Resource Misallocation and TFP Gap Development in Austria*

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Distortions, such as size-dependent credit constraints, may lead to resource misallocation between firms which can dampen productivity growth. In our recent working paper (Sellner, Pintar and Ernst 2023) we use a novel dataset of balance sheets and income statements of Austrian firms to compute measures of capital and labor misallocation for manufacturing and services industries. We find no evidence of increasing overall misallocation for the period 2008-2018. However, moving to a lesser distorted benchmark such as the US economy may increase Austrian productivity levels by up to 50%, with the highest potential in services industries and mainly via reducing misallocation of capital. Further analysis emphasizes the role of financial frictions in the capital reallocation process. In particular, lower cash holdings present a higher impediment to investment for smaller and younger firms in manufacturing.

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Resource Misallocation and Productivity Growth

As many other countries, Austria experienced a pronounced slowdown in productivity growth[1] following the great recession (see Table 1). Furthermore, some studies found that Austrian productivity growth and the total factor productivity (TFP) contribution to output growth lagged behind its peer countries in the last decade (Peneder and Prettner, 2021; Commission, 2022). Recommendations of international institutions (OECD, 2021; Commission, 2022) addressed towards boosting productivity growth in Austria often relate to strict regulations in professional services, a weakly developed market for equity and venture capital financing and lagging behind in selected areas of the digital transformation. These shortcomings may hinder business dynamism, technology diffusion and distort the reallocation of production factors in Austria.

Table 1: Average yearly Total Factor Productivity growth in %

	1996-2007	2007-2011	2011-2019	1996-2019
Austria	1.13	-0.25	0.04	0.51
Germany	0.88	0.08	0.60	0.64
Netherlands	1.08	-0.32	0.00	0.46
Belgium	0.37	-0.82	0.13	0.08
Denmark	0.18	-0.58	1.00	0.33
Finland	2.23	-0.90	0.24	0.99
Sweden	1.52	-0.30	0.34	0.79
USA	1.29	0.74	0.37	0.87
Japan	0.50	-0.12	0.76	0.48

Sources: Sellner, Pintar and Ernst (2023), OECD Productivity Database.

Empirical studies found that the TFP gains from reducing resource misallocation can be substantial. For instance, moving towards a fully efficient resource allocation, TFP levels would have been raised by 57% in the Netherlands in 2017 (see Bun and de Winter, 2022) and 79% in Portugal in 2011 (see Dias et al., 2016). The main idea is that the reallocation of capital and labor between firms is hindered by distortions. Among others, distortions may be taxes or subsidies that affect heterogeneous firms of a common good differently (see Restuccia and Rogerson 2017). It can be shown that if firms with a higher productivity face higher distortions (which hinders their production factor accumulation), a reduction of these distortions will increase overall TFP (see Hsieh and Klenow 2009). Empirically, the effects of misallocation on productivity are either estimated by directly relating a measure of a distortion to allocation and TFP or indirectly via the dispersion in the marginal revenue products of capital (MRPK) and labor (MRPL) within a narrowly defined industry (see Restuccia and Rogerson 2013). The intuition behind the latter approach is, that optimal allocative efficiency is given when profit maximizing firms equate their marginal revenue products with their marginal costs. Assuming that firms producing a homogeneous good face the same marginal factor costs of labor and capital, their respective marginal revenue products should be equalized and dispersion of marginal products among those firms would be zero. Distortions then drive a wedge between marginal revenue products and costs, increasing misallocation and hence dispersion.

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[1] The economic literature states numerous reasons for the slowdown in productivity growth, such as the rise in market power (see for instance Loecker et al., 2020; Akcigit and Ates, 2021), slowing population growth (see Hopenhayn et al., 2022), declining research productivity (see Bloom et al., 2020), declining long-term interest rates (see Liu et al. 2022) and declining allocative efficiency (see Baqaee and Farhi, 2020).

Misallocation and TFP Gap Development in Austria

We quantified misallocation for Austria using the indirect approach of Hsieh and Klenow (2009) on a dataset covering balance sheet and income statements of firms over the period 2008-2018. As misallocation measure, we calculated the dispersion in marginal revenue products of capital (MRPK), labor (MRPL) and their weighted geometric average (TFPR) as a measure of overall misallocation at the most disaggregate industry level available by the data and aggregated them using value-added shares. Figure 1 shows the development of misallocation with all series indexed to zero in the base year. Misallocation of capital increased during the great recession but then declined to about 4 percent above its initial level in 2018. By contrast, misallocation in labor fell to around 8 percent below its 2008 level. Over the whole period, total misallocation (TFPR) did not increase. The results for Austria match those Gamberoni et al. (2016) and Gopinath et al., 2017 for Germany and Norway, but contrast the findings of an upward trending misallocation for several other countries like Belgium, France, Italy, Spain, Portugal and the Netherlands (Gamberoni et al. 2016, Gopinath et al. 2017, Bun and de Winter 2022).

**Figure 1: Misallocation development overall (TFPR), in capital (MRPK) and labor (MRPL)**
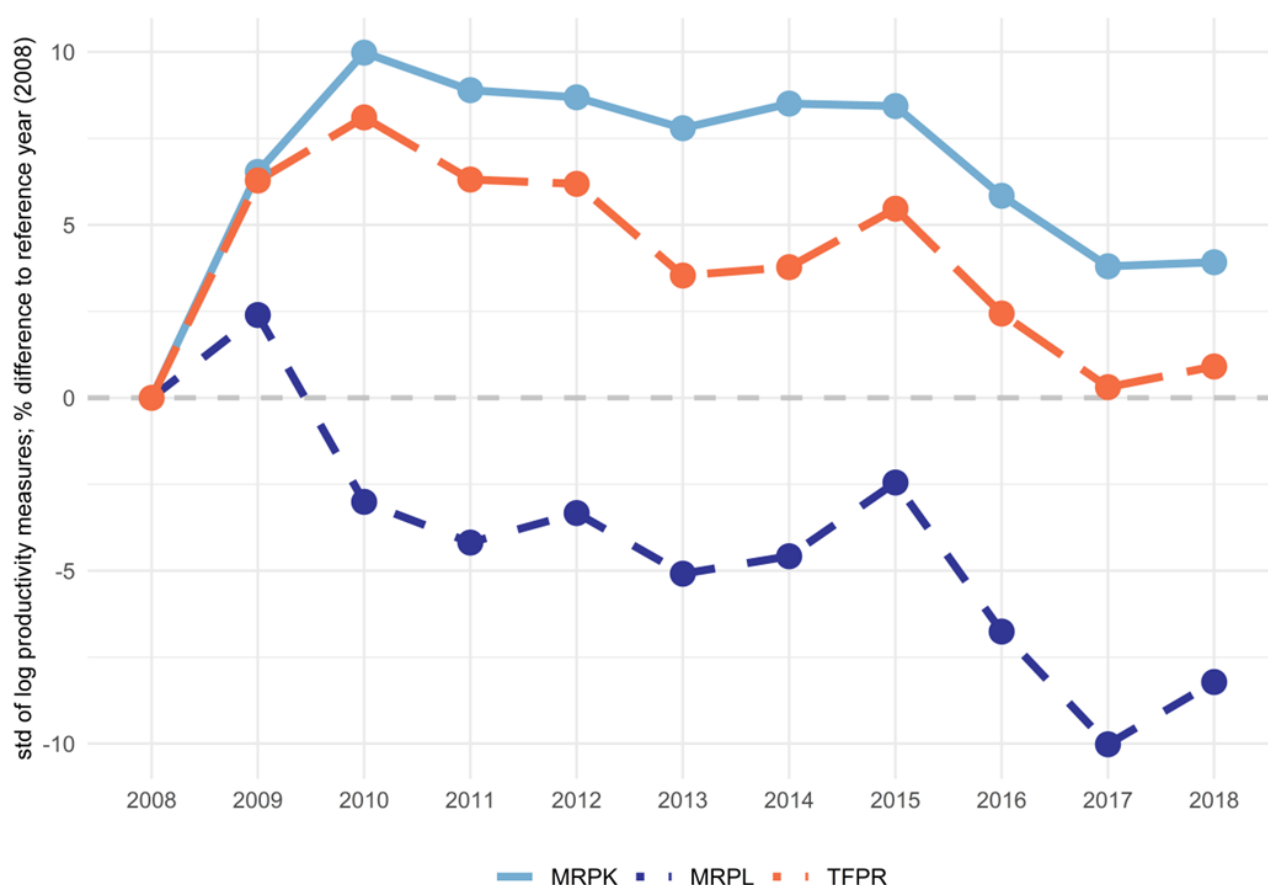
Source: Sellner, Pintar and Ernst (2023).

Additional computations (see Sellner, Pintar and Ernst 2023 for details) indicate that misallocation is significantly higher in services compared with manufacturing. Dias et al. (2016) and Bun and de Winter (2022) found a similar pattern for Portugal and the Netherlands. The higher degree of misallocation in services may be driven by less competitive pressure, lower international trade-ability, higher location-dependence and a higher degree of regulation in services (see Duarte and Restuccia 2010). Moreover, misallocation might be overestimated in the service sector due to the less detailed industry classifications for services which leads to more firm heterogeneity regarding the services sold and production technology.

The potential TFP gains from moving towards an optimal allocation of resources is derived by setting each firms marginal revenue products to their respective industry average, which eliminates dispersion and misallocation. The results of this exercise are shown for the total economy (grey), manufacturing (blue) and services industries (orange) in Figure 2. Focusing on the average between 2008-2018, we see that total economy TFP could be increased by about 66%, with gains of over 100% for services and 50% for manufacturing industries. The estimates seem quite large but lie in the range observed in other studies. For the total economy, Bun and de Winter (2022) found gains of up to 57% for the Netherland and Dias et al. (2016) of up to 79% (92% for services, 54% for manufacturing) for Portugal.

Figure 2: Development of TFP gap for total economy and industry aggregates
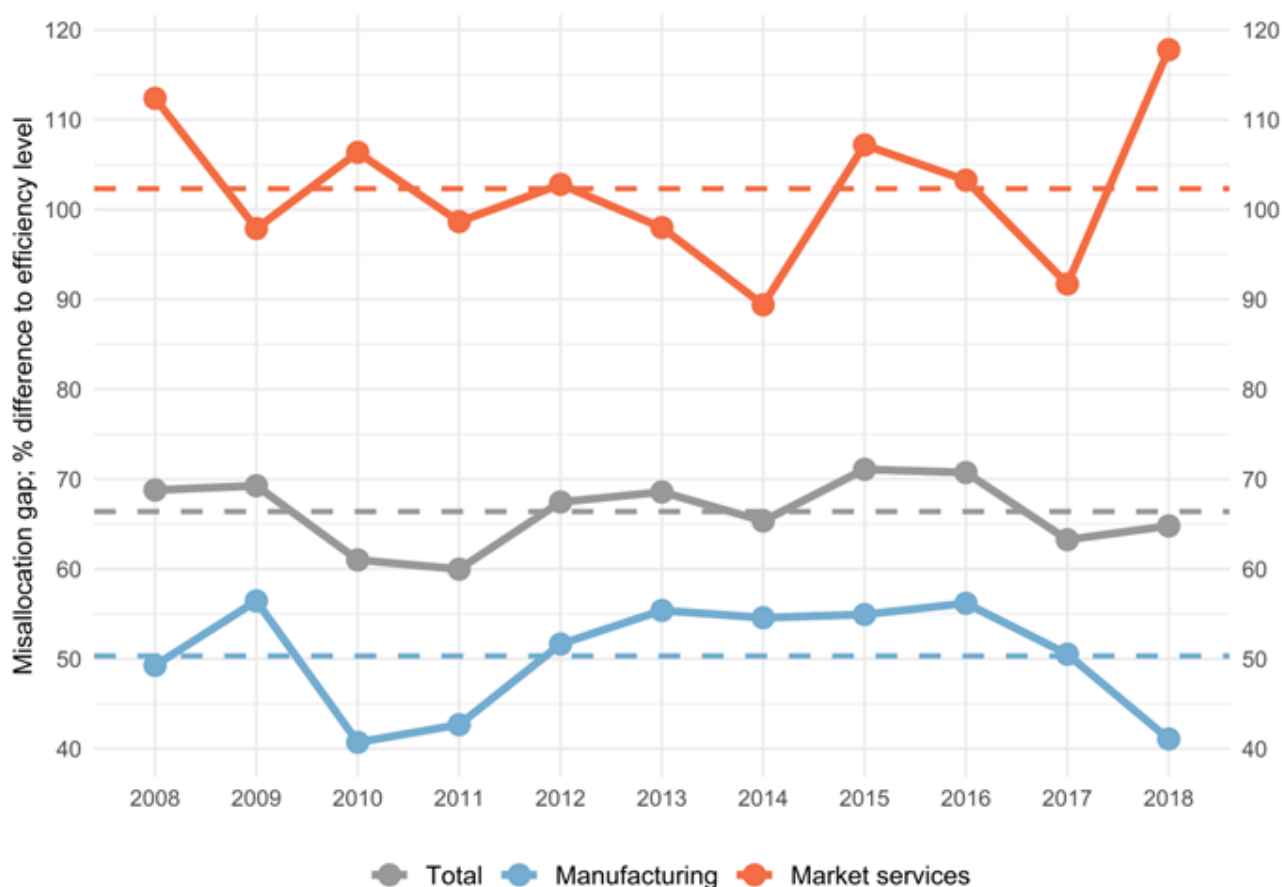
Source: Sellner, Pintar and Ernst (2023).

In a recent meta-analysis Bun et al. (2023) showed that studies using the indirect approach usually find much larger effects of misallocation on TFP than studies applying the direct approach, since several unobserved factors (capital adjustment costs, heterogeneity in mark-ups, measurement bias, etc.) unrelated to misallocation are captured in the dispersion measure. While we demonstrate in our paper that the role of heterogenous mark-ups seems to be limited, our estimates should be considered an upper bound. To further attenuate some of the bias, we can compare the efficiency gains from moving towards the less distorted US benchmark, using the TFP gap estimates for the US of David and Venkateswaran (2019). Given that the indirect US estimate captures factors unrelated to misallocation to a similar extend than our estimates, this should reduce the upward bias somewhat. This exercise results in potential TFP gains for the total economy of roughly 50% (down from the 66% reported above). Assuming a one per cent productivity growth per year (see Table 1), it would take about forty years to reach the same level of productivity that could be achieved by meeting the US efficiency level. However, when comparing only the manufacturing TFP potential from moving towards the US (using the admittedly somewhat dated estimates of 1997 from Hsieh and Klenow 2009), the gains shrink from around 50% to 5%.

The role of financial constraints in factor reallocation

In a final step (see Sellner, Pintar and Ernst 2023 for details), we analyzed the responsiveness of capital and labor accumulation with respect to their marginal productivities using regression analysis similar to Decker et al. (2020) and Bouche et al. (2021). The aim of this exercise was threefold: First, to test if the positive relationship between factor productivity and factor accumulation posited in theory holds in our dataset. Second, to test if this responsiveness changes over time (splitting the sample into three sub-samples). Third, if several measures indicating financial constraints (book debt to total assets, ratio of cash holdings to total assets, ratio of cashflow to total assets and interest paid to non-accruals debt over book debt) impact the allocation mechanism. Note that since we do not employ causal identification techniques, the results may simply reflect correlation rather than causation.

We find that higher marginal revenue productivities are associated with higher factor accumulation for both capital and labor. Yet, we find no evidence that the responsiveness of factor accumulation to factor productivity increased or decreased over time. Furthermore, all four financial constraints measures are significantly correlated with capital accumulation but not labor accumulation. Finally, we found that the positive correlation between capital accumulation and cash holdings is strongest for young, small firms in manufacturing. Sufficient liquidity and equity thus seem to be relevant for improving business dynamism. In a recent survey, interviewed stakeholders and experts mentioned difficulties of business start-ups in raising adequate financing in growth stages, tax discrimination between debt and equity, and a lack of financial knowledge as the three main impediments to raising equity capital (see Breyer et al. 2021). Common suggestions to strengthen equity levels included creating tax incentives, strengthening intermediation support for equity finance and building public-private partnerships.

Conclusion

Using a new dataset covering Austrian firms we computed a measure of production factor misallocation for the period 2008-2018. We do not find evidence that increasing misallocation contributed to the productivity slowdown in Austria. In line with the international literature we find that misallocation is much larger in services than manufacturing industries. According to our estimates, moving to the less distorted US benchmark economy could provide a substantial boost to Austrian total factor productivity, foremost in services industries. We also found a prominent role of liquidity for capital accumulation for smaller, younger firms in manufacturing. Our findings are in line with policy recommendations for Austria on reforming services regulation and undertaking measures to strengthen corporate equity levels. ■

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Richard Sellner is an economist at the Business Cycle Analysis Section of the Oesterreichische Nationalbank (OeNB), which he joined in early 2021. Between 2006 and 2021 he worked at the Institute for Advanced Studies in Vienna as a Senior Researcher in the macroeconomics and economic policy group. His research interests include Research, Development and Innovation Policy, Economic Policy Evaluation, International and Transport Economics, Forecasting and Econometric Model Development. He graduated from the Vienna University of Economics and Business (Master's and Doctoral degree in Economics).

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