Price-price deviations are highly persistent

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Abstract

The present paper explores the persistence of the deviations between market prices on one side and either production or direct prices on the other - namely their tendency to vanish after being hit by a shock. We consider various countries - Austria, Denmark, Italy, Norway, Japan and the US - across different time periods, econometric approaches and methods of computing direct and production prices. Results can change depending on these methods, but even the weakest results would point to price-price deviations taking 5 years to shrink by one half after a shock. The strongest results, instead, show no tendency of price-price deviations to disappear.

Keywords: market prices; direct prices; production prices; deviations; persistence; dynamic panel data methods.

JEL Codes: B51; C23

1. Introduction

Quantitative Marxism has been recently animated by a debate surrounding the correlation and the deviations between sectoral values (or direct prices) and market prices.

This debate has theoretical roots, which have been the subject of a certain number of publications by now (Kliman and McGlone, 1988, 1999; Freeman and Carchedi, 1996, Kliman, 2004; Veneziani, 2004; Mohun, 2004). In essence it is possible to say that scholars in the field tried to understand whether the transformation problem in Marxist economics has any empirical and theoretical grounding. On the one hand if market prices are very close to values, then the transformation problem can be thought to be just an intellectual curiosity and theoretical models of capitalism can be built on the basis of this closeness (Wright, 2005). On the other hand, if market prices are very close to production prices (that is prices charged under the hypothesis of uniform profit rates), it will be possible to infer that there does not exist any barrier to capital mobility (Tsoulfidis and Tsaliki, 2005; Duménil, G. and D. Lévy, 1993).

Hereafter, we focus on empirical issues. One stream of literature attempted to estimate the magnitude of the deviations between sectoral market prices and either production prices or values (see for instance Ochoa, 1984; Tsoulfidis, 2008; Tsoulfidis and Maniatis, 2002; Tsoulfidis and Rieu, 2006). In general these deviations were not found to be too large, being of the order of 10-30%.

One further stream of literature regressed sectoral prices, measured by gross output, on a constant and sectoral money values. Support was found for the hypotheses that the constant is equal to zero, the regression coefficient is equal to one and the R^2 of the model is around 0.95 (Shaikh, 1984; Petrovic, 1987; Cockshott and Cottrell, 1997a, 1997b; Tsoulfidis and Maniatis, 2002).

According to more recent contributions (Kliman, 2002, 2008, Diaz and Osuna, 2005-6, 2007, 2008), this first wave of literature underplayed the role of quantity in gross output and money values. This would lead to either spurious correlation or indeterminacy of the estimates. In the latter case, measures of the dispersion of market prices with respect to either production or direct prices are affected as well, though they can be used for time series analysis (Diaz and Osuna, 2009).

The above works mainly focused on statistical issues, however Kliman (2004) offered an economic intuition for his specific procedure to take into account the role of sectoral quantities and evidence is there produced rejecting the closeness of market and direct prices.

Tsoulfidis and Paitaridis (2009), instead, contended that results obtained from input-output data are not affected by the critique by Diaz and Osuna (2007, 2009), given that the measurement units of output quantities are not important per se. What is important is that they do not change over the period of observation. Tsoulfidis and Paitaridis (2009) also tried to select the most appropriate computation approach on the basis of the empirical consistency with the principle of average profit rate equalization. In other words, price-value deviations do not turn out to be proportional to the value composition of capital. Though, this test is a first step towards an interesting research direction, it does not apply to Kliman (2002) computation approach and it was carried out only for one country (Canada).

Vaona (2014) took a different approach to the issue by exploiting not only cross-sectional but also time variation in market and direct prices. By making use of panel integration and cointegration techniques and computing values as in Kliman (2004), he found hardly any support for the view that market and direct prices are connected. The approach by Vaona (2014) cannot be applied to input-output data, as these only allow computing price-price deviations and not market, production and direct prices themselves.

The present paper approaches the issues above from yet a different point of view. We want to answer to the question whether market prices have any tendency to fluctuate around either production or direct prices. In other words, we want to understand if shocks to their deviations tend to either quickly die away or to persist over time.

It is possible to give a graphical illustration of our research question. In the relevant literature, authors make sometimes reference to a picture where it is possible to see a random oscillation of market prices around either production or direct prices (Tsoulfidis, 2008) - similar to the one occurring between the dashed and the continuous lines in Figure 1. However, are we sure that the dotted and the continuous lines in Figure 1 do not provide a better description of reality? In this case, production (direct) prices would be a centre of gravity for market prices, but the latter can stay far from the former ones for a considerable time. In case the deviations between the two kinds of prices had a unit root, instead, market prices would just wander around without any connection with either production or direct prices. In order to achieve our goal, we import to the literature on price deviations methods and measures used, for instance, to analyse inflation persistence (Altissimo et al. 2006).

Robalo Marques (2004) offered a review of the four most used measures of persistence. Consider an autoregressive model for a given variable, the sum of the autoregressive coefficients (that we denote with ρ) is one of such measures. Two further measures are the cumulative impulse response function (CIRF), defined as $\frac{1}{1-\rho}$, and the largest root of the autoregressive model (which, however, ignores the information contained in other roots). Finally, a popular measure is the "half-life", which, for an AR1 model with no constant, is equal to $-\frac{ln2}{ln\rho}$. Given that the largest root provides only partial information about the persistence of the variable under study, we ignore it. Being the other measures all connected, we start with the sum of the autoregressive coefficients and we will move to the CIRF and the half-life only if necessary.

The rest of this paper is structured as follows. The next section illustrates our data, definitions and methods. Then we move to our results and the last section concludes, discussing research and policy implications.

2. Data, variable definitions and methods

2.1 Data description and computation methods

We consider three ways of computing our magnitudes of interest and we have different data sources.

First we deal with the approach by Kliman (2002, 2004). In this case our data source is the STAN OECD database[1] and we consider the following variables: consumption of fixed capital (CFCC), intermediate inputs in current prices (INTI), gross output in current prices (PROD), value added in current prices (VALU), the number of employees (EMPE), the number of self-employed (SELF), and labour costs (LABR).

We consider a number of countries and time periods: Austria from 1976 to 2009, Denmark from 1970 to 2007, Italy from 1980 to 2008 and Norway from 1970 to 2007. The precise list of sectors and the level of aggregation varies from country to country depending on data availability. More details are given in Appendix A, available - as all the other Appendices to the present work - from the author upon request. After Diaz and Osuna (2005-6), among others, we restrict our attention to the private sector, though, in keeping with the literature, we do not distinguish between productive and unproductive activities (see for instance Tsoulfidis, 2008; Tsoulfidis and Paitaridis, 2009). This distinction remains problematic in the literature also because national statistical agencies do not consider it and shared conventions have not developed so far (for surveys see Vaona, 2011a, 249; Mohun, 2006)[2]. Our aggregate price measure is PROD. The steps taken to compute money values after Kliman (2004) are summarized in Table 1.

Table 2 shows how to compute money values and production prices after Diaz and Osuna (2005-6). In this case, we consider only data for Denmark and Italy for availability reasons. The Diaz and Osuna (2005-6) approach also requires data on the gross operating surplus and mixed income (GOPS), the gross capital stock and on total hours worked. Data on the first variable are available

[1] http://stats.oecd.org/Index.aspx?DatasetCode=STAN08BIS&lang=en

[2] For instance - just to remark how problematic is the issue - Mohun (2006) considers Finance as an unproductive sector. However, wealth management is, for instance, a commodity service produced for profit under a hierarchical structure, which would make it a productive activity.

from the STAN OECD database, on the second variable from national statistical offices[3] and on the third one from the Groeningen Growth Development Center database (www.ggdc.net).

Note that the calculation of the monetary expression of labor time (MELT) is iterative. As illustrated in Tsoulfidis and Paitaridis (2009), the procedure was initialized setting the first year MELT equal to the sum of sectoral values added over the sum of sectoral working hours. We drop the first five years to minimize the dependence of our data from the first observation. As a consequence we consider the years from 1985 to 2007 for Italy and from 1975 to 2007 for Denmark. NOPS and GOPS were corrected for the presence of the self-employed following, among others, Vaona (2011a). The approach by Diaz and Osuna (2005-6) makes also it possible to compute the percentage deviations of market prices from production prices. Note that in this computation approach, the MELT used to compute non-labor costs measured in work hours is evaluated at the prices of the previous year. In presence of a trend in inflation, this might induce a bias in the data. In order to verify whether this might affect our results, we inflated MELT- by using annual inflation rates, computed from the deflator of aggregate production (PRDP in the STAN OECD database). Results are available in Appendix B.

Our last approach is computing market price-value and market price-production price deviations using input-output tables instead of national accounts data. We consider two countries. First, we focus on Japanese data already available in Tsoulfidis (2008, Table 3) for the years 1970, 1975, 1980, 1985 and 1990. Next, we analyze US data produced by Ochoa (1984, 127-128, 144-145), which were the basis of the results achieved in Ochoa (1989). These data cover the period from 1947 to 1972, however they are irregularly spaced, as only the years 1947, 1958, 1961, 1963, 1967, 1968, 1969, 1970 and 1972 are available. This will require special care when estimating deviations persistence - as illustrated below. It is worth recalling that Ochoa (1984) was a seminal contribution, quoted by most of the subsequent literature of reference.

[3] For Italy: http://www3.istat.it/salastampa/comunicati/non_calendario/20100701_00/. For Denmark: www.statbank.dk.

One further note is that when analyzing data computed à la Kliman (2004), we consider relative price-value deviations and the numeraire sectors were Agriculture, hunting, forestry and fishing for Austria; Agriculture, hunting and related service activities for Denmark and Norway; and Agriculture, hunting and forestry for Italy. In other cases, we consider absolute deviations, in the sense that we do not make any reference to a numeraire sector (and not in the sense that we take absolute values of deviations). We consider both possibilities because relative price-value deviations were discussed in the literature (see Diaz and Osuna, 2007, p. 392, for instance). However, we also perform our tests considering absolute deviations for data à la Kliman in Appendix C.

2.2 Issues surrounding the natural logarithmic transformation

Finally, when using data from national accounts we compute deviations in log form, namely we compute the difference between the natural logarithms of either relative or absolute money values and the natural logarithms of either relative or absolute market prices. We proceed in a similar way for production prices. We do so for several reasons. Wooldridge (2012, 216) summarized many pros and cons regarding variables in logs in econometrics. We start from the former ones. Coefficients can be interpreted as elasticities, which do not require knowing the unit of measurement of involved variables. The assumptions of linearity, homoskedasticity and normality are more likely to hold. The (natural) logarithmic transformation tends to reduce variability and the impact of outliers, unless transformed variables are very close to zero. On the other hand, the log transformation cannot be used for either negative or nil magnitudes. In these cases, adding 1 to these magnitudes can hamper the interpretation of the results. Finally, log deviations are a poor approximation to percentage deviations, when these are large.

Regarding the specific field of our research, it is worth recalling that many contributions (Shaikh, 1984; Cockshott and Cottrell, 1997a; Kliman, 2002; Diaz and Osuna 2005-6, 2007) tested the closeness of either direct or production prices, on one side, and market prices, on the other, by making use of the following model:

$$lnp_i = \delta + \gamma lnd_i + \varepsilon_i \quad (1)$$

where p_i is either the market or the production price of sector i, d_i is the direct price of sector i, δ and γ are coefficients to be estimated and ε_i a stochastic error. Prices can be considered either relatively to a numeraire sector or not. Imposing here $\delta=0$ and $\gamma=1$ - two assumptions in favor of the closeness of the two sets of prices under analysis - and bringing to the left hand side lnd_i, one obtains the log deviations of prices, whose persistence we want to investigate.

All in all, relying on natural log deviations seems advisable in our context both for general econometric reasons and for the specific features of previous studies in our research field. Moreover, it means carrying out econometric tests under favorable assumptions ($\delta=0$ and $\gamma=1$) to the closeness of different price sets, assumptions that have not found unequivocal empirical support in previous studies, as written in the Introduction. Nonetheless, in Appendix E we will make use percentage deviations as a further robustness check.

2.3 Econometric approaches

Our econometric methods change according to the characteristics of the datasets considered. When dealing with long time series of twenty years or more, we rely on panel unit root tests. Instead, in the case of short regularly spaced panels, like Japanese ones, we adopt the dynamic panel data estimators by Blundell and Bond (1998) and Roodman (2005) on one side and by Bruno (2005a, b) on the other. These tests and estimators can be found in standard econometric packages and they are described in Baltagi (2005), for instance.

Irregularly spaced panels, as the one in Ochoa (1984), need yet a different econometric approach. Building on McKenzie (2001), we are here interested in a panel data AR(1) model with individual effects and irregularly spaced observations. The former feature allows accounting for sector specific shocks that can inflate the error variance. The latter feature means that the variable of interest is observed over a time-span that goes from 1 to T, but only at specific times denoted by the index t_j for $j=1,2,...,\tau$, such that $1< t_1 < t_2<...< t_\tau <T$. We are also interested in investigating the

significance of an intercept, in order to check whether price-price deviations completely disappear as time passes. Therefore our model will be

$$y_{i,t} = \alpha + \beta y_{i,t-1} + u_{i,t} \tag{2}$$

$$u_{i,t} = \mu_i + v_{i,t} \tag{3}$$

where $y_{i,t}$ is the price-price deviation in sector i at time t, α and β are coefficients to be estimated, $u_{i,t}$ is a stochastic error with two components, μ_i and $v_{i,t}$. After McKenzie (2001), we will exploit the idea to divide data into "cohorts" or subgroups and we will average them over these sub-groups in order to obtain a consistent estimator, while treating individual unobserved heterogeneity.

Therefore our estimate will be based on the following transformation of (2)-(3):

$$\bar{y}_{g,t_j} = \beta^{t_j-t_{j-1}}\bar{y}_{g,t_{j-1}} + \sum_{h=0}^{t_j-t_{j-1}-1} \beta^h \alpha + \sum_{h=0}^{t_j-t_{j-1}-1} \beta^h \bar{u}_{g,t_{j-h}} \tag{4}$$

where only observed time periods are considered, barred variables are averages taken over subgroups indexed by g ($\bar{y}_{g,t_j} = \frac{1}{n_g}\sum_{i=0}^{n_g} y_{i,t_j}$) and $\bar{u}_{g,t_j}$ converges in probability to zero due to the theorem of the consistency of the sample mean (Greene, 2003, 899). α and β can be estimated by non-linear least squares.

Note that McKenzie (2001) assumed that μ_i~i.i.d.$(0,\sigma^2_\mu)$ and $v_{i,t}$~i.i.d.$(0,\sigma^2_v)$, as independent and identical distributions are enough to exploit central limit theorems. However, he devoted more attention to pseudo-panels than to genuine panel data. In particular, it was not suggested there a way to estimate the variance-covariance matrix of α and β for the latter case. When dealing, instead, with pseudo-panels, the variance-covariance matrix of estimated parameters was obtained by exploiting the fact that individuals composing cohorts vary over different periods of observations (McKenzie, 2001, 107). Therefore, we will resort to numerical methods in order to compute standard errors, namely both jackknife and bootstrapping. This implies that the variance of $u_{i,t}$ and, therefore, the confidence intervals of the parameters will be approximated numerically without making specific assumptions on them. The advantage of this procedure is that our confidence intervals will be robust to a number of possible departures from standard assumptions such as the existence of sector specific effects, heteroscedasticity or non-normality.

3. Results

In order to illustrate our results we start with some descriptive evidence on some sectors. As in part already noted by Ochoa (1984, 148), market price deviations from either values or production prices might not tend to gravitate around zero. On the contrary, it is possible to find sectors for which there appear clear trends. In other words, it would seem that shocks might not have a tendency to die away and, instead, they tend to be incorporated in the analysed time series. As showed by Figures 2 to 6, this pattern would not seem to be specific to a given country or computing approach. However, at the same time it cannot be considered to represent the behaviour of all the sectors in all the countries as in some sectors percentage deviations might just fluctuate around zero and in some other they can have a declining trend. Appendix D gives a graphical representation of price-price deviations in all the sectors of all the countries considered using different computation approaches. Descriptive evidence on the US dataset is available in Ochoa (1984, 270-87).

We now turn to panel unit root testing (Tables 3 to 6 and 8 to 11). A clear general pattern emerges: for many of the sectors market price deviations from either values or production prices are non-stationary. This means that shocks hitting them do not tend to vanish. This result is robust across countries, computation methods and using both relative and absolute price deviations, as also testified by Appendices B and C.

We also tried to control for the effect of possible common factors, by cross-sectional demeaning our time series as suggested by Im et al. (1995, 2003). Table 7 lists the sectors that one has to exclude from the sample in order to obtain the acceptance of the null of non-stationarity of all the remaining series. As it is possible to see, it is enough to exclude a few sectors and non-stationarity cannot be rejected[4].

In principle, it would be enough to have only one non-stationary series to produce disturbing evidence for market prices gravitating around either production prices or values. However, this phenomenon appears to be much more pervasive[5].

For price-price deviations taken from Tsoulfidis (2008) we adopt a two-step Blundell and Bond (1998) estimator with finite sample Windemejir (2005) correction. We start with an AR(1) model and we initially insert time dummies and a constant, which are subsequently drop because insignificant. As instruments, we use, for equations in differences, all the lags in the deviations in levels starting from the second one; for equations in levels, instead, we use the first difference of the first lag of the deviations[6]. In order to keep instruments at a minimum they are collapsed. The coefficient of the first lag of price-value deviations is equal to 0.51, with a p-value of 0.00. Specification tests support the model, given that the Arellano-Bond test for second order serial correlation has a p-value of 0.73, the Hansen test for over-identifying restriction a p-value of 0.14, and the difference-in-Hansen tests of exogeneity of instrument subsets a p-value of 0.45. After Bruno (2005a, 2005b) we also estimate a bias Corrected Least Squares Dummy Variable estimator (LSDVC), with bootstrapped standard errors and a bias correction of order O(1/1322). It is initialized with the Blundell and Bond (1998) estimator and it returns a coefficient of 0.44 with a p-value of 0.00.

We repeat the same exercises for market prices-production prices deviations. We follow a similar procedure to that described above, also regarding the choice of the instruments, and an AR(1) model without a constant and time dummies turns out to best suit our data. The coefficient of the first lag of market price-production price deviations is equal to 0.49, with a p-value of 0.00.

[4] We also tried with the procedure suggested by Pesaran (2007) and Lewandowski (2006), which consists in adding lags of the cross-sectional mean to the autoregressive model underlying unit root tests. Results are set out in Appendix E and their implications are not substantially different from those of the results discussed in the main body of the text.

[5] We cannot consider CIRF and the half-life as they are not defined with $\rho=1$.

[6] In brief, this is the STATA command we use: xtabond2 dev L.dev, gmmstyle(L.dev, collapse) twostep robust noc.

Specification tests support the model, given that the Arellano-Bond test for second order serial correlation has a p-value of 0.76, the Hansen test for over-identifying restrictions a p-value of 0.24, and the difference-in-Hansen tests of exogeneity of instrument subsets a p-value of 0.55. The LSDVC returns a coefficient of 0.5 with a p-value of 0.00.

When analysing US data, we divide them into four groups: primary and construction activities, durable manufacturing activities, non-durable manufacturing activities and tertiary activities as detailed in Appendix A. Next, in order to estimate (4), we build a full rank matrix for our regressors as in McKenzie (2001), so the vector of our dependent variable, the matrix of our explanatory variables and the vector of coefficients assume the following form

$$\begin{bmatrix} \bar{y}_{g,11} \\ \bar{y}_{g,14} \\ \bar{y}_{g,16} \\ \bar{y}_{g,20} \\ \bar{y}_{g,21} \\ \bar{y}_{g,22} \\ \bar{y}_{g,23} \\ \bar{y}_{g,25} \end{bmatrix} = \begin{bmatrix} \bar{y}_{g,1} & 0 & 0 & 0 & 0 & 1 & 1 & 1 & 1 & 1 \\ 0 & \bar{y}_{g,11} & 0 & 0 & 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & \bar{y}_{g,14} & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & \bar{y}_{g,16} & 0 & 1 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & \bar{y}_{g,20} & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \bar{y}_{g,21} & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \bar{y}_{g,22} & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & \bar{y}_{g,23} & 0 & 0 & 1 & 1 & 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} \beta^{10} \\ \beta^3 \\ \beta^2 \\ \beta^4 \\ \beta \\ \alpha \\ \alpha\beta \\ \alpha\beta^2 \\ \alpha\beta^3 \\ \alpha\beta^4 \sum_{l=0}^{5} \beta^l \end{bmatrix} \tag{5}$$

We stack the vectors of the dependent variables and of the regressors, obtaining a dataset of 32 observations[7]. We run 1000 bootstrap replications, using the STATA bootstrap function. Regarding production-market prices deviations we obtain an estimate of α and β respectively of -0.006 and 0.89. Bootstrapped standard errors would lead to t-statistics respectively of -1.71 and 22.26 corresponding to a p-value of 0.09 for the constant and of 0.00 for the slope. The confidence interval for the slope is between 0.81 and 0.97, excluding the presence of a unit root. Resorting to the jackknife instead of the bootstrap would hardly change these results. The adjusted R^2 is equal to 0.82. Once dropping the constant, the estimate of the slope rises to 0.9 and it is still highly significant. The evidence regarding the presence of a unit root is inconclusive as the bootstrapped

[7] Note that the product of the matrix and vector on the right hand side of (5) is just the right hand side of (4) once applied to the specific case of the Ochoa (1984) data with its own unequally spacing in time.

confidence interval for β is between 0.79 and 1.01, but using the jackknife it is between 0.81 and 0.97.

When considering direct prices - market prices deviations, the slope is estimated to be 0.86 and the constant -0.007. However, the constant is now significant at the 1% level having both a bootstrap and a jackknife t-statistic of -3.04. Therefore, direct and production prices would not seem to cross in the long-run. The adjusted R^2 is equal to 0.87. Both the bootstrap and the jackknife confidence interval for β are between 0.80 and 0.92.

Compared to those of panel unit root tests relying on national accounts data, results based on input-output matrices are more in favour of the long-run either convergence or gravitation[8] of market prices and production prices, but less so for market prices and values. For the US, it was possible to reject the null hypothesis that the constant of the AR(1) model was equal to zero for market-direct price deviations, but not for those between market and production prices. For Japan, the constant was estimated to be -0.00008 with a p-value of 0.995 for production prices - market prices deviations and of -0.006 with a p-value 0.63 for market prices-values deviations. The fact that it was not possible to understand whether either direct or production prices are poles of attraction for market prices casts shadow on results for Japan. This weakness might be due to the short time dimension of the dataset.

Moreover the coefficient of the lagged dependent variable was most of the time significantly smaller than one. However, even taking its lowest estimate of 0.44 and taking into account that it refers to 5 years intervals, it will take more than 25 years for shocks to die away. To make a comparison, such a persistence, roughly equal to that implied by a half-life of 5 years, is an upper bound of the persistence found in purchasing power parity tests, and it is seldom regarded as low (Rogoff, 1996).

An interesting future research direction might be to compute datasets from input-output tables for longer time-spans. This would make it possible to run heterogeneous unit root tests for this kind of

[8] For the distinction between these two concepts see, for instance, Vaona (2011b).

data too, which is particularly important because it is enough that one series do not converge to generally invalidate the closeness of either direct and market prices or production and market prices.

4. Conclusions

This contribution has showed that deviations between market and either direct or production prices are not short lived. The least we can say is that shocks hitting them take at least 5 years to shrink by one half. However, we have also found abundant evidence that they just do not vanish.

Of course it would be possible to argue that this result descends from poor quality of the data on capital stocks, as done for instance by Ochoa (1984) about his own analysis. This possibility could even be more likely for national accounts data, given the problems they involve in estimating capital stocks. On this point see for instance Australian Bureau of Statistics (1998) and Jaffey (1997)[9]. However, the robustness of our estimates across different computation methods and countries might weaken this argument.

Our results do not tend to support the view that prices and values are close, but they do not tend either to support the view that a uniform profit rate is a realistic assumption, which is in accordance with the evidence produced by the literature reviewed in Vaona (2012). This notwithstanding, the debate surrounding the transformation problem has not been useless as argued by, for instance, Farjoun and Machover (1983). It has taught us that surplus value does not stick where it is extracted. The exchange of goods and services in the circulation sphere can redistribute it from one sector to another. Once accepting this, tracing the flows of value among different economic sectors is an indispensable step for whoever does not want to fall in commodity fetishism.

What is the way ahead? To say the least, market prices tend most of the time to stay far from either production prices or values, which should lead us to embrace theories that dispense with the assumption of their closeness.

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[9] The author thanks Anwar Shaikh for pointing to him these two papers.

One possibility is of course the temporal single system interpretation of Marx (Kliman and McGlone, 1988, 1999; Freeman and Carchedi, 1996). One further option would be modelling marginal magnitudes instead of average ones, such as direct and production prices. According to this view, the regulating conditions that govern price dynamics are not average ones, but those prevailing in the firms where capital accumulation either accelerate or decelerate (Shaikh, 1982; Botwinik, 1993, 151-155; Shaikh, 1997; Tsoulfidis and Tsaliki, 2005; Shaikh, 2008).

In addition, when considering the deviations of market prices from production prices, it is just too tempting to think that they originate from different degrees of competitiveness at the industry level. This would lead to revive past attempts to conjugate the concept of production prices and market power (Semmler, 1984, pp. 147-151; Reati, 1986). Moreover, following for instance Duménil and Lévy (1993, p. 155), one could focus on modelling limitations to capital mobility, as market and production prices stay persistently apart.

Finally, not downplaying the importance of the deviations between market prices and either direct and production prices, can be a first step to draw important policy implications. Take the case of Italy, for instance. In 2007 the market price of the Financial Intermediation sector was 12% higher than the production price and 28% than the direct price. On the contrary, in the greater majority of manufacturing sectors, production prices and direct prices were higher than market prices. The median deviation was in the first case of about 4.5% and, in the second, of about 8%. If, after Kaldor (1966) and Thirlwall (1983), we support the view that manufacturing activities are an engine for growth, we will advise policy makers to reverse this pattern.

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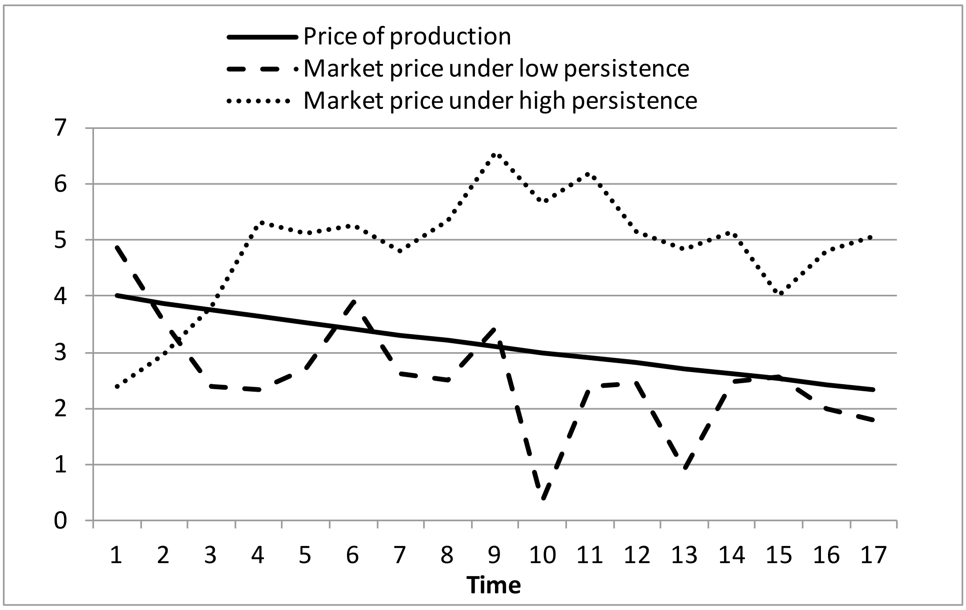
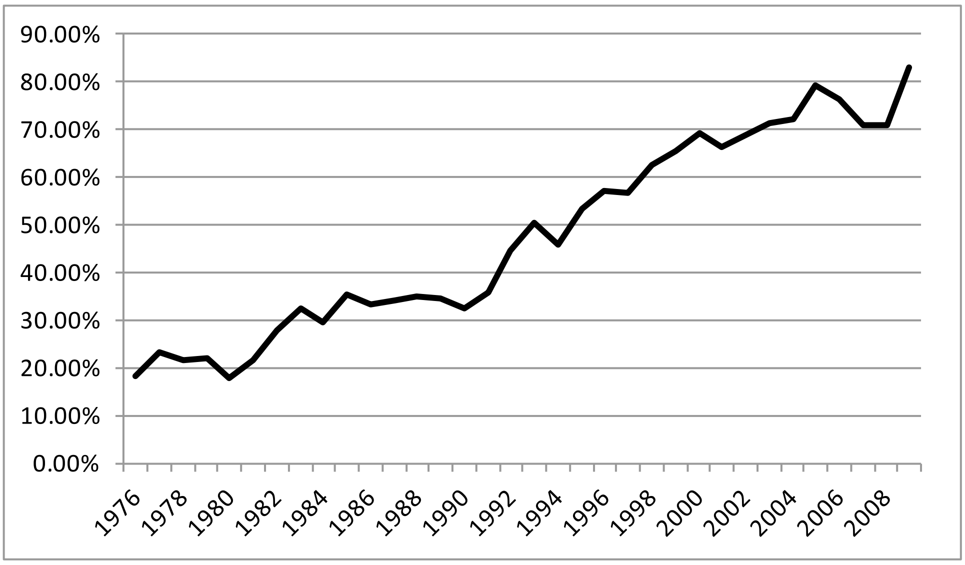
Figures

Figure 1 - Simulated prices of production and market prices.

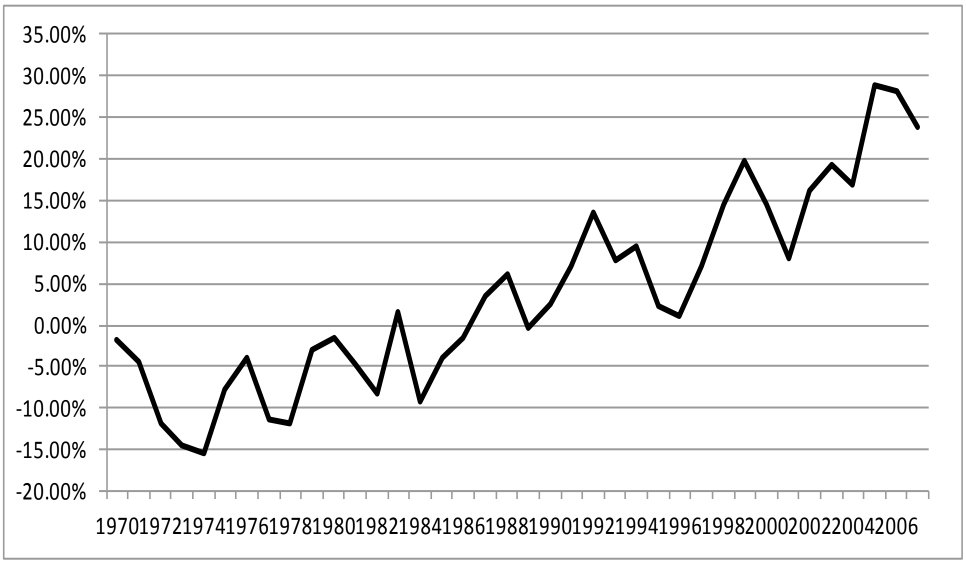


Notes. The price of production was simulated as $p^*_t=8-\sqrt{t}$ where t is a time trend, the market price under low persistence as $p_t=p^*_t+0.2(p_{t-1}-p^*_{t-1})+\varepsilon_t$ where ε_t is a white noise shock and the market price under high persistence as $p_t=p^*_t+0.99(p_{t-1}-p^*_{t-1})+\varepsilon_t$. The equations for market prices are recursive. We initially started with the deviation between production and market prices set equal to a white noise shock and then we applied the equations above. We drop the first 15 simulated observations.

Figure 2 - Relative value-price deviations for selected sectors and countries (%)



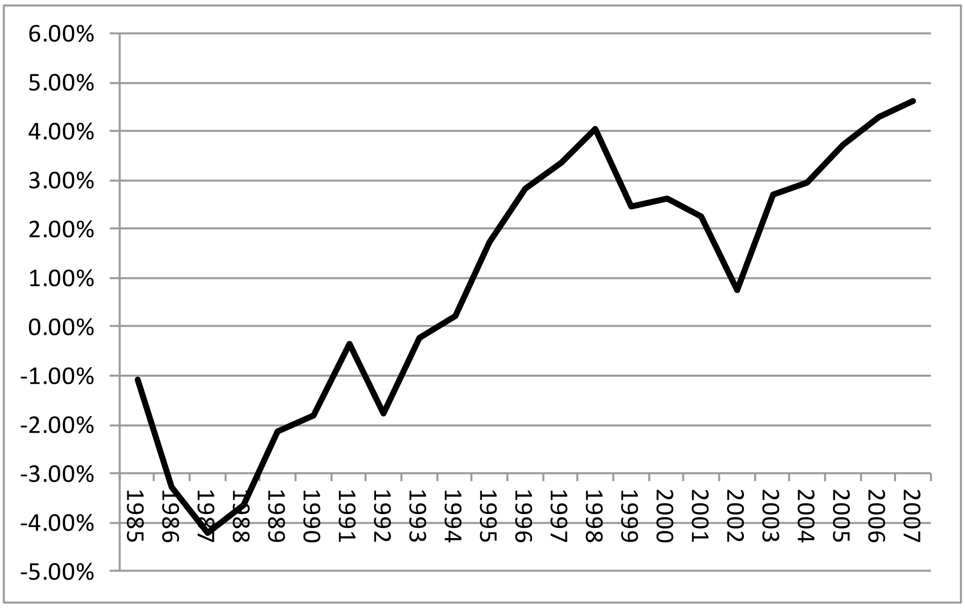
Austria - Food products and beverages



Denmark - Chemicals and chemical products

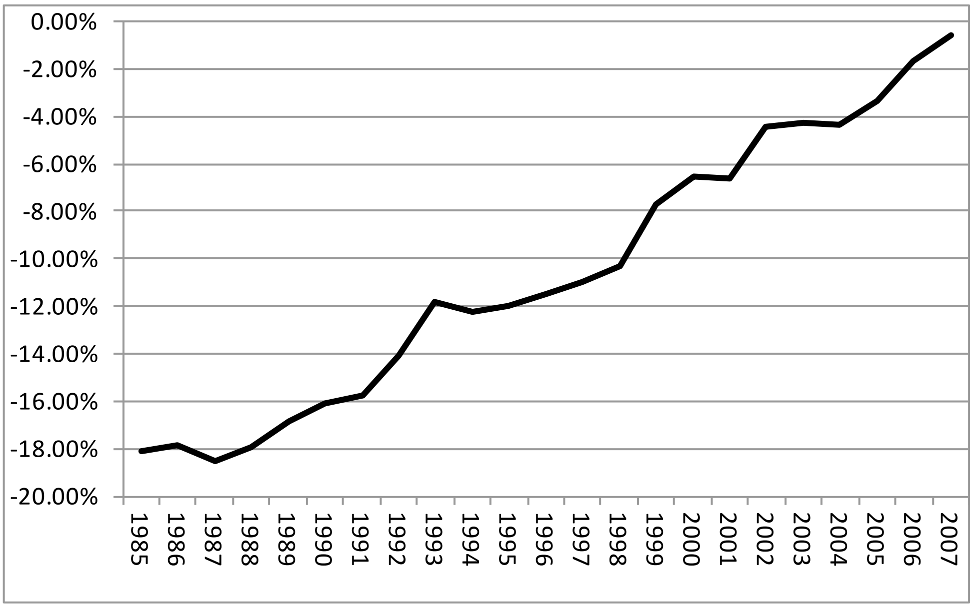
Note: data computed following Kliman (2004). Percentage deviations were computed as the log of relative sectoral money values (MV) less the log of relative sectoral market prices (PROD) times 100. For Denmark the numeraire sector was "Agriculture, hunting and related service activities", while for Austria it was "Agriculture, hunting, forestry and fishing".

Figure 3 - Percentage deviations of production prices from market prices in Italy in the industry "Other non metallic mineral products", 1985-2007



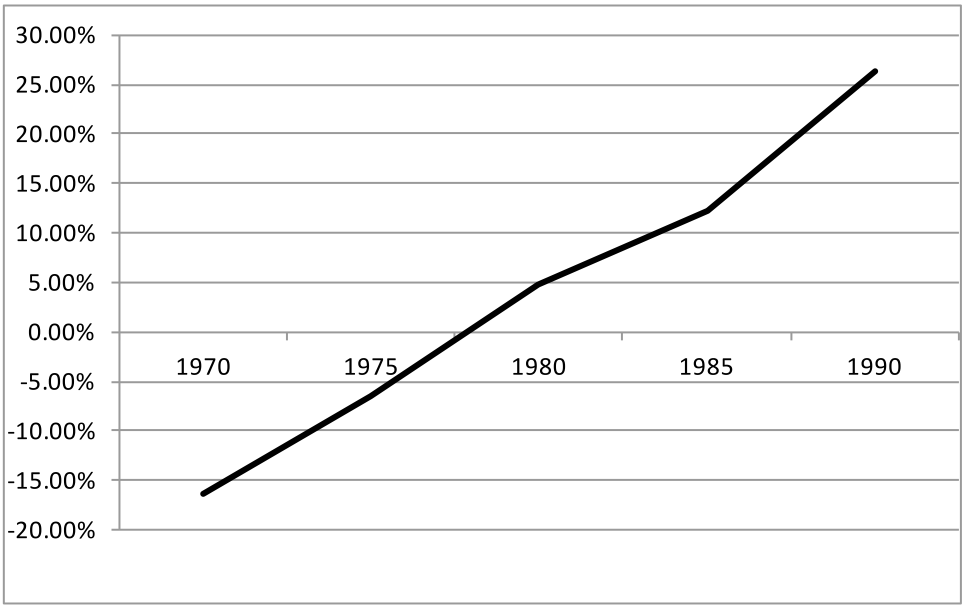
Note: data computed following Diaz and Osuna (2005-2006). Percentage deviations were computed as the log of total production valued at direct prices minus the log of total production valued at market prices times 100.

Figure 4 - Percentage deviations of direct prices from market prices in Italy in the industry "Wholesale and retail trade - repairs", 1985-2007



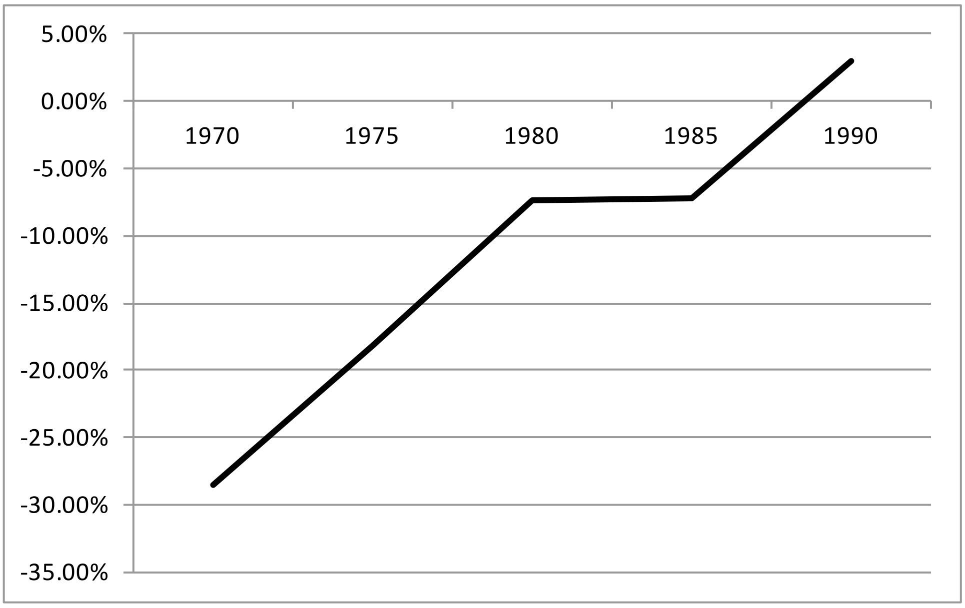
Note: data computed following Diaz and Osuna (2005-2006). Percentage deviations were computed as the log of total production valued at direct prices minus the log of total production valued at market prices times 100.

Figure 5 - Percentage deviations of production prices from market prices in Japan in the motor vehicles sector, 1970-1990



Note: author's elaboration on data from Tsoulfidis (2008). In order to compute percentage deviations we considered the figures in Table 3 of Tsoulfidis (2008) and we subtracted from them 1 in accordance with note 7 in the bespoken paper. Then we multiplied the result by 100.

Figure 6 - Percentage deviations of direct prices from market prices in Japan in the Finance and Insurance industry, 1970-1990



Note: author's elaboration on data from Tsoulfidis (2008). In order to compute percentage deviations we considered the figures in Table 3 of Tsoulfidis (2008) and we subtracted from them 1 in accordance with note 7 in the bespoken paper. Then we multiplied the result by 100.

Tables

Table 1 - Computing sectoral money values after Kliman (2004)

Variable notation	Variable name
1	Labour costs (LABR)
2	Self-employed people (SELF)
3	Employees (EMPE)
4 = 1+1*(2/3)	Corrected Labour costs (LABR')
5	Value added in current prices (VALU)
6	Consumption of fixed capital (CFCC)
7=Σ(5-6-4)	Aggregate surplus value (S)
8=7/ Σ(4)	Uniform rate of surplus value (RSV)
9=8*4	Sectoral surplus value
10	Intermediate inputs in current prices (INTI)
11=9+4+10+6	Sectoral money values (MV)

Table 2 - Calculation procedure for the variables from national accounts categories after Diaz and Osuna (2005-2006)

Variable notation	Variable name
1	Net stock of fixed capital
2	Consumption of fixed capital (CFCC)
3 = 1 + 2	Gross stock of fixed capital
4	Intermediate inputs (INTI)
5 = 2 + 4	Nonlabor costs
6	Labor costs (LABR')
7 = 5 + 6	Total costs
8	Net profit (NOPS')
9 = 8 + 2	Gross profit (GOPS')
10 = 8 + 6	Net final income
11 = 9 + 6	Gross final income
12 = 11 + 4	Total production valued at market prices
13 = 8/(7 + 1)	Rate of profit
14 = Σ8/Σ(7 + 1)	Uniform rate of profit
15 = 7 + 14 * (7 + 1)	Total production valued at production prices
16 = 5/MELT–	Nonlabor costs measured in work hours
17	Thousands of work hours
18 = 16 + 17	Labor value of the total production
19 = Σ12/Σ18	MELT+
20 = 18 * 19	Total production valued at direct prices

Note: the calculation of the monetary expression of labor time (MELT) is iterative. MELT– is the previous year's MELT, and it is calculated with the data of the previous year using the same procedure applied to the calculation of MELT+ (the current year's MELT).
NOPS and GOPS were corrected for the presence of the self-employed. See Vaona (2011a).

Table 3 - Panel unit root tests for relative price - value deviations in Austria (1976-2009), data computed following Kliman (2004)

Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	3.75983	0.9999	45	1478
ADF - Fisher Chi-square	42.6018	1.0000	45	1478
PP - Fisher Chi-square	49.1747	0.9999	45	1485

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 4 - Panel unit root tests for relative price - value deviations in Italy (1980-2008), data computed following Kliman (2004)

Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 5
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	0.27001	0.6064	24	666
ADF - Fisher Chi-square	35.1452	0.9165	24	666
PP - Fisher Chi-square	31.7489	0.9659	24	672

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 5 - Panel unit root tests for relative price - value deviations in Denmark (1970-2007), data computed following Kliman (2004)

Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.31830	0.3751	35	1292
ADF - Fisher Chi-square	72.0672	0.4093	35	1292
PP - Fisher Chi-square	60.7570	0.7768	35	1295

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 6 - Panel unit root tests for relative deviations between market and production prices in Norway (1970-2007), data computed following Kliman (2004)

Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 7
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.06850	0.1426	39	1423
ADF - Fisher Chi-square	75.5375	0.5579	39	1423
PP - Fisher Chi-square	82.2600	0.3489	39	1443

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Note: results obtained after omitting Mining and quarrying of energy producing materials; Sale, maintenance and repair of motor vehicles and motorcycles - retail sale of automotive fuel; Computer and related activities.

Table 7 - List of sectors to be omitted to obtain non-stationarity at the 5% level after cross-section demeaning, by country

Austria	Denmark	Italy	Norway
• Leather, leather products and footwear. • Hotels and restaurants. • Insurance and pension funding, except compulsory social security. • Computer and related activities.	• Forestry, logging and related service activities. • Food products, beverages and tobacco. • Other non-metallic mineral products. • Machinery and equipment, n.e.c.. • Transport equipment. • Construction.	No sector	• Fishing, fish hatcheries, fish farms and related services. • Mining of metal ores. • Food products, beverages and tobacco. • Textiles. • Leather, leather products and footwear. • Pulp, paper and paper products. • Printing and publishing. • Chemical, rubber, plastics and fuel products. • Other non-metallic mineral products. • Basic metals. • Machinery and equipment, n.e.c. • Office, accounting and computing machinery. • Electrical machinery and apparatus, n.e.c. • Medical, precision and optical instruments. • Motor vehicles, trailers and semi-trailers. • Other transport equipment. • Wholesale, trade and commission excl. motor vehicles. • Water transport. • Air transport. • Financial intermediation. • Computer and related activities.

Note: data computed following Kliman (2004)

Table 8 - Panel unit root tests for natural log deviations between market and production prices in Denmark (1975-2007), data computed following Diaz and Osuna (2005-2006)

Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.37188	0.3550	15	477
ADF - Fisher Chi-square	32.7111	0.3352	15	477
PP - Fisher Chi-square	29.3985	0.4967	15	480

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Note: results obtained after omitting Basic metals and fabricated metals; Machinery n.e.c. and Transport equipment

Table 9 - Panel unit root tests for natural log deviations between market prices and values in Denmark (1975-2007), data computed following Diaz and Osuna (2005-2006)

Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.69032	0.2450	15	479
ADF - Fisher Chi-square	34.6568	0.2553	15	479
PP - Fisher Chi-square	34.4222	0.2643	15	480

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Note: results obtained after omitting Food, Transport, Construction.

Table 10 - Panel unit root tests for natural log deviations between market and production prices in Italy (1985-2007), data computed following Diaz and Osuna (2005-2006)

Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 3
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.88490	0.1881	25	542
ADF - Fisher Chi-square	61.3471	0.1305	25	542
PP - Fisher Chi-square	55.2752	0.2822	25	550

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 11 - Panel unit root tests for natural log deviations between market prices and values in Italy (1985-2007), data computed following Diaz and Osuna (2005-2006)

Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	0.35434	0.6385	19	411
ADF - Fisher Chi-square	39.9268	0.3845	19	411
PP - Fisher Chi-square	38.4174	0.4506	19	418

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Note: results obtained after omitting Food products, beverages and tobacco; Textiles and textile products; Pulp, paper, paper products, printing and publishing; Rubber and plastics products; Basic metals and fabricated metal products; Electricity, gas and water supply.