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Upgrading business investment in Turkey

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ABSTRACT/RÉSUMÉ

Upgrading business investment in Turkey

Starting from a low level in early 2000s, Turkey's total capital stock has since expanded rapidly, but the composition and quality of investment raises questions. This study focuses on business investment, as the main driver of physical and knowledge-based capital formation and, hence, of potential output and the material foundations of well-being. Micro data allow to distinguish four types of firms: small businesses with a high rate of informality, medium-sized family firms, large formal corporations, and skilled start-ups. The relative importance of the challenges facing these different types of firms varies, notably with respect to skill shortcomings, regulatory burdens, labour costs, access to bank lending, over-leveraging and scarce equity capital. Improving the current business environment and overcoming the fragmentation of the business sector will be crucial to upgrade the quality of business investment and to enhance the allocative efficiency of capital formation. This calls for promoting formality, best management practices, the build-up of equity capital, access to long-term bank financing and other market-based financing that can complement traditional bank lending; and a faster and more inclusive transition to the digital economy.

This working paper relates to the *2018 OECD Economic Survey of Turkey* (http://www.oecd.org/eco/surveys/economic-survey-turkey.htm).

JEL Classification: D25, E2, F21, O16

Keywords: business investment, R&D, FDI, firm-level data, Turkey

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Améliorer l'investissement des entreprises en Turquie

Le stock total de capital de la Turquie a commencé à augmenter rapidement depuis le début des années 2000, mais la composition et la qualité des investissements soulèvent des questions. Cette étude porte sur l'investissement des entreprises, principal moteur de la formation de capital physique et du savoir, et donc de la production potentielle et des fondements matériels du bien-être. Les microdonnées permettent de distinguer quatre types d'entreprises: les petites entreprises aux taux élevés d'informalité, les entreprises familiales de taille moyenne, les grandes entreprises formelles et les nouvelles entreprises naissantes. L'importance relative des défis auxquels sont confrontés ces différents types d'entreprises varie, notamment en ce qui concerne les carences en compétences, les charges réglementaires, les coûts de main-d'œuvre, l'accès au crédit bancaire, le surendettement et les fonds propres rares. L'amélioration de l'environnement économique actuel et la réduction de la fragmentation du secteur des entreprises seront essentielles pour améliorer la qualité des investissements des entreprises et renforcer l'efficacité de la répartition du capital pour la formation de capital. Cela nécessite de promouvoir la formalité, de meilleures pratiques de gestion, la constitution de fonds propres, l'accès à un financement bancaire de long terme et à tout autre financement basé sur le marché pouvant compléter les prêts bancaires classiques; et une transition plus rapide et plus inclusive vers l'économie numérique.

Ce document de travail se rapporte à l'*Étude économique de l'OCDE de la Turquie 2018* (http://www.oecd.org/fr/eco/etudes/etude-economique-turquie.htm).

Classification JEL: D25, E2, F21, O16

Mots clefs: investissement des entreprises, R&D, IDE, données d'entreprise, Turquie

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Upgrading business investment in Turkey

By Seyit Mümin Cilasun, Rauf Gönenç, Mustafa Utku Özmen, Mehmed Zahid Samancıoğlu, Fatih Yilmaz and Volker Ziemann[1]

Introduction

Capital formation has contributed more to growth in Turkey over the longer term than in comparable catching-up countries (Çağlar and Koyuncu, 2018[1]). The extensive revisions to the national accounts in 2016 have made this trait even more evident. Recent analysis by the IMF also concluded that, since 2012, aggregate investment has exceeded its econometrically expected level (IMF, 2018[2]). However, overall the quality of capital formation has been falling short. In particular, the contributions of total factor productivity and information technology to economic growth remain below comparable countries (Çağlar and Koyuncu, 2018[1]).

The allocation of investment across and within the infrastructure, housing, manufacturing and service sectors reflects myriad demand, expected profitability, political, administrative, tax and firm-level factors and is far from optimal. Informal and semi-formal businesses have significantly lower regulatory and labour costs than formal firms and have a large weight in the economy, undermining the allocative efficiency of capital expenditures. The limited development of long-term credits and capital markets means that some investment opportunities are foregone for lack of retained earnings. Partly as a result of skill gaps, investment in knowledge-based and digitalisation lags. While such shortcomings are visible in other OECD economies, this study, following up on evidence presented in earlier OECD Economic Surveys of Turkey (OECD, 2014[3]; OECD, 2016[4]), shows that they are particularly acute in Turkey.

The paper examines the trends and drivers of business sector investment at the macroeconomic level, with a focus on investment in R&D and digitalisation, as well as on foreign direct investment – a vector of diffusion of global technical and managerial know-how. It then looks at the investment performance of four different types of firms and analyses their determinants and constraints. Drawing on OECD cross-country and country-specific research, it concludes with policy recommendations for consolidating the strong trend growth of investment while upgrading quality and allocative efficiency, with a view for Turkey to move up faster in global value chains (OECD, 2016[4]).

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1. Rauf Gönenç, Volker Ziemann and Mustafa Utku Özmen were respectively Head, Economist and Secondee (from the Central Bank of Turkey) in OECD Economics Department's Austria-Turkey Desk when this research was carried out. Seyit Mümin Cilasun, Mehmed Zahid Samancioğlu and Fatih Yilmaz are economists in the Central Bank of Turkey's Structural Economic Research Department. The authors are grateful to Turkish officials and members of the OECD Economic and Development Review Committee for valuable comments and inputs. Special thanks are due to Vincent Koen and Semih Tümen for precious advice, to Kurmaş Akdoğan and Dennis Dlugosch for technical contributions, to Béatrice Guerard for statistical and graphical inputs as well as to Mercedes Burgos and Sisse Nielsen for their editorial assistance (all from OECD's Economics Department). The document has benefited from numerous contributions from other OECD directorates, including the Directorate for Science, Technology and Industry (STI) and the Directorate for Financial and Enterprise Affairs (DAF), in particular from Mr. Serdar Çelik.

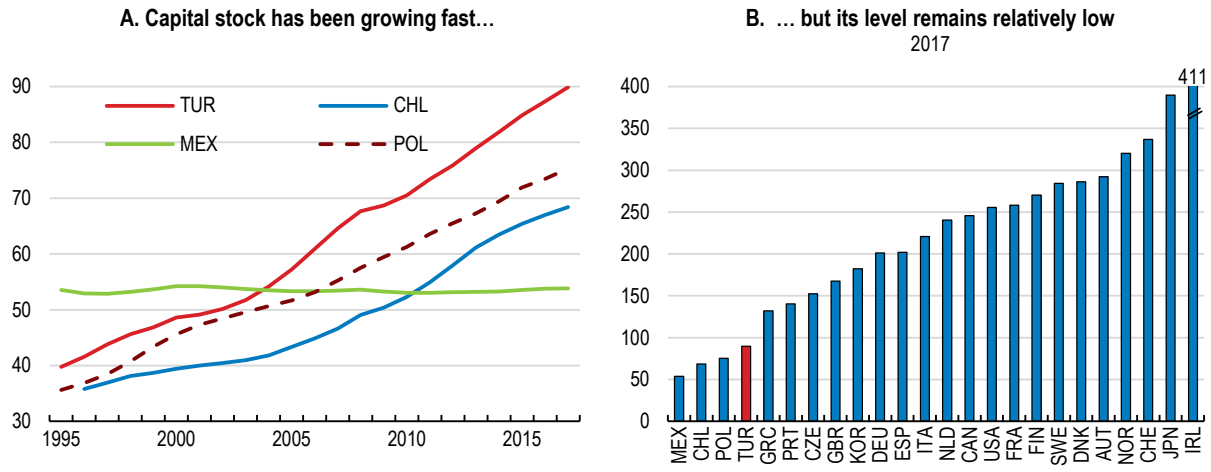
Turkey's capital stock is low but rising

Turkey's per worker capital stock has picked up strongly over the past two decades, outpacing comparable countries (Figure 1. Panel A) albeit from levels well below more advanced OECD countries (Panel B). The pick-up in investment has been a major driver of real GDP growth: on average, the increase in productive capital per worker has contributed 1.5 percentage points to annual potential growth since 2005, thereby accounting for nearly a third of total growth.

The capital stock grows through public investment, mainly in infrastructure, and business investment, mainly in land, buildings, machinery and transport equipment, intangibles but also in infrastructure via public-private partnerships. As a share of GDP, public investment has remained broadly stable at around 4% of GDP since the early 2000s. Business investment, in contrast, expanded strongly from 10% of GDP at the beginning of the century to 19% in 2006. It fell to around 13% during the global financial crisis with the ensuing meltdown in global trade and industrial production before peaking again at 19% by 2011. Business investment hovered between 17% and 18% of GDP between 2012 and 2016, declined in the aftermath of the failed coup attempt in summer 2016 but rebounded in the second half of 2017.

Figure 1. Productive capital stock per worker

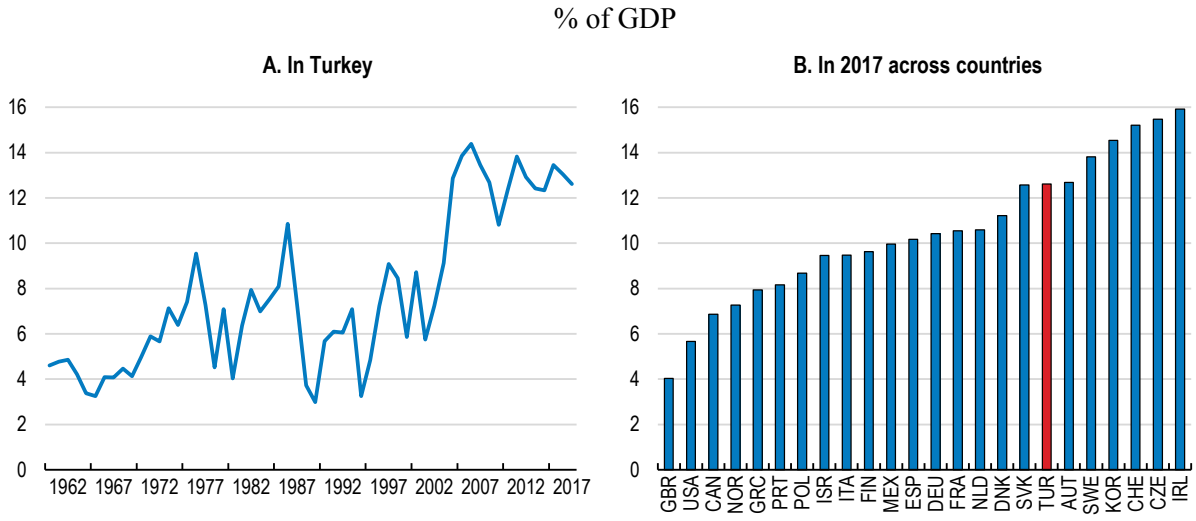
Constant prices, in thousand constant 2010 USD



Source: OECD Economic Outlook database.
StatLink https://doi.org/10.1787/888933799188

According to the national accounts, machinery and transport equipment investment accounts for more than 75% of business investment in Turkey. However, this aggregate also includes investment in defence and security systems. As a result, investment in machinery and transport equipment overstates non-construction business investment. All in all, machinery and transport equipment investment expanded strongly between 2001 and 2005, reaching a relatively high share of GDP compared to other countries (Figure 2). Since then, it has fluctuated around that level with increased volatility in the aftermath of the global financial crisis and the coup attempt in summer 2016.

Figure 2. Machinery and transport equipment investment



Source: OECD Economic Outlook database.
StatLink https://doi.org/10.1787/888933799207

In an attempt to assess the determinants of productive investment across countries, a dynamic investment equation is estimated. The baseline regression comprises several theoretical approaches to modelling investment (Annex A). Results for both total investment and machinery and transport equipment investment show that the coefficients of potential drivers of investment exhibit the expected sign and are significant (Table 1). The β-coefficients reflect the accelerator principle and are in principle adding up to 1. Persistence, measured by β_0, is slightly higher for total investment while machinery and transport equipment investment reacts more strongly to cyclical information such as expected GDP growth or stock market capitalisation, a proxy for expected marginal returns on capital.

The user cost of capital is only significant, and with the expected sign, for total investment but not for aggregate machinery and transport equipment investment. This could hint at a dominant role of internal resources to finance business capital expenditures while housing, and construction spending, are more prone to bank financing and respond therefore more strongly to interest rate movements. The finding may also be driven by the fact that the simplistic definition of user cost of capital (see Annex A) does not account for capital allowances that are predominantly targeted to capital expenditures on machinery investments. The wedge between the statutory and the average effective tax rate (capital costs after deduction of the net present value of capital allowances) is particularly high in Turkey for machinery investment (Figure 3).

Table 1. Drivers of investment at macroeconomic level

Dependent variable: investment over lagged capital stock

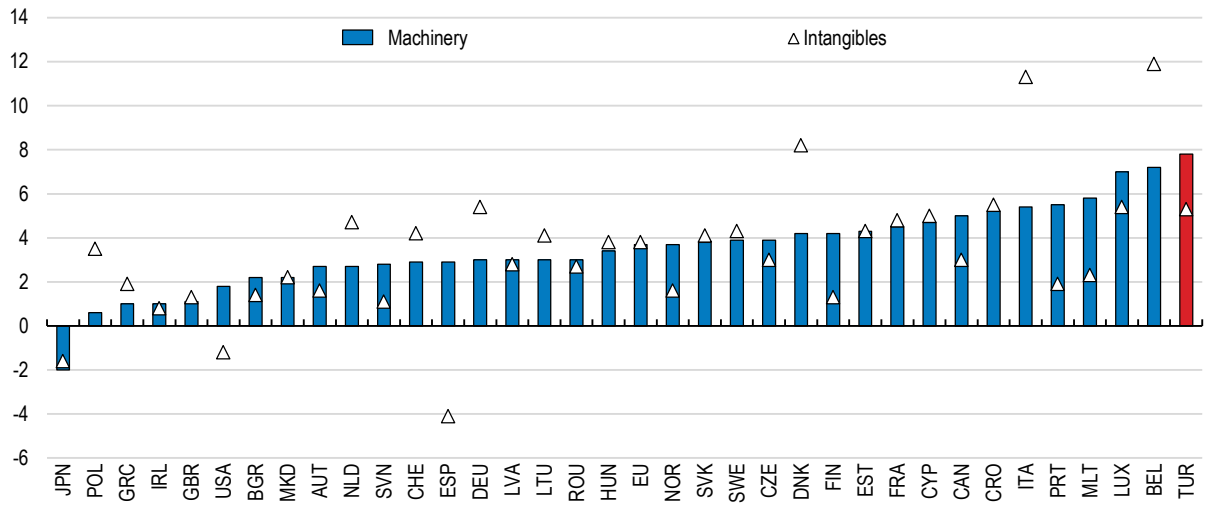
Explanatory variable	Parameter[1]	Total investment (1)	Total investment (2)	Machinery and equipment (3)	Machinery and equipment (4)
Lagged investment rate	β_0	0.6835***	0.7061***	0.6061***	0.6231***
Real GDP growth (forecast, current)	β_1	0.2535***	0.2291***	0.3901***	0.3849***
Real GDP growth	β_2	0.0325***	0.0117	0.0151	0.0153
Stock market capitalisation	γ	0.0043***	0.0050**	0.0102***	0.0091***
User cost of capital	σ	-0.0146***	-0.0095*	0.0086	0.0026
Capital-output ratio	α_1	-0.0153***	-0.0137***	-0.0106**	-0.0167***
Steady-state capital-output ratio	α_2	0.0012**		0.0003	
Current account balance			0.0180*		0.0754***
Credit-to-GDP			-0.0053***		0.0070*
Number of observations		431	426	342	340
Adjusted R^2 (incl. fixed effects)		0.963	0.9649	0.8953	0.9037
Adjusted R^2 (within)		0.8741	0.8806	0.7458	0.7656

***, ** and * correspond to statistical significance at 1%, 5% and 10% respectively.

1: Parameters from equation (4) in Annex A.
Note: Annual panel data covering 44 countries from 2000 to 2016 (machinery and equipment data only available for a subset of 28 countries). All explanatory variables are lagged by one period unless stated otherwise. Capital stocks are obtained through the perpetual inventory method
Source: OECD calculations based on OECD Economic Outlook database and IMF's World Bank's World Development Indicator database.

Figure 3. Gap between the statutory and the effective average tax rate on investment

Percentage points, 2015



Source: ZEW report commissioned by the EU (Spengel et al., 2015[5]).
StatLink https://doi.org/10.1787/888933799226

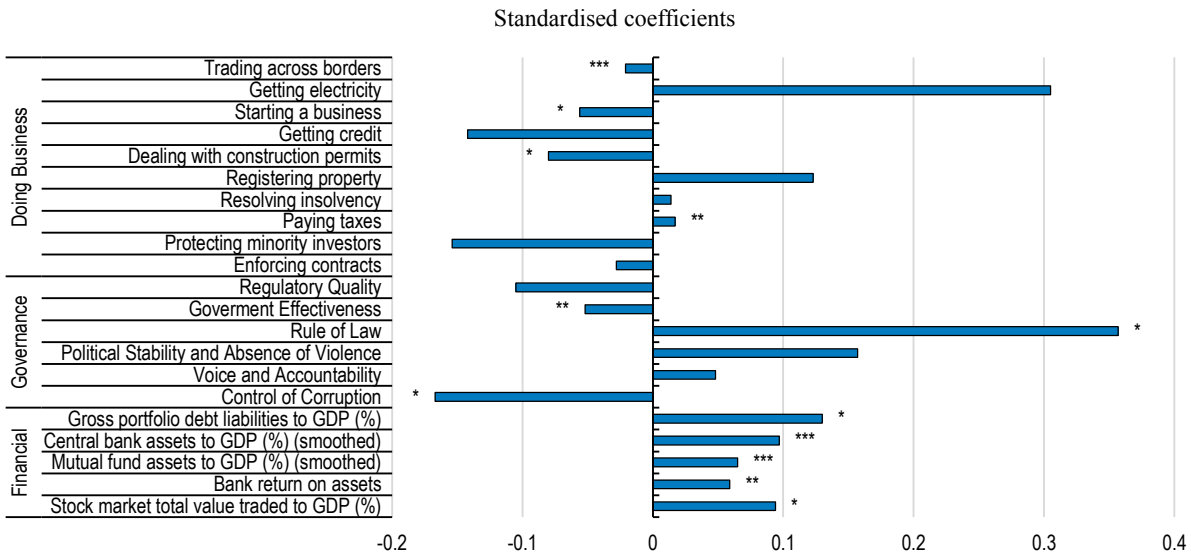
This may also partly explain why the share of corporate income taxes in overall tax revenues is relatively low in Turkey (6.5% in 2016). If the low share reflects allowances for growth-enhancing investments as much as tax evasion, this would constitute a rather positive aspect of Turkey's tax code as it would favour investment. Indeed, the corporate

income tax has repeatedly been identified as the form of taxation that is most detrimental to growth and in particular to investment (Johansson et al., 2008[6]; Brys et al., 2016[7]).

The estimation results confirm the underlying theory predicting a stable desired capital-output ratio as the negative coefficient α_1 reflects mean-reversion while coefficient α_2 captures the impact of changes to the long-run steady-state capital-output ratio induced by technological, demographic or exogenous saving shocks and is expected to be positive (see Annex A). In a variant, saving shocks are directly proxied through changes to credit-to-GDP ratios and current account balances. This model captures reasonably well the Turkish business sector's investment trends in machinery and equipment over the past decade. The high level of investment intensity has been mainly driven by buoyant demand (output growth) and Turkey displays one of the highest country fixed effects across the sample suggesting strong underlying capital formation dynamics.

Both the neoclassical theory and the q-theory of investment underlying the baseline specification used in the above regressions assume frictionless markets. In reality, however, financial, labour and product markets exhibit various degrees of market imperfection across countries and time. To shed light on the link between market imperfections and investment, structural indicators reflecting the business environment (the World Bank's Doing Business indicators), the quality of governance (the World Bank's Worldwide Governance indicators) and financial markets (from the World Bank's Global Financial developments database) are added one by one to the baseline specification. Figure 4 displays standardised coefficients and significance levels.

Figure 4. How the business environment relates to machinery-equipment investment



Note: Based on baseline specification (3) in Table 1. Structural indicators (1-year-lagged) are added one-by-one.
***, ** and * correspond to statistical significance at 1%, 5% and 10% respectively.
Source: Calculations based on OECD (2018), OECD Economic Outlook (database).
StatLink https://doi.org/10.1787/888933799245

The results suggest that the most relevant business environment indicators for firms' investment decisions are the ease of getting electricity and the ease of registering property. Both reflect administrative costs related to expanding properties and equipment. Despite a high number of required procedures, registering property has become easier in Turkey in

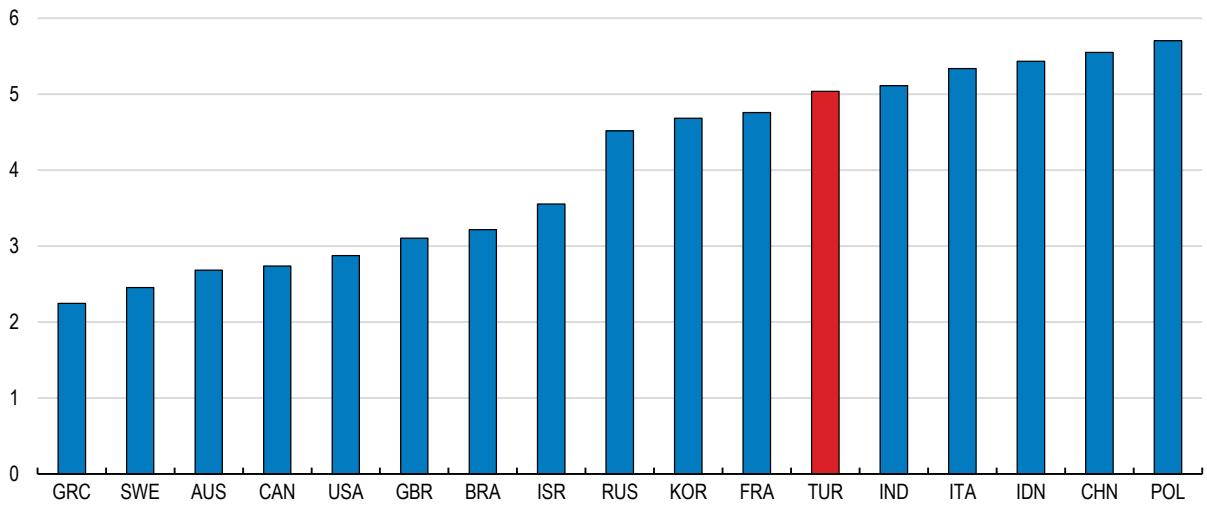
recent years as the cost of transferring property has been reduced. The Coordination Council for Improvement of the Investment Environment (YOIKK) put in force an omnibus bill (Law No.7099 of March 2018) to further ease procedures and reduce costs in all major doing business areas. This legislation has notably permitted the Directorate of Land Registry to carry on various transactions electronically and improve procedures for registering property.

The ease of getting electricity comprises the reliability of power supply and the transparency of tariffs which may serve as a proxy for operational uncertainty underlying investments. The procedures and costs of getting a permanent electricity connection in Turkey (proxied by electricity access conditions in Istanbul) are still lagging behind best international practices. In addition, interruptions and outage times are still an issue. Against this backdrop, the Energy Market Regulation Authority has started to monitor more closely service quality and supply security, and introduced new measures in 2017 in order to improve them. These measures may improve Turkey's ranking in the next vintage of international getting electricity indicators.

Other Doing Business indicators enter the equation with the opposite and unexpected sign (starting a business, getting credit, dealing with construction permits). The use of aggregate investment data might mask the importance of administrative and legal obstacles and the latter may even strengthen the incumbents' competitive position as they undermine competition which makes new investments less risky. The negative link between shareholder protection and investment intensity would be in line with theories suggesting that dominant shareholders overriding minority holders' interests may force managers into excessive risk taking (Burkart, Panunzi and Shleifer, 2003[8]).

Figure 5. Investment rates of listed firms

Median investment rates, 2016



Note: Investment rate is defined as capital expenditures as a share of total capital at the beginning of the year. The cleaning of the database notably prevents double-counting due to cross-listings and excludes mutual funds.
Source: Thomson/Reuters' Worldscope database. For coverage refer to Table 1.B. in Annex 1.B.
StatLink https://doi.org/10.1787/888933799264

The importance of a strong rule of law and a stable political environment for investment decisions corroborates firms' aversion to uncertainty and lack of transparency. Following the major economic crisis in 2001/02, Turkey implemented a wide range of reforms improving confidence in the country's institutions. However, several indicators point to a weakening in the credibility of institutions in more recent years (OECD, 2018[9]). Resuming the reform progress and re-establishing confidence in the quality of governance matters for maintaining a business climate supportive of investment. Furthermore, the empirical evidence presented in the lower panel of Figure 5 suggests that financial development and a healthy banking sector are conducive to higher investment intensity.

The evidence based on countries' national account data shown above has shed light on potential macroeconomic drivers of aggregate investment including aggregate demand conditions, expected return on investment, capital costs, institutional characteristics and financial development. The use of firm-level data allows for a more accurate and granular exploration of these links as it accounts for the heterogeneity of firms with respect to size, access to finance, balance sheets and income statements. Median investment rates of listed Turkish companies are sourced from Worldscope, a standard data set frequently used for firm-level analysis of investment, and confirm the high trend investment intensity of Turkish business (Figure 5).

A vast theoretical and empirical literature has studied the drivers of investment at firm level, focusing in particular on the impact of current and lagged output growth (the accelerator mechanism), the expected profits against the cost of investment (represented by Tobin's Q here defined as the ratio of the enterprise value over its total capital), and of the user cost of capital (see Annex B). Table 2 presents the results of a cross-country estimation of these hypotheses, using data of stock market-listed firms operating in the manufacturing sector from 18 countries (Worldscope database, see Annex Table 1.B.)

Table 2. Drivers of investment at firm level

Dependent variable: Investment rate defined as capital expenditures over total capital

	All firms	All firms	Small	High-tech	Zombies	Exporters	TUR
Investment/capital (lagged)	0.177***	0.122***	0.016	0.110***	-0.037**	0.112***	0.096***
Sales growth	0.041***	0.023***	0.024***	0.024**	0.014***	0.026***	0.084***
Sales growth (lagged)	0.011***	0.006**	0.006	0.005***	0.003	0.008***	-0.008
Sales/capital (lagged)	0.007***	0.005***	0.006***	0.005**	0.002	0.005***	0.006*
Interest rate	-0.023*	-0.022**	-0.021**	-0.013	-0.004	-0.017*	-0.037**
Tobins' Q	0.023***	0.021***	0.019***	0.019***	0.018***	0.021***	0.036***
New equity/capital		0.030***	0.029***	0.025***	0.021***	0.032***	0.027***
Cashflow/capital		0.023***	0.011*	0.013**	-0.010	0.021***	-0.022
Leverage		-0.086***	-0.067***	-0.051**	-0.033***	-0.092***	-0.158***
Leverage x cashflow		-0.013***	-0.016***	-0.011	-0.006	-0.015**	0.060
Number of observations	92596	55488	15149	20012	3096	33130	1116
Adjusted R^2 (incl. fixed effects)	0.42	0.47	0.36	0.47	0.32	0.49	0.40
Adjusted R^2 (within)	0.10	0.11	0.07	0.11	0.10	0.12	0.14

Note: All capital ratios based on total capital at the beginning of the period. Tobin's Q is the log of the ratio of the firm's value and total capital. The presented coefficients are based on linear regressions that include firm-, country-year as well as industry-year fixed effects. Small firms have less than USD 100 million of total assets. Zombie firms are characterised by three consecutive interest-coverage ratios below 1. Exporters are firms with a share of international sales of above 25%. Standard errors are clustered at the country and industry-year levels.
***, ** and * correspond to statistical significance at 1%, 5% and 10% respectively.

Source: OECD calculations based on Thomson/Reuters' Worldscope firm-level data.

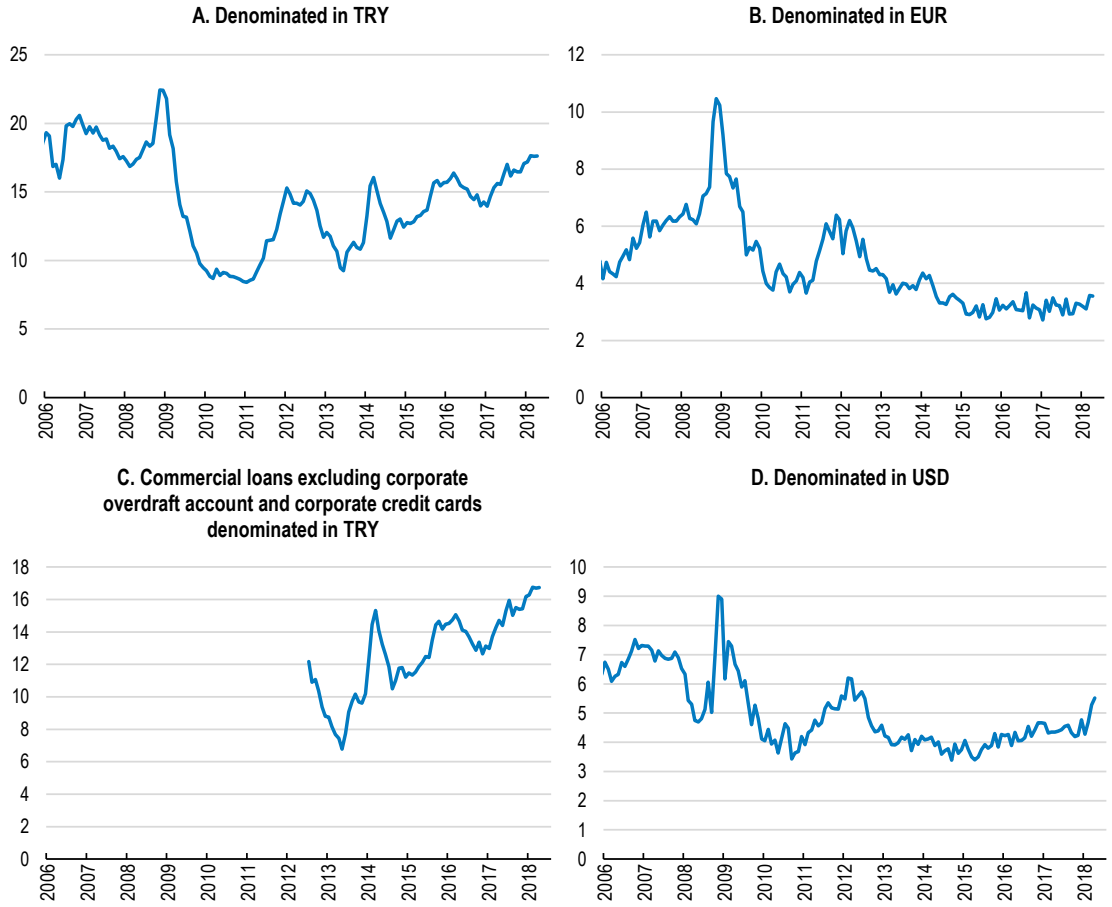
The results confirm the intuition that firm investment rates are far less persistent than aggregate investment rates. The accelerator mechanism, the q-theory and the impact of user costs of capital (here proxied by the firm's interest rate) are confirmed for the firm level, irrespective of the type of firm. The issuance of new stocks is positively associated with investment rates underlying the importance of equity capital for investment. In addition to the aforementioned drivers of investment, internal financing (cash-flow) remains a significant determinant of investment rates. Leverage, defined as debt over assets, is negatively associated with investment.

The results in Table 2 suggest that among listed firms leverage is particularly penalising in Turkey and, in addition, higher leverage is not associated with lower cash-flow sensitivity of investment. This suggests increasing difficulties in accessing external financing for investment project among over-leveraged firms in Turkey. Investment also tends to depend more strongly on current demand and expected marginal return on capital, proxied by Tobin's Q (firm valuation over capital). The results further underscore the importance of interest rate dynamics for Turkish firms' investment rates, as bank financing is more important than other market-based financing, including equity.

The high, and recently rising, level of nominal interest rates also acts as a drag on investment among listed Turkish companies. Nominal interest rates on TL-denominated loans are on the rise, reflecting both increasing country risk and rising inflation expectations (Figure 6). Interest rates on euro- and dollar-denominated loans remain stable but substantial exchange rate volatility and rapid depreciation of the Turkish Lira weigh on both hedging costs and effectively paid interests.

Figure 6. Interest rates are high and rising

Weighted average interest rates for banks' commercial loans denominated in different currencies, in %



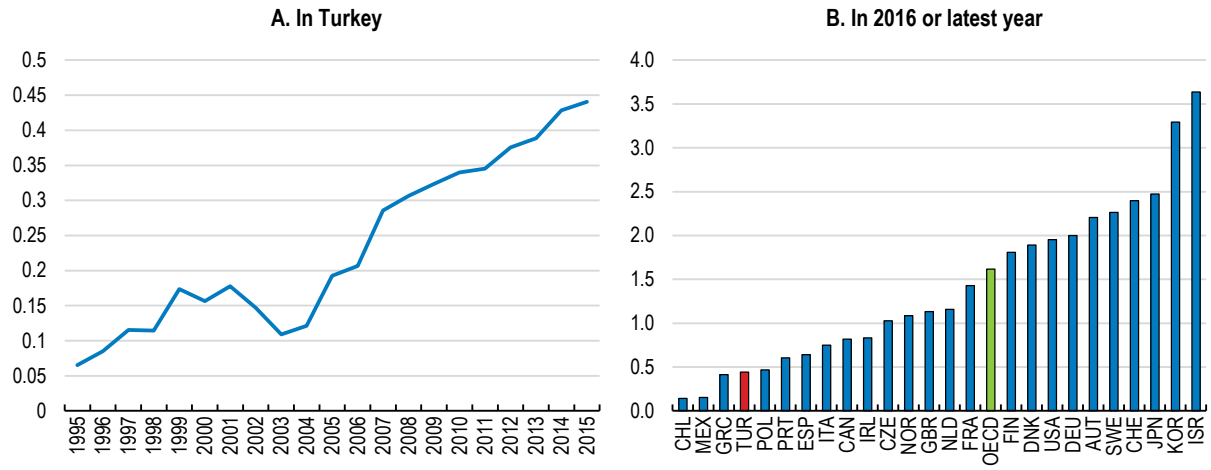
Source: Central Bank of the Republic of Turkey.
StatLink https://doi.org/10.1787/888933799283

R&D expenditures have increased but call for more supportive conditions

In contrast to overall business investment, Turkey's share of R&D expenditures in GDP is below the OECD average. However, the share has risen fourfold since 2005 (Figure 7, Panel A), to above the levels observed in other R&D lagging countries such as Chile, Mexico, Greece and Slovakia and now exhibits a level comparable to the ones observed in Poland (Panel B).

Figure 7. Business spending on R&D is low but rising

In percentage of GDP

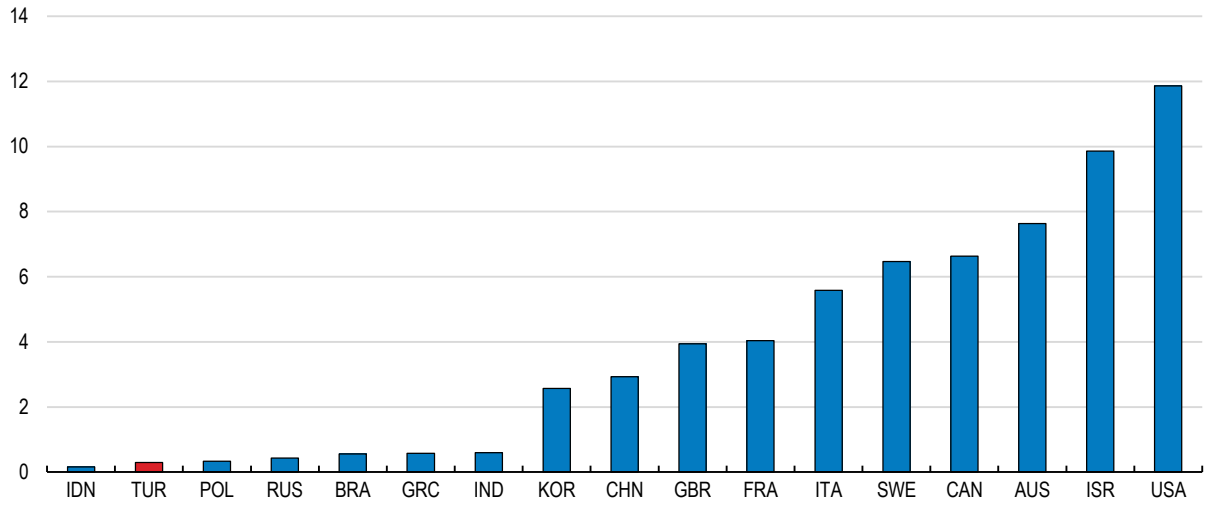


Source: OECD (2018), Main Science and Technology Indicators (database).
StatLink https://doi.org/10.1787/888933799302

Empirical evidence from listed companies (Worldscope) confirms the very low R&D intensity of Turkish firms (Figure 8). The gap between advanced and emerging countries seems to be higher among listed companies than on aggregate (Figure 7, Panel B) although this could also reflect composition effects related to R&D reporting practices that differ across industries. The following empirical analysis corrects for this potential bias by controlling for industry-fixed effects.

Figure 8. R&D investment rates of listed firms

Median R&D investment rates in %, 2016



Note: R&D investment rate is defined as annual R&D expenses over total capital at the beginning of the year.
Source: Thomson Reuters' Worldscope database.
StatLink https://doi.org/10.1787/888933799321

R&D expenditures may be difficult to finance with external sources for a number of reasons. First, returns on R&D are difficult to measure and highly uncertain in nature which makes it difficult for investors to estimate the net present value of R&D investments. Second, external financing, in particular in the form of external equity, could make the protection of intellectual property more difficult, reducing investment incentives. Third, there is typically a lack of collateral which restricts access to bank finance. As a result, in the presence of financial constraints, R&D expenditures are found to be more sensitive to cash-flow developments (Brown, Fazzari and Petersen, 2009[10]).

Empirical investigations based on listed companies in the Worldscope dataset confirm this hypothesis (Table 3), especially for small and financially strained firms. More generally, R&D spending is more stable over time and less dependent on current demand or interest rate dynamics. Similar to investment in fixed assets, equity issuance seems to be a very consistent determinant of R&D expenditures, and over-leveraged firms invest less in R&D. R&D expenses in Turkey do not seem to be affected by standard drivers of R&D investment such as profitability (cash flow) or expected returns on capital (Tobin's Q). Persistence of R&D investment rates is also much lower, indicating that R&D expenses are less stable and predictable than in most other countries. The result could, however, also be driven by a structural break as R&D in Turkey has expanded very rapidly in the most recent period. Based on a longer dataset comprising Turkish manufacturing firms from 1996 to 2013, there seems to be evidence for more persistence and a negative relationship between financing constraints and R&D investment (Gezici, Orhangazi and Yalçın, 2018[11]).

Table 3. R&D expenses

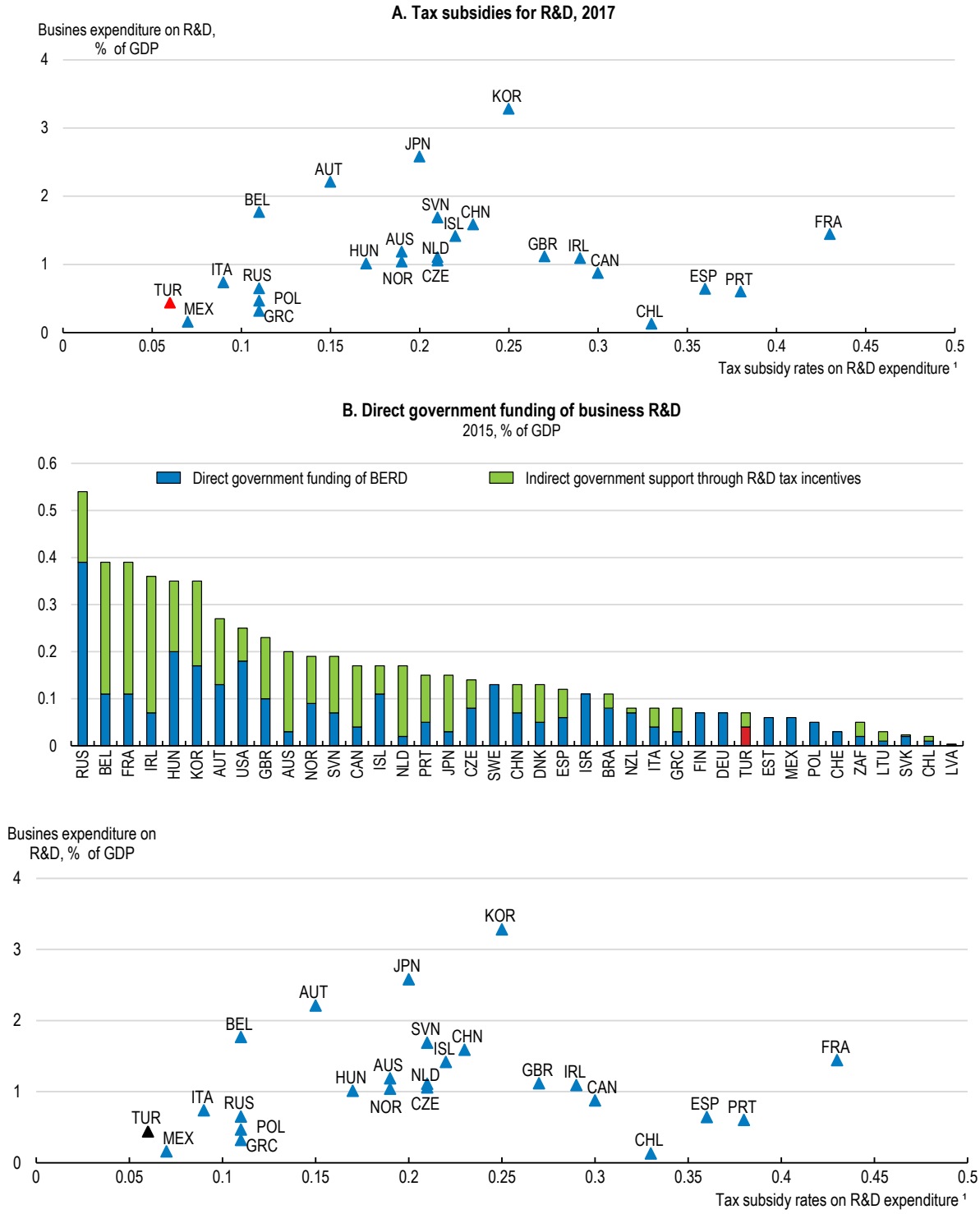
Dependent variable: R&D investment rate defined as R&D expenses over total assets

	All firms	All firms	Small	High-Tech	Zombies	Exporters	TUR
R&D expenses/assets (lagged)	0.2950***	0.3074***	0.2585***	0.2910***	0.1939***	0.2939***	0.1971***
Sales growth	0.0021	-0.0015	-0.0034	-0.0039	-0.0061	-0.0011	0.0011
Sales growth (lagged)	-0.0031	-0.0034	-0.0013	-0.0049	0.000	-0.0035	-0.0007
Sales/assets (lagged)	-0.0047	-0.0078*	-0.0157**	-0.0157	-0.0249**	-0.0056*	0.0006**
Interest rate	0.0009	-0.0018	-0.0050	-0.0026	-0.0085	-0.0045	-0.0001
Tobins' Q	0.0089*	0.0072*	0.0137**	0.0129*	0.0347***	0.0057*	0.0003
New equity/assets		0.0203***	0.0197**	0.0284***	0.0392***	0.0214***	0.0008
Cash flow/assets		0.0069**	0.0123**	0.01	0.0261***	0.0102	0.0007
Leverage		-0.0197***	-0.0248***	-0.0277***	-0.0522***	-0.0175***	-0.0005
Leverage x cash flow		0.0069	0.0030	0.0125	-0.0002	-0.0060	-0.0043
Number of observations	53259	52388	14508	19198	3138	31598	1066
Adjusted R^2 (incl. fixed effects)	0.83	0.84	0.81	0.81	0.75	0.84	0.77
Adjusted R^2 (within)	0.12	0.14	0.11	0.15	0.16	0.13	0.07

Note: All capital ratios based on total capital at the beginning of the period. Tobin's Q is the log of the ratio of the firm's value to total capital. The presented coefficients are based on linear regressions that include firm- as well as industry-year fixed effects. Zombie firms are characterised by three consecutive interest-coverage ratios below 1. Exporters are firms with a share of international sales of above 25%. Standard errors are clustered at the country and industry-year levels.
***, ** and * correspond to statistical significance at 1%, 5% and 10% respectively.
Source: OECD calculations based on Worldscope firm-level data.

Figure 9. Tax subsidies for R&D are low in Turkey

2017



1. Small, profitable firms (see http://www.oecd.org/sti/rd-tax-incentive-indicators.htm)
Source: OECD Science, Technology and Industry Scoreboard 2017.
StatLink https://doi.org/10.1787/888933799340

R&D tax subsidies have become the main tool for governments to boost R&D. Among OECD countries, their share in total government support for business R&D expenditures has risen from one third in 2006 to nearly half in 2015 (OECD, 2017[12]). Tax subsidies seem to be positively associated with business expenditures on R&D, at least up to a certain threshold of about 25% of R&D expenditures (Figure 9). In Turkey, tax credits and tax allowances are among the lowest in the OECD, as currently documented in OECD databases. One reason for that is that the allowance scheme is incremental, which reduces the average allowance over the investment horizon. Second, the relief on labour costs, the main component of R&D expenditures, is smaller than in many other countries due to a relatively low employer social security contribution rate at 17.5%, half of which is subsidised for R&D personnel. Furthermore, the tax code seems to discriminate against intangible investment (Figure 3 above). Additional progress with the quantification of tax incentives in accordance with OECD methodologies would improve their internationally comparable monitorability.

The government can also support business R&D expenditures by direct grants. The share of direct funding in overall government support for R&D is relatively high in Turkey. However, all in all and in international comparison, Turkey ranks relatively low in terms of total R&D support when measured as a share of GDP (Figure 1.9, Panel B).

Consolidating the digitalisation momentum

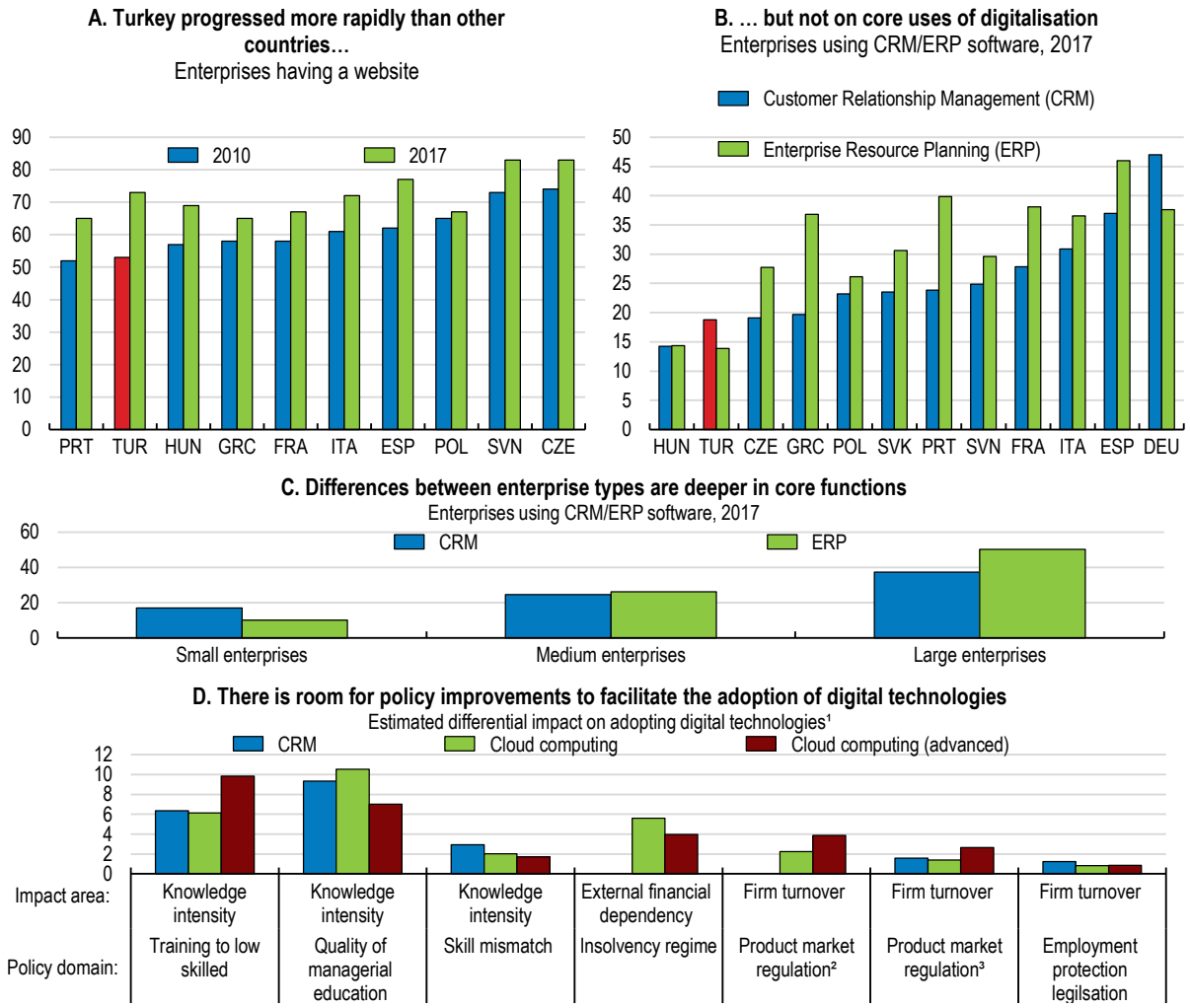
Turkish firms increasingly invest in digitalisation (i.e. in information and communication technologies), though this type of investment is difficult to properly capture statistically. Digital investment intensity rises faster than in a number of other middle-income OECD countries, albeit mostly from lower levels. In some areas, the Turkish business sector has done particularly well. For instance, only half of the enterprises had a website in 2010, meaning Turkey compared unfavourably with other OECD countries; but by 2017, this practice, backed by a new provision included in the commercial law, has increased to 73%, putting Turkey ahead of some advanced OECD members (Figure 10, Panel A).

However, the adoption of digital applications related to core business management functions is not as widespread as having a website. The share of firms using (functionally important) enterprise resource planning (ERP) and customer relationship management (CRM) software is lower than in several comparable countries (Panel B). Also, differences in the adoption rates of technologies between enterprise types are deeper in more advanced functions (Panel C). Both the international comparison and the firm-size divergence in adoption rates may be related to skills gaps.

Turkey has been taking measures to promote digitalisation, for instance by facilitating the connection of businesses to public authorities (i.e. online taxation systems). Yet, there is ample room for additional policy action to incite firms to adopt digital technologies. In recent OECD research, policies aiming at eliminating the skills gap as well as those improving product market competition and labour market flexibility were shown to be effective (Nicoletti, Andrews and Timiliotis, 2018[13]). According to econometric estimations, Turkey's adopting better policy practices in these domains would accelerate the diffusion of digital technologies (Panel D). OECD also calls for adequate social and regulatory protections for workers engaged in non-standard work practices based on digital technologies (OECD, 2017[14]).

Figure 10. Turkey should catch-up more rapidly in core digital applications

% of all enterprises, excluding financial sector (10 employees or more)



1. The estimated impact shows the additional adoption probability of a given digital technology by firms operating in sectors strongly exposed to an impact area, in comparison to firms operating in sectors less exposed to the same impact area, induced by a policy change that would bring Turkey to the level of the best practice in OECD countries in the respective policy domain, based on Nicoletti et al. (2018) and own calculations. As an example, increasing the amount of ICT training provided for low-skilled employees to the level of best practice in OECD is estimated to lead to around 10% more adoption of advanced cloud computing technologies by firms in highly knowledge intensive sectors than those in less knowledge intensive sectors in Turkey.
2. Administrative burdens to start-ups.
3. Barriers to service sectors.
Source: Eurostat (2017), The Digital Economy and Society Index; and Nicoletti et al. (2018).
StatLink https://doi.org/10.1787/888933799359

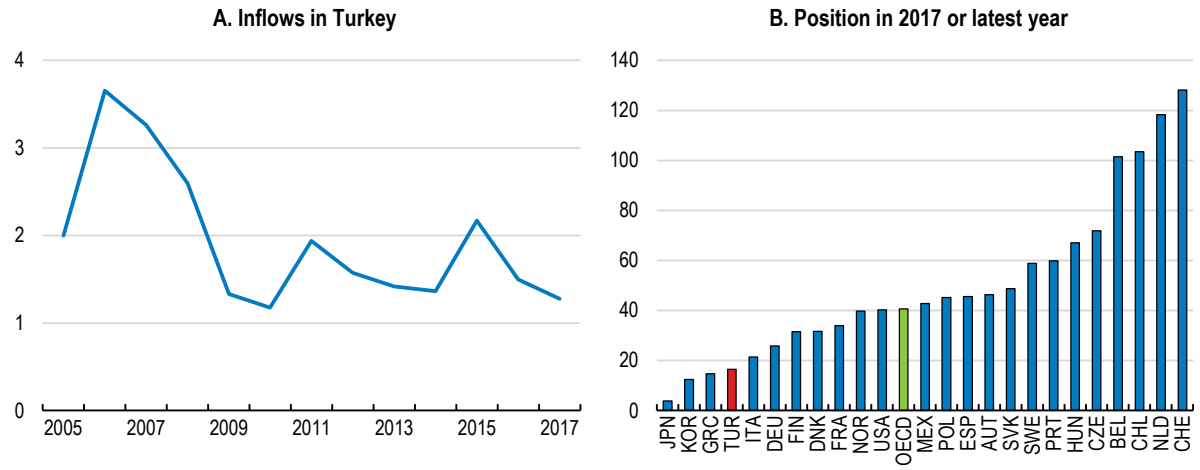
Reviving foreign direct investment

The generally high level of investment is not met with an equally high level of domestic saving. The resulting large current account deficit is one of Turkey's major macroeconomic challenges. Its financing requires sustainable net inflows of foreign capital, preferably in

the form of foreign direct investments (FDI). FDI inflows and stocks remain currently low in international comparison (Figure 11). Notably, the inflow of FDI originating from Europe has declined from around USD 13 billion per year prior to the crisis to below USD 5 billion per year in 2016/17. While Europe's share in Turkey's inward FDI declined from above 80% to around 65% over this period, Europe remains the main driver of FDI inflows to Turkey.

Figure 11. FDI inflows and stocks remain low in international comparison

Inward FDI, % of GDP



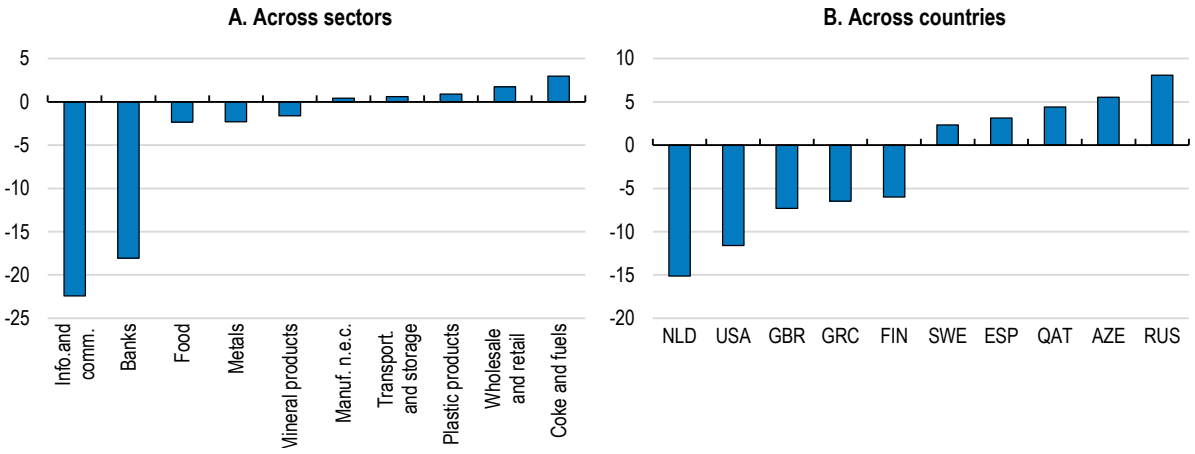
Source: OECD (2018), OECD FDI Statistics (database).
StatLink https://doi.org/10.1787/888933799378

The stock of FDI has peaked in 2010 at close to 25% of GDP and fell to just above 16.7% of GDP in 2016 mainly on account of declining foreign equity participation in services, in particular in banks and companies operating in information and communication (IC) activities. The FDI stock in manufacturing was slightly more resilient over this period but also declined by around 10%. Overall, the drop in FDI stocks in banks (-46%) and IC companies (-66%) accounts for about 80% of the total decrease (Figure 12)

Equity participation originating from Europe and the US has substantially decreased from 2010 to 2016. Despite heavy drops, the Netherlands (mainly as a pass- through country before reaching its final destination) remain the country with the highest FDI stock in Turkey (USD 2.4 billion in 2016) followed by Germany (USD 1.3 billion) and Russia (USD 1 billion). Azerbaijan emerged as the 9th largest direct investor country Turkey by 2016 (USD 0.6 billion) merely driven by a major petro-industry project. Finally, the increase in FDI from Qatar has offset a quasi-equally large decline in FDI from Saudi Arabia over the same period.

Figure 12. Change in FDI stocks by sector and country

From 2010 to 2016, in billion USD



Note: Sectors and countries with the 5 largest gains and 5 largest losses are shown.
Source: Central bank of the Republic of Turkey.
StatLink https://doi.org/10.1787/888933799397

To assess the impact of institutional factors on bilateral FDI flows, a gravity model is estimated. Bilateral flows of FDI in 2016 are regressed on a standard set of explanatory variables including distance, dummies for common language and common legal origin, the levels of GDP and GDP per capita for the origin and the host country, human capital endowments of the origin and host country as well as a dummy taking the value of 1 if a free trade agreement between the two countries is in place and 0 otherwise (Table 4). Similar to the empirical model used for investment rates, institutional variables as observed in the host country are added one by one to the gravity model and Figure 13 reports the obtained coefficients and significance levels.

Table 4. Gravity model for bilateral FDI flows

Dependent variable: log of inward FDI flow in USD million.

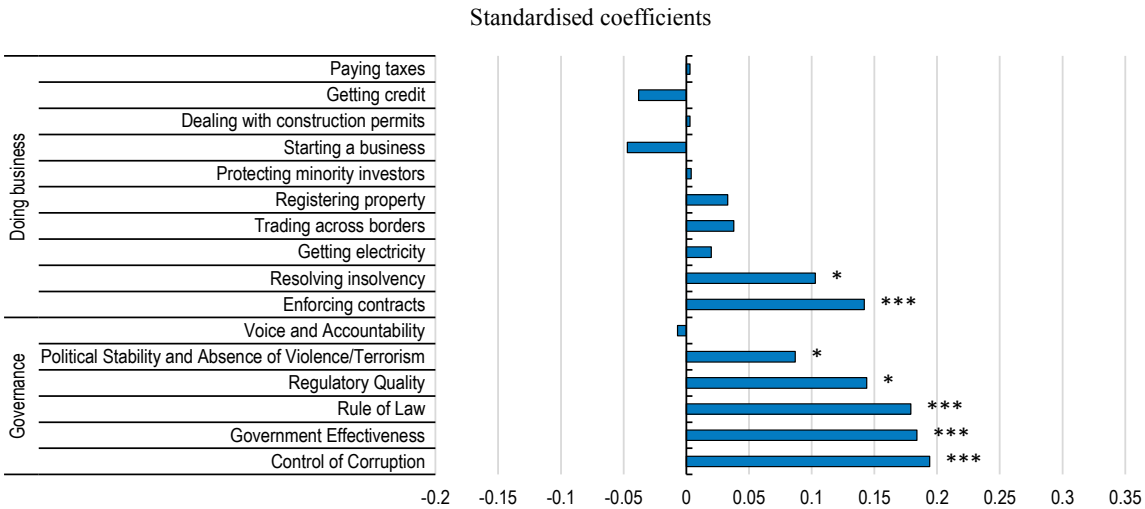
Distance	-0.84***
Common language	1.57***
Common legal origin	0.35***
Log GDP (reporting country)	0.56***
Log GDP (counterpart country)	0.88***
Log per capita GDP (reporting country)	0.73***
Log per capita GDP (counterpart country)	0.77***
Area in sq. kms (reporting country)	0.06**
Area in sq. kms (counterpart country)	-0.22***
Human capital index (Penn World Tables, reporting country)	-0.57***
Human capital index (Penn World Tables, counterpart country)	0.51***
Dummy for existing free trade agreement (Source: WTO, 2015)	0.37***
Number of observations	11137
Adjusted R2	0.64

Note: Linear regression coefficients are shown. Standard errors are clustered at the year level. ***, ** and * correspond to statistical significance at 1%, 5% and 10% respectively.
Source: UNCTAD, CEPII, Penn World Tables.

The results suggest that trust in the host country's institutions affects very strongly its ability to attract FDI inflows. Control of corruption, the effectiveness of government and the rule of law exhibit the highest FDI inflow elasticities and the related coefficients are highly significant. This is consistent with the recent OECD research finding that a percentage point increase in the World Bank corruption perception index in the host country reduces FDI from the countries having ratified the OECD Anti-Bribery Convention by between 4 and 9% (OECD, 2017[15]). Turkey's international position has deteriorated in this area: its ranking in Transparency International's Corruption Perception Index fell from 53rd in 2013 to 81st in 2017. Turkey should build on OECD's "Strategic Approach to Combating Corruption and Promoting Integrity" to regain ground in this area (OECD, 2018[16]).

Regulatory quality and the ability to enforce contracts, as well as the capacity to resolve potential insolvencies are also identified as important drivers of FDI inflows. The weakening in the quality of institutions as measured by the World Bank governance indicators since 2013 may help explain why Turkey did not recover the relatively higher inflows observed prior to the crisis, in particular from European countries. Recent progress in terms of enforcing contracts and insolvency procedures has been encouraging but should be complemented with improvements in the quality of institutions.

Figure 13. How the business environment correlates with foreign direct investment



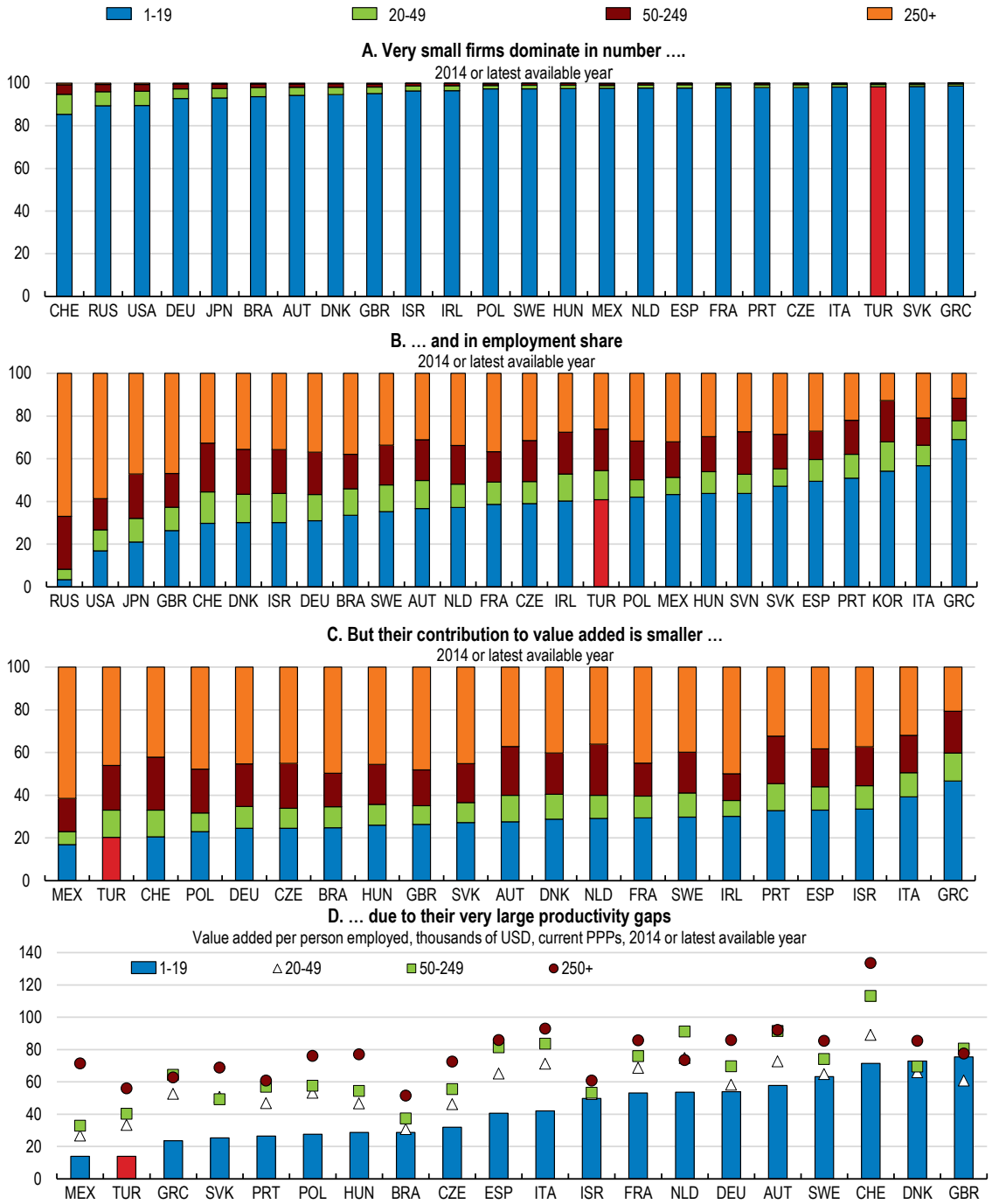
Note: Structural indicators are added one-by-one to a standard FDI gravity model including distance, common language, common legal origin, GDP, GDP per capita and human capital. Standardised coefficients for each indicator are shown and
***, ** and * correspond to statistical significance at 1%, 5% and 10% respectively.
Source: Calculations based on OECD (2018), OECD Economic Outlook (database).
StatLink https://doi.org/10.1787/888933799416

Investment dynamics differs across business types

The business sector is highly heterogeneous in Turkey, as highlighted in earlier OECD Surveys (OECD, 2014[3]; OECD, 2016[4]). It includes a combination of small, low productivity, largely informal businesses; medium-sized, family-managed and generally only partly formal firms; and large, professionally managed formal corporations. A new cohort of skill-intensive start-ups has also emerged. Figure 14 illustrates the segmentation of the business sector according to standard size criteria. It shows the large weight of very small businesses in employment, which contrasts with their significantly smaller weight in

total value-added, highlighting the outstandingly large labour productivity differences between different types of firms.

Figure 14. Turkey's business sector is particularly fragmented



Note: For Russia and the United-States data do not include non-employers. Data for Switzerland exclude enterprises with less than 3 employees. In panel B, data for the United States, Japan, Israel, Korea, and Russia are based on number of employees. For further methodological information, refer to the publication Entrepreneurship at a Glance 2017, Figures 2.2, 2.9, 2.15 and 3.1.

Source: OECD (2017), Entrepreneurship at a Glance 2017.

StatLink https://doi.org/10.1787/888933799435

To preserve the strong growth of investments in the business sector while improving their quality and efficiency, the ability of these different types of firms to upgrade their physical and knowledge-based investments should be improved. Faster re-allocation of resources from less productive and low-potential to more productive and high-potential firms would also help improve the quality of capital formation. Building on the statistical regularities emerging from a large Turkish firm-level database (Box 1), on the analyses of earlier OECD Surveys, and on insights from the expanding firm-level research literature in Turkey (Atabek, 2018[17]; Atiyas and Bakis, 2018[18]; Çağlar and Koyuncu, 2018[1]; Taymaz, 2016[19]; Taymaz, 2016[20]), four types of firms displaying different investment dynamics were identified.

Box 1. A dataset to shed light on firm-level investment dynamics

A firm-level dataset was constructed for this Survey in co-operation with the Structural Economic Research Department of the Central Bank of the Republic of Turkey. The dataset drew on information from the "Enterprise Information System" (EIS) database which consists of firm-level integrated data from eight administrative sources, put together by the General Directorate for Productivity of the Ministry of Science, Innovation and Industry.

In principle, EIS includes all enterprises in Turkey, from micro to large firms and from partnerships to corporations. The dataset constructed for the survey is a subset of the EIS database, encompassing all manufacturing firms providing detailed balance sheets and income statements to the Revenue Administration of the Ministry of Finance. Micro-size sole proprietorships submitting only simplified income statements for tax purposes were excluded, since they do not provide all the information required for the analysis, such as investment in machinery and equipment.

After 340 000 observations were dropped due to insufficient data quality, the final dataset for the purposes of this Survey contained 1.25 million observations on around 260 000 manufacturing firms for the period 2006-16. In addition to detailed balance sheets and income statements, data is available on the age, employment, geographical location and sectoral-technological characteristics of firms. The growth rate of their machinery-equipment and R&D investments can be derived from their balance sheets for the period 2007-16. The remaining imperfections in the data arising from widespread informality in employment and financial reporting remained a challenge, but were not estimated to fundamentally alter the observations on investment and financing trends throughout the business sector.

The dataset includes around 96 000 firms employing 0-9 workers; 34 000 firms employing 10-49 workers; 5000 firms employing 50-99 workers; 3500 firms employing 100-249 workers; 1100 firms employing 250-499 workers and 800 firms employing more than 500 workers for the latest year of data availability, 2016. 165 of these firms were listed in Borsa Istanbul.

Econometric tests were then used to explore some of the links between firm-level characteristics and the growth and composition of their investments. These estimations were run for machinery and equipment investments (Table 5) and for the probability for a

firm to undertake R&D investments (Table 6). (The latter indicator is based on R&D expenditures reported to the tax administration and understates the actual volume of R&D activities for firms which do not benefit from tax allowances).

Table 5. Determinants of machinery and equipment investment

Dependant variable: Investment rate

	By Region			By Size						By Technology Level			
	(1)	(2)	(3)	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)
Sales growth	0.008***	0.008***	0.002	0.005***	0.009***	0.005	0.003	0.0000	0.039***	0.007***	0.01***	0.005***	0.013
	(0.001)	(0.002)	(0.003)	(0.001)	(0.001)	(0.004)	(0.004)	(0.008)	(0.011)	(0.001)	(0.002)	(0.001)	(0.008)
Cash flow	0.009***	0.034***	0.058***	0.003	0.019***	0.002	0.028**	0.017	0.031	0.02***	0.013***	-0.005	-0.021
	(0.003)	(0.008)	(0.022)	(0.004)	(0.005)	(0.012)	(0.013)	(0.02)	(0.04)	(0.004)	(0.005)	(0.005)	(0.02)
ROA	0.054***	0.004	-0.018	0.03	0.037*	0.073	0.096*	0.048	-0.004	0.03*	0.057**	0.054**	0.155
	(0.014)	(0.032)	(0.06)	(0.019)	(0.022)	(0.052)	(0.054)	(0.082)	(0.137)	(0.017)	(0.025)	(0.024)	(0.124)
ROA_sq	-0.136***	-0.023	-0.2	-0.098*	-0.08	0.049	-0.329*	0.022	-0.249	-0.076	-0.17**	-0.1	-0.278
	(0.043)	(0.11)	(0.214)	(0.054)	(0.073)	(0.172)	(0.179)	(0.242)	(0.373)	(0.053)	(0.079)	(0.071)	(0.32)
Leverage	0.024*	0.019	0.036	0.017	0.111***	0.287**	0.353**	0.559	0.063	0.02	0.024	0.013	0.17
	(0.014)	(0.026)	(0.052)	(0.017)	(0.031)	(0.139)	(0.146)	(0.424)	(0.313)	(0.017)	(0.021)	(0.022)	(0.141)
Leverage_sq	-0.013	-0.008	-0.039	0.0004	-0.005	-0.048	-0.011	-0.014	0.026	-0.011	-0.004	-0.015	-0.092
	(0.011)	(0.022)	(0.041)	(0.014)	(0.017)	(0.047)	(0.046)	(0.09)	(0.112)	(0.014)	(0.017)	(0.019)	(0.109)
Employment	0.009**	0.023***	0.025*	0.028***	0.025	0.128	-0.065	-0.102	-0.268	0.015**	0.01	0.008	0.072
	(0.004)	(0.008)	(0.014)	(0.009)	(0.017)	(0.092)	(0.089)	(0.13)	(0.197)	(0.006)	(0.007)	(0.006)	(0.049)
Employment_sq	-0.003***	-0.006***	-0.006**	-0.008***	-0.006**	-0.022*	0.002	0.006	0.018	-0.004***	-0.003**	-0.001	-0.006
	(0.001)	(0.001)	(0.003)	(0.002)	(0.003)	(0.012)	(0.009)	(0.012)	(0.015)	(0.001)	(0.001)	(0.001)	(0.006)
Age (3-5)	-0.038***	-0.024***	-0.017	-0.032***	-0.034***	-0.048***	-0.055***	0.007	-0.073	-0.037***	-0.036***	-0.028***	-0.026
	(0.003)	(0.006)	(0.012)	(0.004)	(0.004)	(0.017)	(0.016)	(0.03)	(0.051)	(0.004)	(0.004)	(0.005)	(0.03)
Age (6-10)	-0.06***	-0.038***	-0.034**	-0.049***	-0.057***	-0.077***	-0.066***	-0.035	-0.05	-0.056***	-0.057***	-0.051***	-0.015
	(0.003)	(0.007)	(0.014)	(0.004)	(0.005)	(0.019)	(0.019)	(0.036)	(0.056)	(0.005)	(0.005)	(0.006)	(0.039)
Age (11-100)	-0.061***	-0.043***	-0.05***	-0.048***	-0.06***	-0.08***	-0.071***	-0.074*	-0.072	-0.058***	-0.062***	-0.051***	-0.001
	(0.004)	(0.009)	(0.017)	(0.006)	(0.006)	(0.022)	(0.021)	(0.041)	(0.059)	(0.006)	(0.007)	(0.007)	(0.047)
Real wage	-0.0003**	-0.0005	-0.0014*	-0.0005**	0.0000	-0.0004	-0.0001	-0.0008	-0.0009	-0.0001	-0.0008***	0.0001	-0.0004
	(0.0001)	(0.0004)	(0.0008)	(0.0002)	(0.0002)	(0.0004)	(0.0004)	(0.0006)	(0.0019)	(0.0002)	(0.0002)	(0.0002)	(0.0004)
Observations	289,208	69,554	18,336	155,759	150,451	23,949	19,776	6,455	4,777	181,464	123,740	69,387	3,160
R-squared	0.3	0.31	0.3	0.32	0.32	0.4	0.41	0.45	0.35	0.29	0.3	0.33	0.33

Note: Firm-level fixed effect estimations. All variables enter the equation with a one period lag. ROA is operating profitability and employment is log transformed. For age groups the baseline category contains firms younger than 3 years old. Regions are classified as: (1) West, (2) Tiger region and (3) Others. Size is classified by the number of employees: (1) 0-9, (2) 10-49, (3) 50-99, (4) 100-249, (5) 250-499 and (6) >500. Technology level is classified as: (1) low, (2) low to medium, (3) medium to high and (4) high, according to OECD classification. "_sq" denotes squared terms. The equations also control for productivity distance to the frontier firm, being a listed firm, employment and leverage interaction, technology type and productivity distance to the frontier firm interaction, along with year, year*sector, year*sub region fixed effects. Robust standard errors are in parentheses. ***, ** and * correspond to statistical significance at 1%, 5% and 10% respectively.
Source: Own calculations (CBRT/OECD).

Available data does not permit to document some important firm-level characteristics concerning corporate governance, management information systems and financial reporting practices of firms. Still, combining the information available on their age, size, ownership, geographical location, technological sophistication, profitability and financing patterns, possible links between related firm characteristics and physical and knowledge-based investment outcomes can be outlined for empirical investigation.

Very small, largely informal businesses

Very small, largely informal businesses form a very large population in the manufacturing sector. Available information on the weight of informality according to firm size and on

the strong reverse correlation between informal jobs and educational background of employees (OECD, 2014[3]) suggest that their workers have generally limited formal education. Firms employing less than 10 workers and older than five years (excluding therefore young, high-skilled and potentially high-growth start-ups) form the bulk of this group. Around 50 000 such businesses were in the dataset as of 2016. Two main features distinguish these firms: i) they are in practice less bound by official regulations and tax and financial reporting obligations than other firms; and ii) in turn, their interactions with government authorities, with the banking and financial sector, and with other business partners are impaired because of this large dose of informality.

Table 6. Determinants of the probability of reporting R&D expenditures

	By Region			By Size						By Technology level			
	(1)	(2)	(3)	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)
Sales growth	0.0005**	0.0012**	0.0001	0.0004**	0.0008	-0.0041	0.0034	0.0139	0.0129	0.0008***	0.0008**	-0.0003	0.0031
	(0.0003)	(0.0006)	(0.0007)	(0.0002)	(0.0006)	(0.0029)	(0.0042)	(0.009)	(0.0116)	(0.0003)	(0.0004)	(0.0008)	(0.0057)
Cash flow	-0.0000*	0.0000***	-0.0000	-0.0000	-0.0000**	0.0000	-0.0000	0.0001	-0.0003*	0.0000	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0008)	(0.0002)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Employment	-0.0086***	-0.0102***	-0.0113**	-0.0004	-0.0239*	-0.192	0.345	2.176*	-0.293	-0.0082***	-0.0012	-0.023***	-0.0423*
	(0.0017)	(0.0034)	(0.005)	(0.0026)	(0.0129)	(0.289)	(0.289)	(1.18)	(0.241)	(0.0018)	(0.0022)	(0.0048)	(0.0219)
Employment_sq	0.0035***	0.0032***	0.0028**	0.0014	0.0055***	0.0237	-0.0321	-0.182*	0.0267	0.0024***	0.0014***	0.0089***	0.0163***
	(0.0004)	(0.0008)	(0.0011)	(0.0009)	(0.0021)	(0.0339)	(0.0287)	(0.101)	(0.0171)	(0.0004)	(0.0005)	(0.0011)	(0.004)
Age (3-5)	0.0006	-0.002	-0.0011	0.0002	0.0005	0.0152*	-0.0157	-0.0028	-0.0354	-0.0008	-0.0003	0.002	0.0357**
	(0.0008)	(0.0017)	(0.0026)	(0.0008)	(0.0014)	(0.0082)	(0.0112)	(0.0379)	(0.0633)	(0.0008)	(0.0012)	(0.0025)	(0.017)
Age (6-10)	0.0028**	-0.0026	-0.0037	0.0008	0.004**	0.0348***	-0.0296**	0.011	0.0402	0.0004	-0.0002	0.0059*	0.0647***
	(0.0011)	(0.0022)	(0.0033)	(0.001)	(0.0018)	(0.0101)	(0.0144)	(0.0438)	(0.0651)	(0.0011)	(0.0015)	(0.0032)	(0.0213)
Age (11-100)	0.0019	-0.0049*	-0.0033	0.0002	0.0046*	0.0378***	-0.0411**	-0.0181	0.0367	0.0012	-0.0009	-0.0009	0.0527*
	(0.0015)	(0.0029)	(0.0045)	(0.0012)	(0.0024)	(0.0118)	(0.017)	(0.0467)	(0.0718)	(0.0015)	(0.0021)	(0.0043)	(0.027)
Real wage	0.0006***	0.0004**	0.0006	0.0005***	0.0006***	0.0002	0.0011**	0.0025***	0.0002	0.0002*	0.0003***	0.001***	0.0017***
	(0.0001)	(0.0002)	(0.0004)	(0.0001)	(0.0001)	(0.0004)	(0.0004)	(0.0008)	(0.0006)	(0.0001)	(0.0001)	(0.0002)	(0.0004)
Export ratio	0.0014	0.0046	0.0191**	0.0017	0.0043	0.0009	0.0144	0.0113	0.0318	0.0014	-0.0018	0.0083	0.123***
	(0.0019)	(0.0043)	(0.0089)	(0.0015)	(0.0031)	(0.0116)	(0.0139)	(0.03)	(0.0449)	(0.0019)	(0.003)	(0.0053)	(0.0349)
ROA	0.005	-0.0052	0.0026	0.0017	0.0031	0.0051	0.0356	-0.0358	0.121	0.0007	0.0044	0.0063	0.026
	(0.0032)	(0.007)	(0.0123)	(0.0026)	(0.0057)	(0.0195)	(0.0285)	(0.0536)	(0.0745)	(0.0032)	(0.0042)	(0.0094)	(0.0484)
Leverage	0.0026	-0.0062	-0.0012	-0.0018	0.0045	0.0742**	-0.0106	0.0787	-0.189*	-0.0019	0.0064	0.0017	-0.118
	(0.004)	(0.0069)	(0.0083)	(0.0031)	(0.0069)	(0.034)	(0.0453)	(0.0971)	(0.114)	(0.0038)	(0.0055)	(0.0115)	(0.0768)
Leverage_sq	-0.0029	0.001	0.0002	0.0008	-0.0026	-0.0624**	-0.0139	-0.0702	0.168*	-0.0005	-0.0066	-0.0000	0.0792
	(0.0037)	(0.0068)	(0.0091)	(0.003)	(0.0062)	(0.0291)	(0.0389)	(0.0847)	(0.0984)	(0.0036)	(0.0051)	(0.0109)	(0.0717)
Observations	468,802	111,908	34,330	307,917	219,535	30,209	23,650	7,437	5,383	292,671	207,185	110,505	5,615
R-squared	0.69	0.6	0.6	0.45	0.6	0.75	0.79	0.84	0.84	0.62	0.64	0.69	0.78

Note: Firm-level fixed effect estimations. ROA is the operating profitability and employment is log transformed. ROA and leverage enter the equations with a one period lag. For age groups the baseline category contains firms younger than 3 years old. Regions are classified as: (1) West, (2) Tiger regions and (3) Others. Size is classified by the number of employees: (1) 0-9, (2) 10-49, (3) 50-99, (4) 100-249, (5) 250-499 and (6) >500. Technology levels are classified as: (1) low, (2) low to medium, (3) medium to high and (4) high, according to OECD classification. "_sq" denotes squared terms. The probit regressions also control for productivity distance to the frontier firm, being a listed firm, employment and leverage interaction, technology type and productivity distance to the frontier firm interaction, as well as year, year*sector, year*sub region fixed effects. Robust standard errors are in parenthesis. ***, ** and * correspond to statistical significance at 1%, 5% and 10% respectively.
Source: Own calculations (CBRT/OECD).

According to Turkstat's 2016 Labour Force Survey, 41% of the workers of non-agricultural firms employing less than 10 workers are employed outside the scope of labour regulations (without social security and tax registration), against 13% in firms employing between 10-19 workers and less than 10% in the others. According to this Survey's dataset, only 22% of firms employing less than 10 workers had any outstanding bank relations and bank

credits in 2016. Many draw on trade credits (from suppliers and customers, which is their main source of external financing) and this practice has expanded over the past decade. Their total degree of leverage remains nonetheless well below other types of firms.

These firms have also very low labour productivity levels and their productivity gap vis-à-vis manufacturing sector averages has widened over the past decade, although gaps may be smaller in terms of total factor productivity (Taymaz, 2016[19]; Çağlar and Koyuncu, 2018[1]) (Figure 15). They have also expanded their machinery-equipment stock at a slower pace than other types of firms (Figure 16). A small proportion of them have any R&D activities and this share has not improved over time (Figure 17)

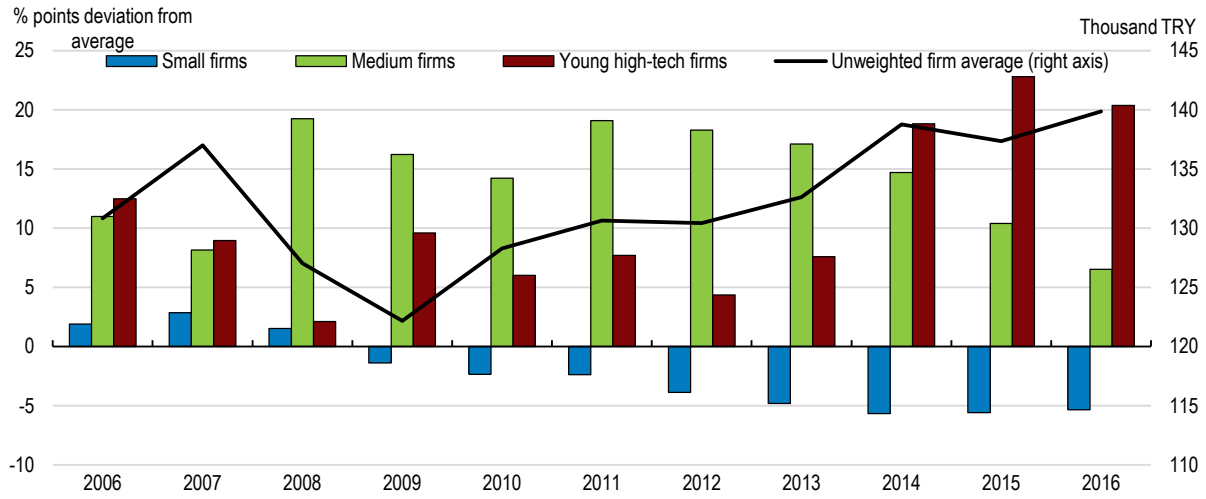
The empirical findings on the determinants of machinery and equipment investments of very small firms point to the following main factors:

- Sales growth (the accelerator mechanism) is the key driver of their physical investments.
- The two standard drivers of physical investment identified in the international and Turkish research literature (internal cash-flows and credit) do not seem to play any significant role in this type of firms (while their relevance is confirmed for firms in other categories).
- Among these very small firms the relatively larger ones invest more. This positive relation between firm size and investment is stronger in this group than in other firm categories.
- Firm-level average wages seem to affect negatively their investments, possibly reflecting their engagement in price competition. This is a clear difference from other firm types (where the impact of the average wage level on investment is insignificant – hinting at their transition to non-price competition).

Concerning the policy avenues available to improve the performance of this type of firms, international research suggests that well-designed basic management training programmes can help improve their management practices and their productivity (Hampel-Milagrosa and Reeg, 2016[21]; Cravo and Piza, 2016[22]), as also stressed by Turkey's Productivity Strategy and Action Plan 2015-18 (Ministry of Science Industry and Technology, 2015[23]). Simple and user friendly digital management tools are becoming available for them. Their concentration in Small Industrial Sites (around 500 such SISs throughout Turkey host more than 100 000 very small manufacturing businesses) may facilitate the implementation of technical support programmes. Turkey's SME Agency KOSGEB has traditionally directed its programmes to relatively larger manufacturing SMEs installed in Organised Industrial Zones (OIZs) but has recently started to develop programmes for very small firms, including in service businesses. One of these programmes targets their engineering and design capabilities.

Figure 15. Labour productivity diverges across firm types

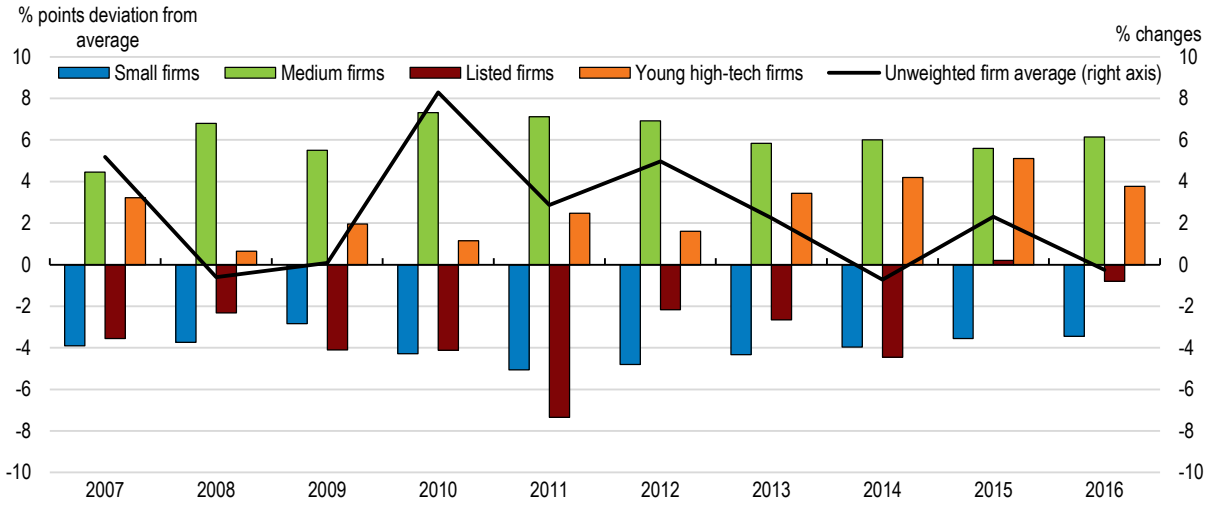
Manufacturing, real net sales per worker in 2006 prices



Note: Small firms (employing less than ten workers and which are more than five years old), medium-sized firms (employing from 50 to 249 workers), and young technology-intensive firms (less than four year-old firms in upper-middle and high technology sectors) real labour productivity are shown in percentage point deviation from the manufacturing sector average, after controlling for sectoral composition differences.
Source: OECD/CBRT dataset on the basis of Enterprise Information System (EIS).
StatLink https://doi.org/10.1787/888933799454

Figure 16. Machinery and equipment investments grow at uneven paces

Manufacturing, growth rate of machinery and equipment stock (real prices)



Note: Investment growth rates of small firms (employing less than ten workers and which are more than five years old); of medium-sized firms (employing from 50 to 249 workers); of firms listed on the stock exchange; and of young technology-intensive firms (less than four year old firms in upper-middle and high technology sectors) are shown in percentage point deviation from the manufacturing sector average, after controlling for sectoral composition differences.
Source: OECD/CBRT dataset on the basis of Enterprise Information System (EIS).
StatLink https://doi.org/10.1787/888933799473

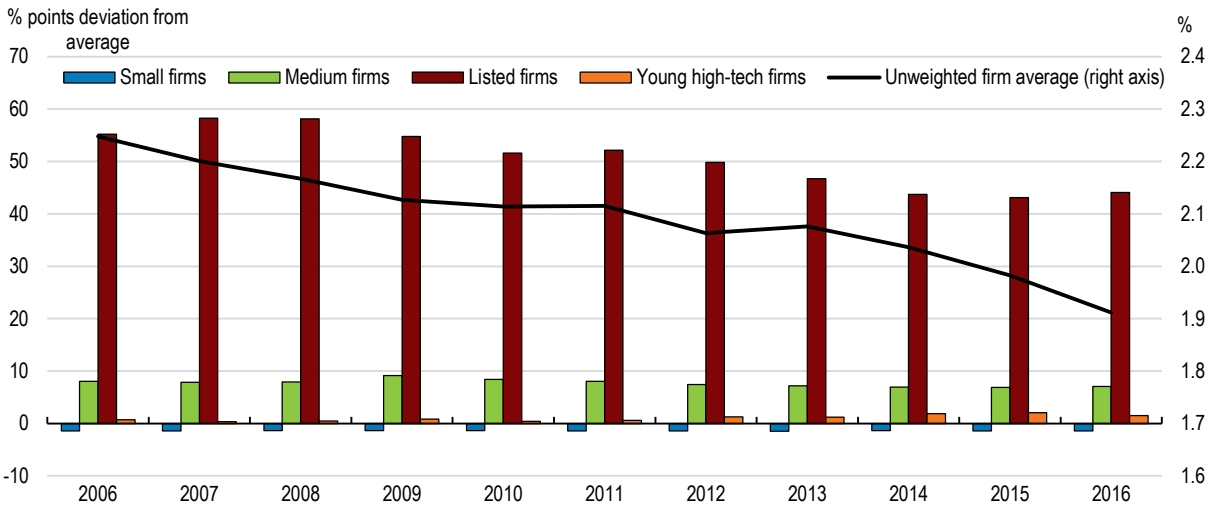
Medium-sized family firms

Medium-sized family firms constitute a very different type of business. They have played an important role in Turkey's industrial development over the past decade. They grew in all regions, including in the so-called "Anatolian Tiger" catching-up regions. They are led by the successful first or second generation owners of the previously smaller businesses which have succeeded to build-up stronger technical, managerial and financial capacities. They employ higher-skilled personnel than small firms, pay them higher wages, and register a higher proportion of them with the social security system (health and pension benefits). Their production capacities are flexible and the delivery times of their products may be very short. Many started to integrate into regional and global value chains. The proportion of such firms operating in lower-middle and even higher-middle technology sectors has increased and part of them started R&D activities (Figure 17)

Their employment varies considerably, from tens to hundreds of workers per firm. Firms employing 50-250 workers are the most representative size category. They generally operate under close family governance, with family members in key managerial positions. They tend to offer limited external financial transparency, which may restrict their access to external equity capital and to professional labour markets and, as a result, could constrain their investment and organisational innovation capacity (Box 2).

Figure 17. Probability of reporting R&D expenditures

Manufacturing, share of firms reporting R&D expenditures in their income statement



Note: Share of small firms (employing less than ten workers and which are more than five years old); of medium-sized firms (employing from 50 to 249 workers); of firms listed on the stock exchange; and of young technology-intensive firms (less than four year old firms in upper-middle and high technology sectors) are shown in percentage point deviation from the manufacturing sector average, after controlling for sectoral composition differences.
Source: OECD/CBRT dataset on the basis of Enterprise Information System (EIS).
StatLink https://doi.org/10.1787/888933799492

Box 2. A semi-formality trap in medium-sized family firms?

Medium-sized family firms have traditionally relied on hands-on management by their owners. Their management information systems appear to be basic, and there is evidence that many underreport their effective employment, activity, wage and profitability levels. Very few publish audited financial accounts. The vast majority refrain from stock market listing but resort massively to bank loans to finance their development. Their communication with banks has traditionally been based on private bilateral rather than on published financial information. This established practice is now challenged by the new prudential rules in the banking sector which require reliance on formal audited accounts

A recent survey conducted by the Corporate Governance Association of Turkey among family firms (TKYD, 2017[24]), point to important challenges. Around 43% of the firms state that they need to strengthen their capital structures and 37% plan to accelerate the digital transformation of their businesses. The survey finds that only 27% of firms have put in place formal corporate governance arrangements so far, but 49% are in the process of doing so. A fundamental issue reported by Turkish family firms is the challenge of transmission to the next generations. The transition to the third generation is reported as a particularly testing stage. TKYD recognizes that reinforcing capital structures by upgrading family firms' corporate governance arrangements and transparency may increase costs in short-term, but emphasises that Turkish family firms should assume these costs as the expected gains are considerable.

The prevalence of insider management in these firms – that international research identifies as a deterrent to productivity growth (Bloom and Van Reenen, 2010[25]), when associated with limited financial information and transparency, may delay their transition to integrated management systems based on digital technologies.

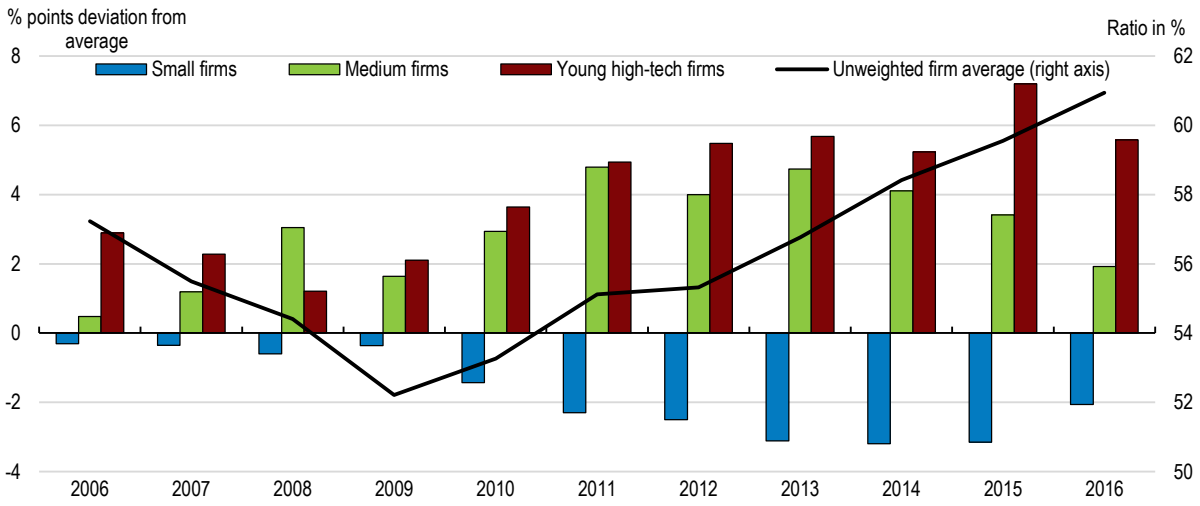
The empirical findings on the determinants of machinery-and-equipment and R&D investment of medium-sized firms hint at a number of specificities (Table 5 and Table 6):

- Medium-sized manufacturing firms employing between 50-249 workers have steadily expanded their machinery-equipment investments over the past decade, faster than all other sizes of firms.
- Such firms in Anatolian Tiger towns have increased their machinery-and-equipment investments even faster.
- The strong growth of investments required first of all strong internal cash-flows. The relationship between internal cash-flows and investments has been particularly strong in the core category in this group – i.e. firms employing 100 to 250 workers.
- Internal cash-flow effects have been particularly strong in Anatolian Tiger towns. This invites two possible explanations: i) the external funding necessary to complete internal cash-flows may have been less abundant or more costly in these catching-up regions, and/or ii) Anatolian Tiger towns' family firms may have kept and re-invested a higher proportion of their profits in the development of their businesses.

- A strong impact of internal cash-flows on R&D investments is also visible in Anatolian Tiger towns, but not in the Western regions. Firms in Western regions may have had better access to external resources for funding their R&D investments.
- The profit margins and the resulting cash flows declined in many medium-sized firms over the past decade, in particular among the lower-scale ones and in Anatolian Tiger towns. This has restricted their internal funding capacities for both physical and knowledge-based investments.
- Growing recourse to debt has been the medium-sized firms' response to the gap between internal resources and their growing physical and knowledge-based investment needs. A rapid build-up of debt resulted in the medium-sized firms of all regions (Figure 18).
- There is some early evidence that a non-linear relationship exists between debt and machinery-equipment and R&D investments. While access to debt is associated with higher rates of investment, this positive impact seems to diminish at higher levels of leverage. Beyond a threshold, excess leverage may constrain both physical and knowledge-based investment. There is some evidence that this constraint may be particularly strong for medium-sized firms.
- The investment and productivity gains that could be expected from medium-sized firms' access to external equity markets cannot be quantitatively estimated at this point, but is considerable.

Figure 18. Medium-sized firms and high-tech start-ups are particularly leveraged

Manufacturing, ratio of total liabilities to total assets



Note: Small firms (employing less than ten workers and which are more than five years old), medium-sized firms (employing from 50 to 249 workers), and young technology-intensive firms (less than four year-old firms in upper-middle and high technology sectors) ratios are shown in percentage point deviation from the manufacturing sector average, after controlling for sectoral composition differences.
Source: OECD/CBRT dataset on the basis of Enterprise Information System (EIS).
StatLink https://doi.org/10.1787/888933799511

Public policies can help medium-sized family firms surmount their excess debt constraints. Helping them become fully formal and financially transparent would be an important first step. Technical support to the adoption of modern management and financial information systems, and a favourable tax treatment of transition to fuller financial transparency (for instance through tax allowances for external audit costs) could play a positive role. A strategy for developing the most important elements of an "equity ecosystem" (see below), including via the active participation of domestic institutional investors in the equity capital market, may help many so-far closed medium-sized firms to open to capital markets and secure new long-term resources for their investments – as was also recommended in the previous OECD Economic Surveys (OECD, 2014[3]; OECD, 2016[4]).

Large, stock-market listed firms

Large, professionally managed and usually stock-market listed firms constitute the formal pillar of the Turkish business sector. Around half of the machinery-and-equipment stock of the Turkish economy is in large firms employing more than 500 workers, and around a quarter in directly listed firms (a large part of the large-size non-listed firms belong nonetheless to listed conglomerates). They include big family holdings, some former state-owned firms which have been privatised through public offerings, and international firms operating in Turkey – listed in their country of origin. They achieve Turkish manufacturing's highest labour productivity and returns of investment, and, according to an earlier study (McKinsey Global Institute, 2003[26]), top layer corporations match the productivity and efficiency levels of their advanced OECD country counterparts. They have developed R&D and technological innovation capacities (Figure 17 above) and invest extensively in employee training. Subject to the financial reporting rules of the Turkish Capital Markets Board and of the Istanbul Stock Exchange (Borsa Istanbul) they are financially transparent according to global standards. About ten of them have issued securities in the international market and are rated by international rating agencies.

Multi-generation family holdings form the core of the formal business sector. They have developed special corporate governance arrangements which, despite family prevalence on boards, offer a large space to professional management. A recent review suggests that Turkey's multi-generation family holdings have nonetheless room for further tightening their management information and control systems, including through integrated digital applications (Bigan, Decan and Korkmaz, 2017[27]). Their access to domestic and international capital markets augments their investment resources and capacities. They increased their external debts under the highly benign international funding conditions of the post-global crisis period (Box 3).

Box 3. Firms listed in domestic and international capital markets

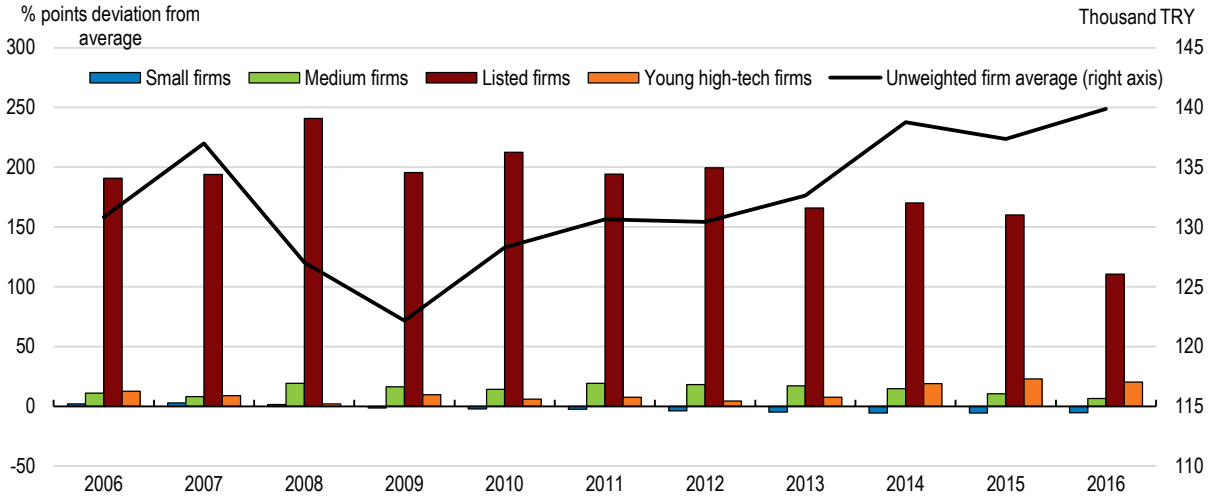
The transparency, credibility and "blue-chip" status of stock market-listed firms in the domestic and international banking and capital markets reduce their capital costs and allow them to tap more investment resources. This has permitted them to build up pools of funding resources which benefit all their affiliates, and, when needed, their suppliers and customers via trade credits. This capacity has contributed to the remarkable expansion of the holding company form in the Turkish economy.

As they tend to fully comply with formal laws and rules, these firms face higher regulatory, social contribution and tax costs than the rest of Turkish manufacturing, which may more than offset their lower capital costs. This may negatively affect their cost competitiveness, in particular in labour intensive sectors (OECD, 2016[4]).

The financing edge of these firms in the domestic market does not necessarily extend to international markets. The proportion of their floated shares and the volume of their public offerings (IPOs and SPOs) remain generally small by international standards. It was recently suggested that not more than ten Turkish holding groups have sufficiently large security emission projects to engage mainstream long-term institutional investors - rather than more risk-prone and volatile international hedge funds (Ünlü, 2017[28]). These firms are also constrained by Turkey's sovereign rating ceilings and bear the corresponding risk premia in their corporate bond yields and stock price/earnings ratios. In March 2018, the corporate bonds of Turkish firms such as Koç Holding, Anadolu Efes, Coca Cola Içecek and Oyak were downgraded to below investment grade by the main international firm-level rating agency as a result of an additional one-notch downgrade of Turkey's sovereign rating.

Figure 19. Listed firms achieve higher labour productivity

Manufacturing, real net sales per worker in 2006 prices



Note: Small firms (employing less than ten workers and which are more than five years old), medium-sized firms (employing from 50 to 249 workers), firms listed on the stock exchange, and young technology-intensive firms (less than four year-old firms in upper-middle and high technology sectors) real labour productivity are shown in percentage point deviation from the manufacturing sector average, after controlling for sectoral composition differences.
Source: OECD/CBRT dataset on the basis of Enterprise Information System (EIS).
StatLink https://doi.org/10.1787/888933799530

Foreign firms having invested in Turkey constitute the internationalised fringe of the formal sector, with additional financing capacities from their mother companies. This shields their funding capacities from domestic banking and capital market conditions. However, as their

key capital formation decisions are taken at the level of their global headquarters, the return/risk assessment of their projects remain exposed to global perceptions on the risk factors in local business conditions.

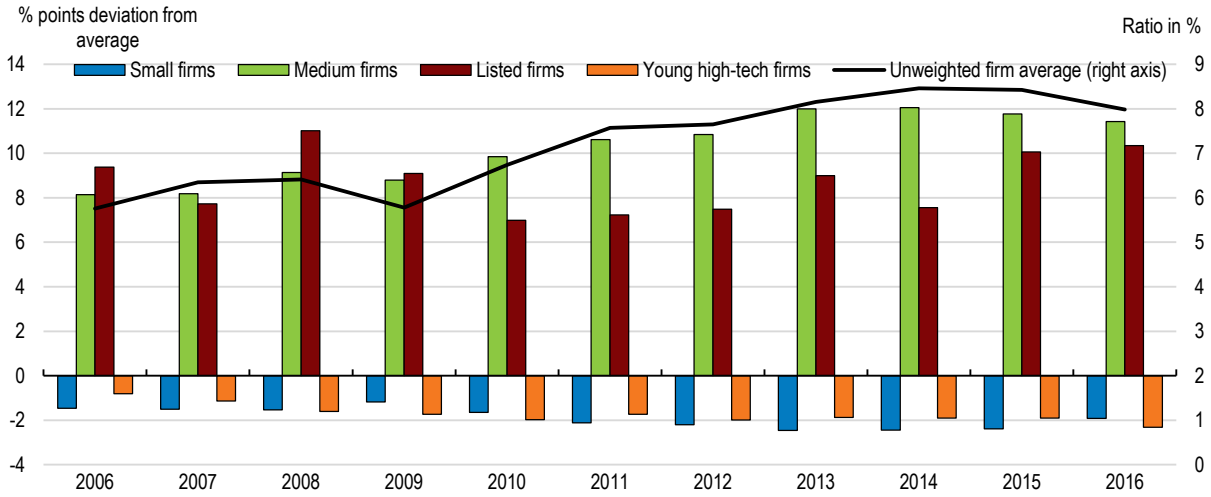
Figure 16, Figure 17 and Figure 19 highlighted the trends in the physical and knowledge-based investments of listed firms and their edge in labour productivity. Tables 4 and 5 present some econometric results on possible influences on very large firms' machinery-equipment and knowledge-based (R&D) investments:

- Listed firms invest more in machinery and equipment than non-listed firms – all other firm characteristics equal.
- They also invest more in R&D, although this is confined to lower-middle technology sectors.
- Large firms and in particular listed firms have significantly higher labour productivity and return on asset levels than other types of firms, even if this gap was reduced over the past decade (Figure 19).
- Still, there are signs that these firms may not be realising their full investment potential in machinery-equipment and in knowledge-based assets, due to the weight of the bank debt that they have accumulated (Figure 20). Although the sample size for these firms is smaller than for other firms, there is some early evidence that very high bank leverage is harmful for the growth of both their physical and R&D investment.
- Firms in high-technology sectors may be escaping this debt constrain. Their physical investments continue to grow even under high-debt. These firms may have achieved higher credibility and creditworthiness with financial investors and creditors than counterparts in less sophisticated activities - or may possess more valuable collateral.

As listed firms are more compliant with local laws and pay significantly higher corporate taxes than other firms, their physical and knowledge-based investments are in principle more sensitive to tax incentives. Well-designed incentives may stimulate additional knowledge-based capital building in these high-performance firms, with positive spill-over effects for the rest of the economy (Andrews, Criscuolo and Gal, 2015[29]). R&D incentives in Turkey are very generous, including a 250% corporate income tax deduction, wage subsidies, personal income tax, social security premium and VAT exemptions, and higher amortization rates for newly acquired assets. However, Turkey grants comparatively less R&D tax incentives than other OECD countries.

Figure 20. Bank leverage of medium-sized and listed firms is high

Manufacturing, ratio of bank liabilities to total assets



Note: Small firms (employing less than ten workers and which are more than five years old), medium-sized firms (employing from 50 to 249 workers), firms listed on the stock exchange, and young technology-intensive firms (less than four year-old firms in upper-middle and high technology sectors) ratios are shown in percentage point deviation from the manufacturing sector average, after controlling for sectoral composition differences.
Source: OECD/CBRT dataset on the basis of Enterprise Information System (EIS).
StatLink https://doi.org/10.1787/888933799549

Skilled start-ups

Skilled-start-ups form a still small but promising layer of the business sector. They are led by skilled managers and workers and engage in sophisticated manufacturing and service activities. Part of them have large firms as shareholders, and many draw on the wide set of supports available for start-ups (Box 4). They tend to develop their machinery-and-equipment investments very vigorously - while their reporting limited R&D expenditures to the tax administration may be due to the tax exemptions they anyway obtain in the techno parks and technology development zones (Figure 16, Figure 17).

Box 4. Turkey's start-up eco-system

The Turkish government, together with large firms and universities, has developed several schemes to support high-technology start-ups over the past decade. These schemes have helped foster a relatively large cohort of high-technology start-ups:

- The Scientific and Technological Research Council of Turkey (TUBITAK)'s Techno-Entrepreneurship Grant Programme offers $33 000 per firm in seed capital to eligible high-tech start-ups.
- TUBITAK offered grants subsidising up to 75% of the R&D costs of technology start-ups.

- A Treasury programme provides direct subsidies to entrepreneurs with innovative technological ideas. In 2015, around 70% of the applicants received support.
- The SME Agency KOSGEB offers conditional start-up grants, subject to participation in start-up training courses (or to attending KOSGEB-approved university lectures on entrepreneurship). Between 2010 and 2017, more than 900 000 people participated in these programmes and 42 000 entrepreneurs launched start-ups under this programme.
- Techno parks attached to major universities offer substantial tax advantages under a special law. Member firms are granted corporate income tax exemptions and their staff personal income tax exemptions. The number of firms installed in techno parks had approached 5000 in 2018 and they were employing around 45 000 eligible workers.
- "Endeavor" is an international non-profit contributor to the start-up ecosystem in Turkey. Young firms selected in the entire country gain access to a network of international and national business leaders volunteering to help and coach them in their take-off years.
- "Garaj" is a domestic non-profit organisation arranging networking events and training courses for start-ups. Despite being a young organisation it has gained considerable visibility among start-ups. It also sponsors crowd-funding initiatives.
- Investors in start-ups obtain substantial tax advantages. Domestic and international venture- and angel-capital investors registered and licenced by the Treasury can deduct 75-100% of their investments in start-up funds from their personal income taxes. More than 450 investors have registered so far and invested approximately TRY 12 million. A Turkey "Fund of Funds" scheme was also created by the Treasury in 2013, to take minority participations (of less than 30%) in venture funds. These included a 25% stake in the EUR 260 million Turkey Growth and Innovation Fund (TGIF) which, by May 2018, invested EUR 52 million in six start-ups. An additional Treasury facility of TRY 2 billion was announced in December 2017, to directly invest in start-ups. The Treasury projects that the amount of Treasury funds invested in start-ups will not exceed the total amount of private venture and angel capital committed to the same start-ups and will in all instances not exceed TRY 2 billion by 2023 (around 1% of projected 2018 GDP in real terms).

The results of these substantial support schemes in terms of technological and commercial success rates have not been systematically assessed to date. The firm-level Enterprise Information System (EIS) of the Ministry of Science, Industry and Technology can be further developed and used to this effect, and could help concentrate public supports on the most effective schemes.

The population of young firms (less than four years old) in upper-middle and high technology sectors has regularly augmented in the past five years. Compared to their international counterparts, these firms may be handicapped by their less sophisticated local (upward and downward) linkages, but the highest potential ones seek to compensate this handicap by fostering links with global academic and technological partners (OECD,

2013[30]). The need to liaise with official and international partners requires them to be much more transparent operationally and financially than other small businesses.

The sophisticated background of their owners and personnel also entice them to operate formally and legally. Many of them adopt modern organisation forms and management information systems. The previous OECD Survey documented that institutional and governance weaknesses at national level might have more discouraging impacts on this type of firms than on the others (OECD, 2016[4]). Recent information points to a similar effect on the international venture capital investors that envisage to invest in them (Clark, 2017[31]).

Some available evidence on the investment drivers and constraints of these firms includes:

- The youngest firms achieve the strongest investment growth rates.
- As they mature, these firms build up considerable amounts of debt (Figure 18), and, beyond age 3-4, they become more dependent on internal cash-flows to continue to finance investments.
- For small firms and firms in high-technology activities, size does not seem to be a constraint on the capacity to undertake R&D expenditures. The relation between size and engagement in R&D activities is even negative in most parts of the business sector.
- The cash-poor sophisticated start-ups may be facing stronger financial constraints in Anatolian Tiger towns. There is a positive association between internal cash flows and the probability of initiating R&D projects in Anatolian Tiger towns, which is inverted in Western regions. Western high-technology firms may be able to engage in longer-term innovation projects, and may be able to fund them with external resources on a longer period.

OECD countries' general experience with government support schemes for start-ups suggest that a good balance between "tax" and "equity" support measures is helpful (Calvino, Criscuolo and Menon, 2016[32]). Innovative support instruments such as "technological prizes" can also help direct public incentives to targeted technological areas, while maintaining competition between firms and supporting many of them at once (Brynjolfsson and McAfee, 2015[33]). Still, additional private resources (equity and bridge finance) become necessary as they grow.

Diversifying and strengthening the financing of investment

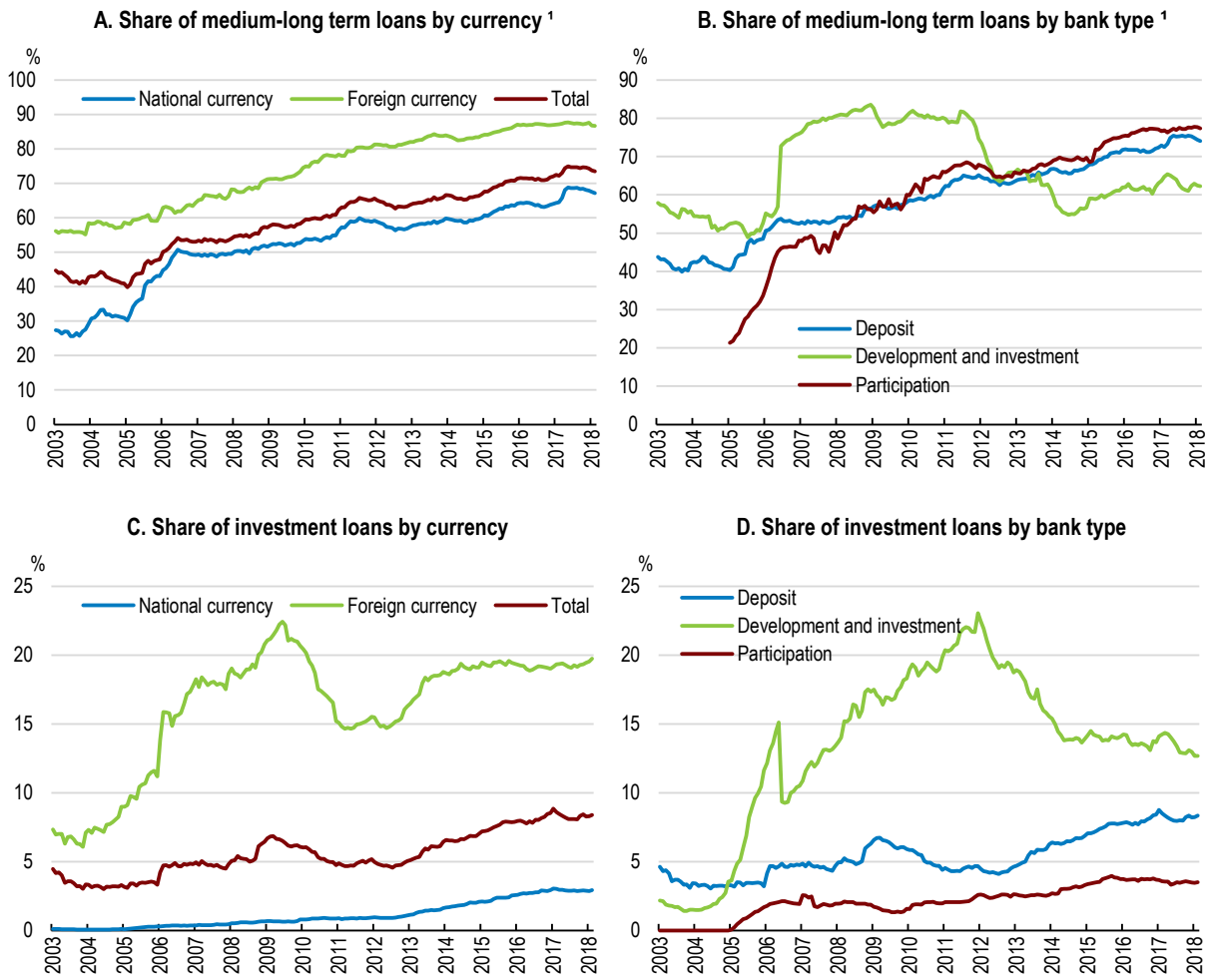
In Turkey, own capital and retained earnings have traditionally been the main sources of funding for investment. Going forward, financial deepening will help sustain and improve business investment. The financial system has been growing significantly faster than GDP since 2008, but 90% of the system's total assets are held by banks. Other financial intermediaries such as insurance and pension funds are relatively underdeveloped and associated capital market funding benefits only few companies. Access to new equity capital is even more restricted. Stock market capitalisation is low and private equity still scarce.

The extension of the treasury-backed credit guarantee scheme in early 2017 (Box 5) has reinforced bank dominance and led to an additional increase in bank loans over 2017 - albeit mostly in the form of medium-term loans (average maturity of 40 months) to support working capital. Only 2.8% of the loans provided under the guarantee scheme in 2017 were

investment loans (KGF, 2018[34]) although other loans, not classified as investment loans, may also have been used for to finance investment projects.

Congruently, banks' NPL ratios have decreased and the overall quality of bank assets improved. Current capital adequacy ratios of Turkish banks are in line with a smooth transition to Basel III requirements. Nonetheless, available capital buffers also reflect the sensitivity of capital ratios to exchange rate depreciation as the share of foreign currency assets exceeds the share of foreign currency debt. On the back of healthy and well-regulated banks, loan maturity (Figure 21, Panels A and B) and the share of investment loans (Panel C) have increased over the past decade, mainly through loans provided by deposit banks (Panel D). In addition, internationalised firms can turn directly towards banks residing abroad. While interest rate conditions are more favourable for these dollar- and euro-denominated loans, the recent pressure on the exchange rate has led to a sharp decline in cross-border loans.

Figure 21. Bank loans have supported investment



1. Medium-long term loans are loans with a maturity of more than one year.
Source: Banking Regulation and Supervision Agency (BDDK).
StatLink https://doi.org/10.1787/888933799568

The loan-share of private domestic banks has fallen from more than 70% in 2005 to around 35% in early 2018. The share of foreign banks has experienced the strongest increase between 2005 and 2008, partly driven by a series of local bank acquisitions by foreign banks, when it more than quadrupled from 5% to above 20%. Apart one major acquisition in 2015 bringing the share to around 30%, foreign banks' share in total loans has stagnated thereafter and even declined more recently. Since 2013, state-owned banks have registered considerably higher loan growth rates than private banks. Their share in total loans has risen to 38% early 2018 against an average of 28% between 2010 and 2013.

Participation banks, a synonym for non-interest-earning Islamic banks, have experienced particularly strong growth from 2005 to 2013 but their share in total banking assets and loans has diminished over the past five years. The authorities currently seek to help these banks to contribute more actively to the funding of the business sector in general and business investment in particular. A strategy document is being prepared to provide this sector with a more complete regulatory framework which could spur access to finance of firms that are out of reach of traditional bank lending activities and may search for more risk sharing forms of external finance.

Box 5. The treasury-backed credit guarantee fund (KGF)

The credit guarantee fund has been created in 1993 to provide access to bank financing for SMEs with insufficient collateral. Historically, the scope of the scheme was rather modest with a volume below 0.5% of GDP. In a response to the loss of the Turkish government's investment grade sovereign borrower status, which has affected banks' capital adequacy and lending capacity in 2016, and risks of credit rationing, the government decided to extend the scheme substantially as of March 2017. Maximum guarantees for all types of enterprises were raised, the guarantee commission fee substantially lowered and the limit of the fund increased from TL 20 billion to TL 250 billion (8% of 2017 GDP). While the extension was meant to be temporary, there is a general understanding that redemptions will be allowed to be reallocated.

The credit guarantee scheme helps overcome the lack of collateral and also gives incentives for firms to go fully formal. Indeed, to be eligible, a firm must pay taxes and social security contributions and is not permitted to have any tax and social security contribution arrears. Additionally, the firm must not be in the process of bankruptcy or termination.

Following the extension of the scheme, the number of SMEs requesting a KGF guarantee soared, from 30 000 in 2016 to more than 320 000 in 2017, with the total approved loan amount rising from less than TL 10 billion to around TL 265 billion (around 90% of which are guaranteed by the KGF) thereby giving 110 000 new SMEs access to bank-financing. Investment loans accounted for only 2.8% of guaranteed loans in 2017, well below the average share in total loans (Figure 15, Panel C), but other loans, not classified as investment loans, may have also been used to finance investment projects. As a result, the relaxation of the financial constraints of both borrowing firms and banks after the implementation of this measure appears to have facilitated the recovery of business investment from the second half of 2017. In addition, following a

decision in February 2018, a third of the available TL 55 billion of unused and already returned guarantees shall be reserved for capital investment loans. In May 2018, TL 35 billion of guarantees, mainly from redemptions, were re-introduced, TL 30 billion of which will be reserved for working capital loans and the rest for exporters.

Market participants estimate that the KGF extension, as a positive credit supply shock, has added between 1 and 1½ percentage points to 2017 real GDP growth in Turkey and improved bank profitability via lower provisioning (IMF, 2018[2]; Morgan Stanley, 2017[35]). The scheme guarantees loans so long as the bank's NPL ratio of KGF-guaranteed loans does not exceed 7%, which caps the contingent liabilities of the Treasury. By early 2018, the banking sector's NPL ratio had declined below 3%. It needs to be seen whether the maturation of KGF-backed loans challenges this resilience.

Turkey's credit guarantee system is currently the OECD's largest as a share of GDP and it is advisable to undertake a careful analysis of its costs and benefits. Certain OECD countries have put in place effective evaluation systems in this area, including rigorous measurements of counterfactuals. Turkey can draw on this experience, including with a view to normalise the total size of its credit guarantee system along OECD good practices. A pre-announced schedule would facilitate its implementation (OECD, 2017[36]).

Recent bank lending surveys suggest that credit demand has been fuelled by the need for working capital and debt restructuring, while the demand for loans financing capital expenditures in fixed assets has declined further. Credit instruments remain primarily confined to short and medium-term loans that are not suitable for the financing of long-term fixed investments. The main reasons behind this maturity mismatch lie in high and uncertain inflation prospects, high and rising loan-to-deposit ratios and a lack of transparency among firms leading to information asymmetries and high monitoring risks. Risks are lower for firms subject to compulsory external auditing with IFRS standards, that is, firms with more than 200 employees as well as listed firms.

The government has introduced a number of targeted investment credits via its Small and Medium Sized Enterprises Agency (KOSGEB) to help overcome bottlenecks in access to finance. Banks sign agreements with KOSGEB, which takes on part of the interest payments for the respective SME loans. Between 2003 and 2017 more than 500 000 SMEs have benefitted from KOSGEB investment credits, which has created a volume of TRY 20 billion of loans. KOSGEB offered a new wave of interest-free credits and allocated a budget for around 460 000 SMEs towards the end of 2016 which helped to lean against the adverse economic effects of the failed coup attempt in 2016. The European Commission Programme for the Competitiveness of Enterprises and SMEs (COSME) will also provide loan guarantees to over 37 000 Turkish small businesses up to TRY 750 million (around EUR 150 million) – in addition to the treasury-backed credit guarantee scheme described in Box 5.

The authorities have also explored other avenues to improve the business sector's access to finance and to make better use of existing assets. First, absorbing at least part of the country's massive "under-the-pillow" gold savings in the mainstream financial system would buttress financial assets and help provide collateral. Since 2011, the central bank has allowed banks to hold an increasing amount of required reserves in the form of gold. As of

October 2016, the central bank also started to accept scrap gold collected by banks under the Reserve Options Mechanism (ROM) facility to incorporate "under-the-pillow" gold into the financial system. Additionally, the Treasury has recently issued gold-backed debt securities. Second, the recent creation of a sovereign wealth fund not only aims at financing strategic infrastructure investments but also at collateralising the country's strategic assets and, directly or indirectly, easing domestic firms' access to funding notably from abroad (Box 6).

Box 6. The sovereign wealth fund

The "Turkey Wealth Fund" (TWF), was established in late 2016 with the aim to strengthen the development of the economy. It is not yet fully operational but its declared objective is to develop and increase the value of the country's strategic assets and to provide resources for strategic investments. The fund will focus on fostering capital market deepening, attracting foreign funds and providing financing for large-scale strategic investments.

To this end, the TWF is expected to engage in two types of activities. First, backed by the collateral on its balance sheet (which includes state-owned enterprises' equity shares and government real estate, which reportedly raised TWF's asset value at TRY 250 billion in 2017 – or 8% of GDP), the TWF will engage in long-term borrowing from international capital markets with the purpose of lending to domestic firms at lower costs. Its articles of association also permit it to participate in domestic firms' direct borrowing from abroad by providing collateral and guarantees.

Its founding law exempts TWF and its affiliated funds from a number of laws, notably from the Law on the Protection of Competition. This may reduce competition in the markets where TWF intervenes.

In the future development of the Fund Turkey should build on OECD's "Guidance on Sovereign Wealth Funds" (OECD, 2008[37]). This guidance contains principles and safeguards to help countries developing such funds, as well as those receiving their investments, to facilitate their operation in a transparent, open and commercially-oriented environment.

Non-bank avenues of financial intermediation remain nonetheless underdeveloped. Institutional investors are smaller than in other catching-up countries and pension funds have only 12% of their portfolio invested in domestic equities - a lower share than in other catching-up OECD countries (OECD, 2017[38]). As a result, stock market capitalisation as a share of GDP is very low in international comparison. Access to outside equity capital through the market is mostly confined to large companies listed at the Istanbul Stock Exchange (around 400 firms, including financial companies), which operates a rather efficient trading system as reflected in high stock market turnover ratios. Similarly, the domestic private debt securities markets are underdeveloped (so far, around 700 firms, mainly in the financial sector, have issued commercial paper and corporate bonds).

The deepening of both equity and debt markets has become crucial for widening financing sources for long-term investment projects. The OECD has recently emphasised that this requires, more than a few "silver bullet" measures, the development of a multi-dimensional eco-system with a range of investment instruments, issuers, investors, expert professionals,

exchange platforms and tax rules and trading regulations (Box 7). The Turkish authorities have already taken an important tax measure in this direction, by eliminating the debt-equity bias in corporate taxation in 2015 via full tax allowances for equity remuneration costs (Spengel et al., 2016[39]).

Private equity investment, including venture, growth and angel capital participation by domestic and international investors in Turkish business enterprises is another avenue of non-debt and non-bank financing. This is less demanding than the issuance of market securities in terms of an ecosystem, but requires highly sophisticated investors, who are rare. According to one source, Turkey became, together with Poland, one of the two most dynamic countries in venture and angel capital investing in Europe in 2017 - even though the total volume of investments is still very low (Start-up Watch, 2018). Venture capital placements in Turkey grew in the aftermath of the global financial crisis (OECD, 2018[40]). Venture capital and business angel investments may be compatible with non-interest earning participation investments (Islamic finance) (OECD, 2014[3]). The ongoing draft law on participation finance will possibly include provisions in this area.

Box 7. Building up an ecosystem for equity investing in small firms

Public equity markets for small companies need to be supported by a healthy ecosystem. The latter is currently undersized in Turkey and requires more fully engaged investment banks, SME-specialised banks, research analysts, brokers, market makers, and other third-party advisors focused on SMEs (Figure 19). Legal and financial advisors, accountants and other professionals providing services targeted to SMEs benefit issuing companies and investors by enhancing transparency and confidence. Such ecosystems need to be developed at both local and national levels.

The ecosystems for SMEs are generally not wide-ranging enough in other OECD countries either, impeding the functioning and deepening of equity markets and reducing companies' willingness to list altogether (Nassr and Wehinger, 2016[41]). On the basis of related OECD research and other countries' experiences, the following elements deserve particular attention in the Turkish context:

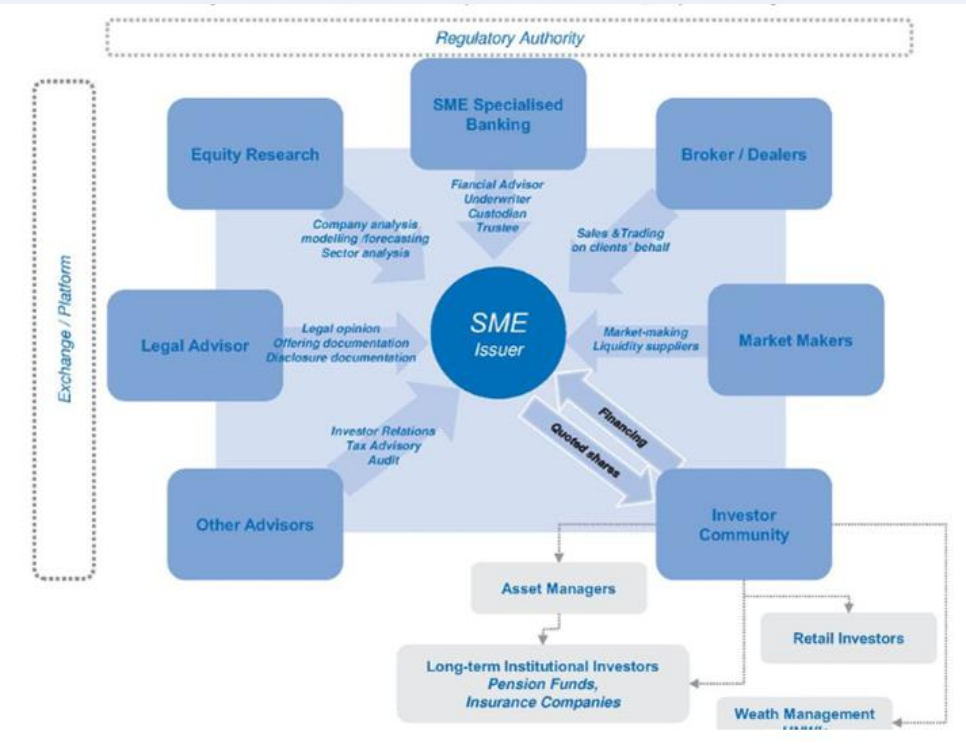
- **The absence of equity research by financial analysts on small and mid-sized firms reduces their visibility and attractiveness among investors.** International research underlines the benefits of attracting foreign analysts, notably by promoting common accounting practices (Bae, Tan and Welker, 2008[42]). Equity research assists investors in making informed investment choices, providing an evaluation of the attractiveness of an individual stock and of the expected operating performance of the underlying company. It is of particular importance in the case of small high-growth firms where information is scarce and harder to assess.

- **Equity research coverage of small and mid-sized equities is hampered by the inherent characteristics of small firms**. The small size of initial public offerings (IPOs) and secondary trades renders equity

research for small companies economically challenging. The so-called "transparency barrier" resulting from the reluctance to share sensitive information by even the most successful and best managed SMEs in order to protect their strategic position is another impediment. A large part of professional investors would reportedly not engage in a trade on either primary or secondary markets without relevant research being available.

- **Tax factors play also an important role in institutional and retail investors' portfolio allocations to small companies.** Investment-driven tax reliefs and positive incentives may induce long-term investment into SMEs. Tax relief is the most commonly cited incentive by market participants, and examples of such practices have proven to accelerate the development of SMEs equity markets. In the United Kingdom for example, tax-advantaged venture capital schemes fuelled investments in small growing businesses. The French Plan Epargne Actions (EA-PME) scheme played a similar role. The latest OECD *Economic Survey of Italy* advocated the energetic use of tax incentives to promote equity investments in small firms (OECD, 2017[43]).

Figure 22. A valuable ecosystem for SME equity offerings



Source: Nassr and Wehinger, 2016.

A three-pronged structural upgrading is in order to strengthen investment

A three-pronged structural upgrading process in the business sector would help to overcome some of the main obstacles to efficient capital formation, to achieve better balanced development of physical and knowledge-based investments, and to ease the shift of capital formation toward the more productive and highest potential areas of the economy. Turkey is in a position to achieve more rapid progress in three interrelated areas:

Much of the economy's resources remain in low-productivity informal and semi-formal activities. Policies can further address this challenge by: i) directly targeting better knowledge-building and productivity gains within these activities (training and technical support in small industrial sites (KSSs)), and ii) permit permitting the higher productivity and higher potential firms of all sizes to invest more and employ a higher share of workers via regulatory reforms reducing their burdens.

The ongoing digital transitions in the business sector, financial firms and public administration have the potential to deliver substantial efficiency gains i) within business firms (operational, managerial and financial information systems), ii) in transactions between firms and banks and capital markets, and iii) in interactions between firms and tax, customs and other regulatory authorities. The efficiency of the ever-growing business incentives can also be improved via digital monitoring of beneficiaries' behaviour and outcomes.

Progress on these fronts requires long-term knowledge-based investments and calls for a reinforcement of the equity capital basis of firms. While access of small informal firms to bank credit is not yet secured, the analysis in this paper suggests that under high debt leverage now attained in many high-growth firms, and given the immaterial character of many of their investments, firm balance sheets must be strengthened with additional equity capital. Raising additional equity from public markets and private equity investors is compelling.

There are important synergies between these three areas: i) formal and more professionally managed businesses can produce more operational, managerial and financial information, reaping the related productivity gains; ii) progress with digitalisation facilitates internal and external (operational, managerial and financial) transparency, easing communication with financial market partners, regulators and tax administrators; iii) internal and external transparency reduce information asymmetries and facilitate additional equity financing from owner families, public securities markets and private investors.

The continuing integration of Turkish firms in GVCs, in practice often with EU business partners, holds additional promises of accelerating managerial modernisation and digitalisation, transparency, and equity absorption capacity. The updating and extension of the Customs Union agreement between the EU and Turkey along the most advanced customs union best practices would support this three-pronged process.

Several recent policy initiatives seek to upgrade the investment financing environment. Shortcomings in this environment have become more binding as a growing share of firms piled on debt and reached credit limits. New government initiatives include the massive extension of credit guarantees and several streams of low-interest loan and grant schemes for SMEs and start-ups. Government-owned banks' lending activities were also expanded, including in the first two quarters of 2018, and the newly created Sovereign Wealth Fund will purportedly support long-term and large-size investment projects and improve domestic firms' access to finance (Box 6).

These initiatives ought to be geared towards supporting the mainstream competitive market-based financing channels of the economy. Given their very rapid build-up there may be a risk for their turning into alternatives rather than complements to these mainstream financing channels. This risk invites well-calibrated policies to avoid competitive distortions and crowding-out. Robustly regulated private financial intermediaries competing on a level-playing ground should be encouraged to extend long-term funds (in the form of equity, credits and other risk-sharing instruments) to formal firms with strong corporate governance and financial transparency standards. Turkey's new business finance measures could be actively used in this direction.

A stable and robust macroeconomic and financial framework may deliver sharper reductions in capital costs and stimulate more vigorous investments, capital reallocation and structural upgrading in the composition of investments than direct subsidies through government-led concessional financing. The OECD policy recommendations based on this paper's analysis are summarised in Box 8 below.

Box 8. Policy recommendations

Key recommendations

- To reduce the funding costs of the economy improve the international credibility of governance institutions, fiscal transparency and price stability.
- Carry out a strategic review to identify and address the most binding constraints to the development of the currently weak ecosystem for equity financing of investment.
- Encourage family firms through technical support and awareness campaigns to develop standard corporate governance, professional management and financial transparency.
- Evaluate the uptake of the various recent social security contribution cuts granted and make permanent those which have proven most supportive of formalisation, financing this through better tax enforcement.
- Enforce the compulsory auditing rules of the new Company Law. Reduce audit costs - while maintaining audit quality standards- via tax incentives in the early years of audited financial reporting.
- Streamline the various R&D incentives schemes on the basis of cost-benefit analyses, and build on international best practices to improve take-up and efficiency of tax subsidies and grants.
- Streamline and stabilise business incentives. Report them according to state aid law, subject them to competition review, and monitor their impact on beneficiary firms' behaviour using the new Enterprise Information System (EIS).
- Undertake a cost-benefit analysis of the credit guarantee system and normalise its size, tighten the macroprudential rules and contain the quasi-fiscal activities of public financial institutions.

Other recommendations

- Promote standard accounting and financial bookkeeping in firms of all sizes. Support this by promoting the diffusion of low cost and user-friendly digital management applications.
- Improve the quality and coverage of firm-level credit information and credit rating systems.
- Encourage and publicise good quality private equity analyses.
- Monitor and evaluate the efficiency of the many incentives for high-technology start-ups. Monitor firm-level outcomes using the Enterprise Information System (EIS).

Annex 1.A. Modelling investment

The steady-state

The capital stock accumulates as a result of net investments ($\dot{K}$) originating from a fraction of output that is saved (sY) minus the depreciation of existing capital (δK):

$$\dot{K} = sY - \delta K \tag{1}$$

Assuming a standard Cobb-Douglas production function $Y=K^{\alpha}(AL)^{1-\alpha}$ with L the labour force (growing with l) and A a measure of labour efficiency (growing with g), the capital output ratio can be shown to converge to a steady-state level given by:

$$\frac{K}{Y} = \frac{s}{g + l + \delta} \tag{2}$$

In the steady-state, output and capital grow at the same rate $g+l$. Changes to the saving rate only affect the levels of the capital stock and output but not their long-term growth rates.

The accelerator principle

Assuming a fixed capital-output ratio σ, a firm's "desired" capital stock is proportional to output ($K^* = \sigma Y$) which means that the growth of capital equals the growth rate of output. To reflect the notion of expected output change that determines the desired capital stock and to avoid endogeneity, forecasts from the OECD's Economic Outlook are used to represent simultaneous growth rates of real GDP.

Tobin's Q

To the extent that the market value of a firm reflects the discounted value of future earnings, a firm's manager has an incentive to increase the capital stock so long as the firm's market value exceeds the replacement costs of the firm's capital. The ratio between firm valuation and capital replacement costs is called Tobin's Q. In the absence of countries' net worth (measuring the replacement costs of the country's capital stock), and building on stable steady-state capital output ratios, economists commonly use the country's stock market capitalisation as a share of GDP as a proxy for Tobin's Q.

User cost of capital

The neoclassical theory posits that the marginal expected return on capital is equal to the real user costs of capital. The user of cost (UCC) of capital is a function of the real interest (r), the depreciation rate of installed capital (δ), the price of investment goods relative to the price of output, the corporate income tax (τ) and the allowance rate on capital expenditures (θ).

$$UCC_t = \frac{P_t^I}{P_t^Y}\left(\frac{r + \delta}{1 - \tau}\right)(1 - \theta\tau) \tag{3}$$

Tax allowances typically depend on the type of investment, the size of the firm and on whether a firm runs profits. For the sake of simplicity, and due to a lake of sufficient and comparable data across time and countries, the econometric specification abstracts away from tax allowances and sets $\theta = 0$.

Convergence to steady-state

Short-run dynamics of investment should also reflect gaps with respect to long-run equilibria. Consistent with the idea of stable capital-output ratios, the lagged capital-output ratio is added to the equation inducing a mean-reverting effect. Second, the theoretical steady-state capital-output ratio from equation (2) is added. The savings rate in (2) is modelled as the sum of gross investment and the current account balance both expressed as a share of GDP and smoothed over time.

The econometric specification

As a result, the baseline econometric specification is given by:

$$\frac{I_{c,t}}{K_{c,t-1}} = \beta_0 \frac{I_{c,t-1}}{K_{c,t-2}} + \beta_1 y_{c,t} + \beta_2 y_{c,t-1} + \gamma Q_{c,t} + \sigma UCC_{c,t-1}$$
$$+\alpha_1 \frac{K_{c,t-1}}{Y_{c,t-1}} + \alpha_2 \frac{K^*_{c,t-1}}{Y^*_{c,t-1}} + \delta_c + \delta_t + \varepsilon_{c,t} \qquad (4)$$

The regression includes country-fixed effects (δ_c) and year-fixed effects (δ_t). As such, the model does a good job in dealing with potential omitted variables bias as it can capture time-invariant structural features inherent to countries as well as global real and financial cycles. However, the use of standard linear regressions to estimate a dynamic panel induces a Hurwicz-Nickell bias on the coefficient of the lagged dependent variable. The bias on the other regressors is limited (Barro, 2015[44]) at least so long as the regressors are uncorrelated with the lagged dependent variable.

Annex 1.B. The drivers of investment at firm level

Following the seminal paper by (Bond and Meghir, 1994[45]), the empirical specification is derived from the first-order condition of a firm's dynamic investment choice, allowing for short-run deviations from the desired capital stock. The obtained investment equation models the firm's investment rate (annual capital expenditures divided by total capital at the beginning of the year) as a function of the lagged investment rate to account for persistence, current and lagged sales growth reminiscent of the standard neo-classical accelerator mechanism and an error correction term determining the short-run dynamics towards the desired or steady-state capital-output ratio.

To allow for sector-specific technological or country-specific shocks, the regressions also absorb industry-time and country-time fixed effects. Further, the inclusion of cash-flow and equity issuance rates as well as Tobin's Q allow for an assessment of the impact of financial constraints and expectations. The literature defines cash-flow typically as net income plus depreciation, amortisation and R&D expenses as accounting standards register the latter as operating expenses (Brown and Petersen, 2009[46]). Tobin's Q is approximated by the ratio of the firm's valuation and its total capital. The specification also adds leverage (debt over assets) to assess the role of indebtedness for investment behaviour.

Annex Table 1.B. Coverage of Worldscope database

Number of manufacturing firms included in the sample.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AUS	162	250	250	248	266	283	297	302	303	299	294	300	298	262	275	283	278
BRA	155	138	133	131	137	135	130	125	118	119	125	120	112	106	101	95	90
CAN	298	318	347	357	361	465	466	459	448	430	430	422	392	335	294	292	276
CHN	620	675	768	924	1026	1055	1140	1381	1624	1886	2006	2113	2212	2396	2535	2509	2490
FRA	362	357	350	351	335	337	321	311	308	302	288	288	280	284	289	278	260
GBR	522	530	544	553	565	571	549	534	486	458	430	428	417	404	389	374	359
GRC	24	55	40	41	42	144	142	142	132	130	126	117	106	101	95	90	84
IDN	149	152	148	147	150	146	150	154	158	159	164	166	163	170	169	169	167
IND	303	319	296	382	471	585	1473	1531	1572	1604	1592	1631	1761	1709	1685	1653	1629
ISR	48	55	61	86	89	200	211	213	215	219	213	204	203	185	170	166	160
ITA	106	104	108	111	122	133	139	135	133	133	132	126	123	124	121	118	111
JPN	1048	1135	1160	1192	1223	1252	1268	1273	1284	1293	1310	1318	1333	1346	0	0	0
KOR	524	555	641	676	725	1100	1110	1169	1256	1286	1300	1306	1338	1377	1411	1422	1408
POL	41	41	55	87	115	142	153	160	176	183	188	192	201	184	188	187	179
RUS	8	11	18	26	42	269	315	328	356	364	344	331	298	278	260	241	227
SWE	148	149	144	152	161	187	202	219	215	210	212	212	209	209	228	239	236
TUR	87	103	141	142	144	181	177	182	188	193	202	209	205	203	199	195	192
USA	3530	3422	3272	3243	3245	3248	3208	3157	2962	2840	2719	2648	2504	2297	672	549	427

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