OECD average	1.9	1.5

Source: Conway et al. (2003)

Suppose moreover that *each firm is uncertain about its own efficiency.* When a firm first enters an industry, it has only a vague idea of what its efficiency is. As times goes by, and based on each period's experience, the firm gradually forms a more precise estimate of its true efficiency. In each period, the firm chooses optimal output based on its current expectation of efficiency; roughly speaking, the output level such that price is equal to expected marginal cost.

Given the above elements, we conclude that firms that get a series of bad signals (high production costs) gradually become "pessimistic" about their efficiency level, gradually decrease their output, and, eventually, may decide to exit the industry (as variable profit is insufficient to compensate for the fixed cost). By contrast, firms that receive a series of good signals (low production costs) remain active and gradually increase their output.

This model of *competitive selection* is consistent with several of the stylized facts described in the previous section. In particular, the model is consistent with the stylized fact of *simultaneous entry and exit in the same industry*. Firms that accumulate a series of very unfavorable productivity signals hold a very unfavorable estimate of their own efficiency. As a result, their expected value from remaining active is negative, which in turn leads them to exit. New entrants have no information regarding their efficiency. Their expected efficiency is, therefore, much better than the exiting firms': No news is better than bad news. This justifies that their expected value from being active is positive, in fact, greater than the entry cost. In summary, it is possible for a firm with no information about its efficiency to enter, whereas a firm with unfavorable information about efficiency exits.

Efficient firms are firms with a low marginal cost function. Because firms equate price to (expected) marginal cost, it follows that more efficient firms sell a higher output. Together with the previous results, this implies that exiters (the active firms with lowest expected efficiency) are also the firms with lower output. By selection, the firms that remain active have an efficiency higher than average. In particular, higher than the average entrant's. It follows that entrants' output is lower than the surviving firms' average output. In this way, the model is also consistent with the stylized fact that *firms that enter and firms that exit are smaller than average*.

Finally, the competitive selection model is also consistent with the empirical observation that the firm size distribution is neither single valued nor indeterminate, as the perfect competition model would imply. In fact, a given population distribution of efficiency levels implies a particular distribution of firm sizes.[12]

Jovanovic (1982) model is not the only one that is consistent with the type of stylized facts described in Section 2. Other important broad frameworks include Hopenhayn (1992) and Ericson and Pakes (1995). In fact, I will come

[12] It may be worth to point out that the competitive selection model does not depend on firms being asymmetric with respect to costs. We could alternatively assume that some firms' products are better than others'.

to these later in the paper. In particular, I will show how Ericson and Pakes (1995) address one of the main criticisms to the Jovanovic model, namely, that it does not explain why different firms have different efficiency levels in the first place.

3.2 Explaining the evolution of new firms

As mentioned in Section 2.2, new firms are characterized by a very right-skewed distribution. As time moves on, the size distribution of that cohort shifts to the right and becomes closer to a log-normal. One first natural interpretation of this pattern is that the smallest of the small firms are exiting in greater numbers, leaving a set of survivors that has a more symmetric distribution (in particular with fewer very small firms). However, using Portuguese data, Cabral and Mata (2003) reject this interpretation: They show that the size distribution of 1984 entrants is very similar to the 1984 size distribution of the 1984 entrants that survived until 1991, which contradicts the hypothesis that selection is doing most of the work.

Cabral and Mata (2003) propose an alternative hypothesis, namely, that financing constraints play an important role. Among the set of entrants, some firms start off very small because they do not have the resources to start off at their efficient level. As they gradually become less financially constrained, the distribution moves to the right and becomes more symmetric (as found in the data).

Barrios et al. (2005) corroborate this explanation with data from Ireland. They show that the above evolution of firm size skewness is found in Irish firms but not in multinational firms. This seems consistent with the hypothesis that multinational firms are less financially constrained and therefore not subject to the above dynamics. However, Fagiolo and Luzzi (2004), using Italian data, reject the hypothesis that financing constraints have a significant effect. Based on firm level survey data where respondents indicate if they are financially constrained, they construct two distributions of new firm size distribution: that of financially constrained firms and that of not financially constrained firms. The difference between the two distributions is minimal.

Albuquerque and Hopenhayn (2004) and Cooley and Vincenzo (2001) propose more structural models that incorporate financing constraints. In particular, Cooley and Vincenzo (2001) show how financing constraints explain the fact that growth rates are decreasing in size (controlling for age) and decreasing in age (controlling for size).

An alternative explanation for the evolution of firm size focuses on the role of sunk costs. Cabral (1995) provides a theoretical explanation for the negative relation between firm size and firm growth among new entrants. The idea is that capacity and technology choices involve some degree of sunkness (that is, investments for which value is foregone upon exit). Because small entrants are more likely to exit than large entrants, it is optimal for small entrants to invest more gradually, and thus experience higher expected growth rates upon entry than large entrants do.

3.3 Explaining variability in productivity

The characterization of the firm size distribution provided by Jovanovic's model is, to a great extent, tautological: The distribution of efficiency levels is *assumed* rather than derived; a more satisfactory model would also explain the distribution of efficiency levels. One possibility is to assume that firms invest in R&D and that efficiency levels result from these R&D investments. This is what the model by Ericson and Pakes (1995) does.

Ericson and Pakes (1995) consider a model where each firm's productivity results from rationally chosen R&D investments. Specifically, in each period, firms decide whether to remain active, and if so, how much to invest in R&D. Investment leads to a stochastic improvement in the firm's type, which can be interpreted in a way similar to Jovanovic (1982).[13]

Ericson and Pakes (1995) derive a rational expectations Markov equilibrium, which is ergodic. In the long-run, there will be a distribution of firm types and firm sizes. In other words, instead of assuming a distribution of types, as in Jovanovic (1982), we now derive such distribution as an equilibrium result. The key to heterogeneity of firm types is, therefore, the randomness of the investment process.

It seems reasonable to assume differences in efficiency and productivity result from luck of the draw in the R&D process. Still one may wonder how such large differences in productivity as those reported in the previous section can be sustained in the long run. After all, one of the main effects of competition is precisely to weed out the under-performers. One possible explanation, advanced by Syverson (2004a), is that product differentiation allows firms to survive with below-par productivity levels. Consistently with this explanation, Syverson (2004a) shows that industries with greater degree of product differentiation are also industries with greater variability in productivity.

An alternative explanation is that not all industries are that competitive. If the more productive firms price above cost, then less efficient firms may be able to survive (if with lower margins). Syverson (2004b) tests this hypothesis in the concrete industry. He shows that, in geographical areas where there is less competition, there is also greater variability in productivity levels. A related test is that of Asplund and Nocke (2005). They show that, in geographical markets where demand density is greater, and thus market competition more intense, the average life span of an entrant is lower. Although they do not directly present theoretical or empirical results on productivity level, this result is consistent with Syverson (2004b) on the disciplining effects of competition.

In summary, firm heterogeneity (namely, in terms of productivity level) is a combination of exogenous firm attributes (managerial ability, company

[13]Ericson and Pakes (1995) also consider the possibility of non-competitive behavior by firms.

culture, etc.) and luck in the investment process.[14] Although typical industries exhibit a significant degree of variation in productivity levels, such dispersion is smaller in more competitive industries (e.g., industries with lower degree of product differentiation).

3.4 Market distortions and welfare

The fundamental theorem of welfare economics states that, under perfect competition, the market solution is efficient. But, as we have seen in Section 2, the perfect competition model does not stand up to the facts very well. What then can be said of the market efficiency result? To my knowledge, Hopenhayn (1992) provides the most general extension of the fundamental theorem. Based on an extension of Jovanovic's (1982) model, he shows that the market equilibrium is efficient if firms are price takers —even if efficiency varies across firms and across periods. This is a strong result. In particular, if there are no entry barriers, then the equilibrium level of firm turnover (possibly with high firm turnover compared to the net entry rate) is socially optimal.

In other words, for all its differences with respect to perfect competition, competitive selection maintains one important property: efficiency. So long as firms act as price takers, the equilibrium solution, absent any artificial barriers, is socially efficient. Each firm's output decision in each period is efficient: Price equal to expected marginal cost is the most efficient output decision, that is, the one that maximizes total surplus. Moreover, it can be shown that the firm's entry and exit decisions are also optimal from a social point of view. The basic idea is the same as in the model of perfect competition: A very small firm has a negligible impact on other firms and on price. It follows that it internalizes all of the costs and benefits from entering or exiting the industry: What is good for the firm is good for society.

It might seem inefficient to have firms entering and exiting a given industry simultaneously. But we must remember that firms are uncertain about their efficiency. The only way to determine a firm's efficiency is to actually enter the industry. A central planner who attempted to maximize total surplus would not be able to do better than the market. In summary, it can be shown that the equilibrium under competitive selection is efficient.

It follows that distortions to the natural workings of the market lead to a lower level of social welfare. A particularly careful illustration of this point is provided by Hopenhayn and Rogerson (1993). Based on the Hopenhayn's (1992) model of competitive selection, Hopenhayn and Rogerson (1993) estimate the impact of a distortion to the process of firm creation and destruction. Specifically, they consider the impact of firing costs. The results are

[14] Pakes and Ericson (1998) test the relative importance of these two sources of heterogeneity. They show that firm type is ergodic in manufacturing but not in services. This is consistent with the interpretation that Jovanovic's (1982) story does a better story at explaining the dynamics of firms in the services sector, whereas Ericson and Pakes (1995) is a better model of firms in manufacturing.

staggering: For example, they estimate that a tax on dismissals equivalent to 1 year's wages reduces steady-state utility by more than 2% measured in terms of consumption. The welfare loss comes about from an 8% reduction in firm turnover. This implies that less efficient firms are active, whereas other, more active firms, remain inactive. Also, the labor adjustment cost implies that some firms are smaller or greater (in terms of number of employees) than would be efficient. Hopenhayn and Rogerson (1993) estimate that, for more than 90% of the firms, the gap between the marginal productivity of labor and wage would be greater than 5%.

I suspect that Hopenhayn and Rogerson's (1993) analysis yields a lower bound of the welfare loss from barriers to entry and mobility. The reason is that they assume all firms are subject to the same barrier. But casual observation suggests that, just as there is significant variability in firm productivity, there is also significant variability in the barriers to entry and mobility that each firm faces.

To get an idea of the magnitude of this effect, consider the following simple model. Suppose there are 1,000 price-taking firms each with capacity 1.[15] I assume that marginal cost is constant and normally distributed with mean 100. Consistently with the empirical evidence, I assume a coefficient of variation of 1, so standard deviation is also 100. Market inverse demand is given by $p = 200 - 0.01Q$, where Q is total output (number of active firms).

I first compute the equilibrium in this economy. This amounts to ordering firms by marginal cost, thus obtaining market supply; and then finding the supply–demand equilibrium.

Suppose now that this economy is subject to a series of distortions. Specifically, firm i's marginal cost is changed by t_i, where t_i is normally distributed with mean μ and standard deviation σ. I assume the value $t_i q_i$ is a transfer, so the only social cost implied by t_i is the distortion it creates.

The social cost of distortion t_i can be divided into two terms. First, assuming no change in costs, t_i leads to a gap between price and marginal cost and the corresponding Harberger excess burden triangle (allocative inefficiency). Second, for a given output level, t_i also implies an increase in production cost compared to the minimum total production cost (productive inefficiency).

Figure 7 shows the welfare effects of distortions for various values of μ and σ. Consider first the case when $\sigma = 0$. As we increase the value of μ, the welfare loss increases. Notice that the relation between μ and welfare loss is convex. If σ is low, then the welfare loss is limited to allocative inefficiency, which is proportional to $t_i^2 = \mu^2$. It follows that a small value of μ implies a very small welfare loss. This is, in essence, the underlying argument in Harberger's (1954) claim that the welfare loss from market distortions in the US is very small.

[15]The model can easily be extended to firms with different capacities; simply assume that some firms have multiple establishments, each consisting of one of the "firms" that I consider.

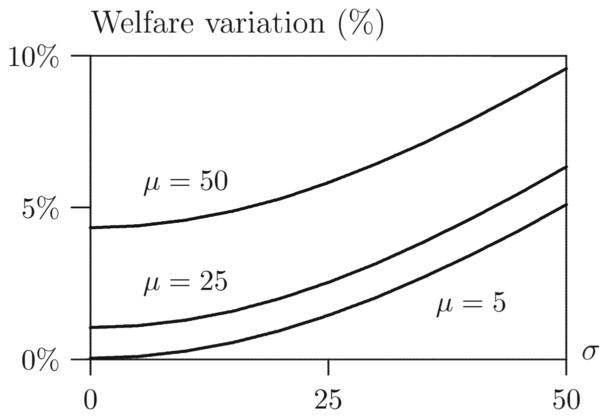


Fig. 7 Welfare loss from cost distortions. Each firm's cost is increased by a stochastic variable with distribution $N(\mu, \sigma)$

Figure 7 suggests that the welfare loss is also convex with respect to σ. For example, if $\sigma = 50$, then welfare is as large as when $\mu = 50$ and $\sigma = 0$. In fact, even if μ is very small, a high value of σ implies a high welfare loss.

The above calculations are based on a static, partial equilibrium model. However, the qualitative ideas, and in fact, the order of magnitude of the effects, would likely be similar in a richer model. In fact, the work of Restuccia and Rogerson (2003) suggests that this is the case. They consider a framework in the line of Hopenhayn (1992) and Hopenhayn and Rogerson (1993), adding to it the possibility that different firms face different prices in making their output and entry/exit decisions. They calibrate their model and estimate that the welfare loss due to distortions may be as high as 30% of GDP.

In summary, I argue that the welfare cost of distortions depends not only on the size of distortions (μ) but also on how these vary across firms (σ). There are various sources of cross-firm variation, including tax evasion and more generally the informal economy. I will return to these in the next section.

4 Policy implications

The theoretical ideal of perfect competition includes, among others, the presumption that firms are price takers and that there are no barriers to mobility. Although the assumption of price-taking behavior is a reasonable approximation to many industries, the ideal of a level-playing field with no barriers to entry and mobility is far from reality.

Competition policy has made great inroads in the treatment of the classical "problematic" cases: mergers and acquisitions in concentrated industries, public utilities, and so forth. But a lot still needs to be done in a variety of so-called "competitive" industries. Here is where, in my opinion, the main focus of microeconomic policy should lie.

In this section, I further develop this point. First, I focus on the idea of industry turnover as a characteristic of the normal behavior of the economy. Next, I argue that turnover is actually a very important channel for the process of industry productivity growth. Finally, I present the ideal of economic mobility as one of the main goals of competition policy.

4.1 Turnover and welfare

One of the most common misperceptions regarding micro policy is that it should protect firms from failing and exiting. It is true that the immediate effect of saving a firm from exiting is to save a number of jobs equal to that firm's employment. But such policy would imply a significant welfare cost in terms of resource misallocation. A firm that is artificially kept alive implies a firm that will not be created, knowing that the latter would probably be more efficient than the former. In this regard, the welfare cost estimates by Hopenhayn and Rogerson (1993) are particularly telling.

One variation of the above misperception is that public policy should protect small firms especially because their turnover rate is typically higher than average (as documented in Section 2). But again, a high turnover rate may well be part of the natural process of experimentation inherent to a healthy competitive industry. In fact, the cost of experimentation is smaller for small firms, and so it is only natural that, in equilibrium, we observe higher entry and exit rates for small firms. So, as a matter of principle, one cannot say that because their turnover rate is higher small firms should be particularly protected.

Having said that, it is true that some market imperfections hit small firms in a particular way. For example, imperfect credit market conditions are likely to bias the market against small firms. In general, any imperfections that increase a firm's fixed cost slant the field against small firms. The solution is then to correct as much as possible for those credit market imperfections.

4.2 Productivity growth

One of the most important results from the analysis of time series productivity data is the importance of industry turnover in the process of productivity growth. There are essentially two ways in which to increase average productivity in a given industry. One is to increase the productivity level of each firm; the other one is to increase the relative weight of higher productivity firms. Public policy frequently heralds the former and places less emphasis on the latter. Government programs to improve the quality of human and physical capital inputs have greater political impact; whereas fostering a more fluid process of firm entry and exit, if anything, carries a political cost. This is unfortunate, for the empirical evidence is that resource reallocation is the primary source of productivity growth.

Olley and Pakes (1996) offer an interesting case study of the role of turnover in productivity growth. They look at the 1980's deregulation process in the US telecommunications equipment industry. The common wisdom is that deregulation improves efficiency by forcing incumbent firms to become more efficient. Although telecommunications equipment firms indeed became more efficient after deregulation, the greatest source of industry improvement was the process of capital reallocation among incumbent firms.

The exercise of productivity growth accounting leads to different results in different economies and industries; it also depends on the particular definition of productivity.[16] However, the common message of all of these exercises is the importance of the process of industry turnover, both in terms of entry and exit and in terms of resource reallocation among incumbents.

This naturally leads to the question: What can public policy do about it? I next argue that one of the primary areas of competition policy ought to be guaranteeing the basic conditions of economic mobility: a level-playing field where competition may work effectively towards the selection of the more efficient firms.

4.3 Economic mobility

The Fundamental Theorem of Welfare Economics is remarkably robust. Although it is usually formulated in the context of perfect competition, which is based on a lot of assumptions, one only really needs to assume (a) price-taking behavior and (b) free entry, exit, and mobility. In particular, as shown by Hopenhayn (1992), market efficiency is consistent with firm heterogeneity and imperfect information.

Most firms in the Portuguese or any other economy, especially small- and medium-sized firms, face a fairly flat demand curve. It follows that price-taking behavior is a fairly good first-order approximation. We are, thus, left with condition (b). Unlike price-taking behavior, the ideal of economic mobility is very far from the reality of the Portuguese and most other economies.

Contrary to the increasingly discredited advocates of a strong industrial policy (e.g., government investment in national champions), a growing majority of economics scholars advocates that the best microeconomic policy is a good competition policy. And within micro policy I would advocate that promoting economic mobility plays a central role. Competition policy typically focuses on concentrated industries, industries where firms have market power. Competitive industries (that is, industries where firms are price takers) are frequently given less importance. But the term "competitive" can be deceiving: Price-taking behavior is an important step towards efficient competition, but it is not the only one. One must make sure that "competitive" industries are truly competitive. This is where economic mobility comes in.

I denote by *economic mobility* the set of conditions ensuring that, in competitive industries (industries where firms are price takers), competition leads to an efficient equilibrium. Barriers to entry, such as the bureaucratic costs of creating a new firm, are an obvious instance of a distortion that drives the market equilibrium away from the efficient outcome idealized by the Fundamental Theorem. If all firms were equal, barriers to entry would not be a very big problem: Fewer firms might enter than with no barriers, but the

[16] See Ahn (2001) for a survey.

loss would not be that great if the size of the barrier was not that great.[17] But all firms are not equal; and so, more than higher prices, the implication of a barrier to entry is a lower rate of turnover and thus a less than perfect replacement of less efficient incumbents.

But economic mobility is not just about barriers to entry. The empirical evidence suggests that much of the reallocation of productive resources takes place among active firms. Any artificial barrier that encumbers this process has an effect on turnover similar to a barrier to entry. One example is given by severance payments and, more generally, legal and economic restrictions to layoffs; but there are other examples.

Another point suggested by the analysis in the previous section is that a crucial aspect of economic mobility is not so much the size of distortions but how they differ across firms. In fact, the loss of productive efficiency is more likely to come from the variation in the size of distortions than its size. It is bad enough if potential entrants must pay an extra cost to become active; but it is much worse if some potential entrants must pay a higher cost than others.

There are several sources of cross-firm variation in barriers to entry and mobility. For example, when entry entails complicated bureaucratic steps, the worst thing that can happen is that *some* firms may be able to evade those bureaucratic costs. Other important sources include fiscal evasion and more generally avoidance of government imposed regulations (labor, environmental, and so forth). The point is that fiscal evasion, for example, is not simply a problem of fairness, it is also an efficiency problem.

In sum, economic mobility is a set of conditions that create level-playing fields, one where firms can easily enter and exit, grow and shrink, according to their relative efficiency - an environment where market selection leads to efficient selection.

5 Final remarks

Most of microeconomics research in the past few decades has been devoted to showing when and why markets do not work. The game theory revolution—promptly taken up by industrial economists—stresses the importance of market power. Other scholars, from Akerlof to Spence to Stiglitz, focus on asymmetric information and market failures. In the 1980s, work by Arthur et al. highlights the importance of increasing returns and non-ergodic market outcomes. It would seem that classical and neo-classical economics are dead.

In fact, the Fundamental Theorem of Welfare Economics is alive and well. True, there are industries with special problems of market power, asymmetric information, natural-monopoly structures, and so forth. But for the most part,

[17] This is, in essence, the point of Harberger's (1954) estimate of the social cost from monopoly: If the distortion is small, then the welfare loss is of second order.

the assumption of price-taking behavior is a fairly good first-order approximation. And the Fundamental Theorem is then the best guide to public policy: create a level-playing field and let the market do the rest.

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