The case studies and shipment-level analysis of dwell time presented in chapter 3 show that long dwell times (which account for a large share of containers in terminals) are one of the key issues that need to be addressed (probably across the continent) and are related mostly to factors under the control of shippers. This confirms one of the initial hypotheses of this work, which is that the behaviors and strategies of shippers have an impact on dwell time in ports. The demand by importers for port dwell time beyond the time required to complete port operations and transactions seems to be related mainly to inventory management and the “business model” used (including the extent of informal practices).

Due to the fact that demand from importers seems to explain a large part of long-dwell cargo, in this chapter we present theoretical foundations explaining current demand in Sub-Saharan Africa and then present some statistical analysis, based mainly on firm surveys.¹

Some Theoretical Considerations

The model examines cost minimization strategies and profit maximization strategies. Coupled with various market structures, it seeks to explain why behaviors that are perceived as irrational, such as leaving cargo in the port, are the best option for an importer.
**Cost Minimization Strategies**

The application of the cost minimization model presented in appendix B leads to the expected conclusion that, because additional dwell time results in additional logistics costs, any market player seeking to minimize its total logistics costs will try to reduce port dwell time. We also reach two secondary conclusions of importance.

The first pertains to the impact of dwell time on replenishment time. Our analysis shows that the optimized interval time between reorders is inversely proportionate to dwell time in the port. An inefficient port clearance system with very long clearance time would therefore encourage shippers to replenish their cargo at shorter intervals and to split their annual orders into smaller and more frequent batches for delivery.

The second pertains to the arbitrage between different warehousing options. Modern container shipping operations should facilitate the movement of goods along chains, and ports should be nothing more than gateways.

In the new paradigm of “warehousing-derived terminalization,” port terminals tend to replace warehousing facilities and gradually become strategic storage units. Our analysis shows that companies seeking to minimize total logistics costs will leave their cargo in the port when the financial cost of clearing it outweighs the potential savings from not storing it in private or third-party facilities outside the port.

In this situation, there is no incentive to clear the cargo from the port storage area, even if storage costs are high (parking costs plus demurrage fees); the move to cheaper storage facilities outside the port will only occur after cargo has spent a long time stored in the port. Also shippers might be willing to leave their cargo in the container terminal or in off-dock container yards (ODCYs) if they cannot bear the financial cost of paying all port clearance charges and fees in advance. They will not move their cargo until they have sold it and are able to pay these expenses.

**Profit Maximization Strategies**

Analysis of total logistics costs provides useful insights into the reasons why shippers might seek to reduce port dwell times. However, cost minimization does not explain the variety of strategies observed with regard to port dwell time, including the paradoxical situation where shippers are indifferent to long or very long dwell times.

The analysis of free competition does not depart from the conclusions of the cost minimization analysis, but the analysis of monopolies does provide useful insights into profit maximization strategies. We show first
that, despite being a cost setter, a rational monopolist should seek to reduce port dwell times to optimize profits because it is not possible to pass on all costs to the clients without losing sales. In a situation where demand is inelastic to price, modeled through the kinked curve theory, we show that the monopolist is not affected in the short term by higher logistics costs and therefore makes no effort to reduce dwell times. Such a scenario is likely to happen for patterns of cyclical demand that are elastic to price only in the long term (for example, food supplies, drugs, and equipment), while in the short term, there is little demand risk and the monopolist is therefore indifferent to higher logistics costs due to longer dwell times. A third pricing behavior derived from this situation of inelastic demand and observed among monopolistic companies is opportunistic pricing, which explains some paradoxical situations in which companies are willing to suffer from adverse logistics conditions because doing so helps them to justify charging higher markups or holding inventories longer in order to speculate on higher sale prices.

Companies seldom operate as pure monopolies, however, and the distribution of market power is more often in the hands of a few firms—that is, an oligopolistic situation. We analyze different cases of oligopolies in turn: cartels, leader-followers, price war (Bertrand competition), Nash equilibria–Cournot competition, and kinked oligopoly. All of these situations lead to different behaviors. In a cartel or leader-follower situation, monopolistic pricing strategies are observed. In a price war situation, the market behaves in the same way as in free competition, and companies try to minimize dwell time and logistics costs to secure competitive advantage over other market players. In other situations, the unpredictable consequences of price changes discourage the few market players from undertaking any price move that may unbalance the system; as a consequence, prices are stable despite changing logistics conditions.

**Uncertainty**

Taking uncertainty into account does not radically change the dynamics of cost minimization or profit maximization; in fact, it strengthens the conclusions in the previous chapters. We show that because of the risk of losing profit, companies operating in an uncertain context and lacking visibility on actual delivery times will behave with excess caution, accepting longer dwell times and building time for delay into their production or trading schedule to plan for the worst situation. This leads to longer dwell times in port, despite the adverse impact on costs and profits, because the long dwell time that is built into the business model,
expenditures, and logistics, especially for landlocked countries, is not designed for fast clearance (and payment).

**An Empirical Analysis of Demand: Lack of Competence or Purpose?**

A key factor is the lack of competence and professionalism of small importers and customs brokers, who often do not exercise due diligence in the clearance process. This results in considerable delays in payment and slows down the entire logistics chain. The capacity and professionalism of the private sector have a large effect on the clearing process, even greater than expected. For instance, an analysis of Douala port by a major freight forwarder found that customs procedures cause only 1 percent of all abnormal—20 days or more—cargo delays. The same analysis calculated that lack of or erroneous documentation by the importer or delays by the pre-inspection company are far more time-consuming than customs procedures in total clearance time.

**Empirical Evidence in the Ports of Douala (Cameroon) and Lomé (Togo)**

**Douala**

In Douala, the high level of inventory coverage leads to long port storage times. Using a typical private storage cost of FCFA 100 per ton per day,\(^2\) we estimate that storage in the port of Douala is cheaper than outside storage for 22 days, meaning 11 days more than the container terminal’s free time\(^3\). As long as most shippers do not intend to reduce inventory levels sharply, cargo dwell times will remain very high in the port of Douala.

The situation could improve slightly if shippers were aware of the total logistics costs associated with long cargo dwell times. Few operators include hedging costs or financial charges in their calculation of factory prices, and even fewer envisage actions to reduce dwell times with the objective of reducing inventory levels. As a consequence, dwell time in ports appears simply as an alternative to dwell time in private facilities, and shippers do not undertake a comprehensive analysis of lead time and inventory levels. Shippers who have high inventory coverage (typically two or three months) do not experience a major direct impact on costs because long dwell times are simply an alternative to costly and physically limited private storage.
However, the situation is radically different for shippers that have low inventory coverage, have just-in-time production processes, or handle urgent shipments. In these cases, the direct costs of higher cargo dwell time in port are not offset by savings in private storage costs since cargo is used or sold as soon as it arrives in the shipper’s facilities. In other words, storage in port is not perceived as an alternative to storage in private facilities but rather as a pure delay in the supply chain that affects logistics costs and customer service. The direct costs of long dwell times would quickly become prohibitive, especially in terms of lost sales (an estimated 0.5 percent a day).

The contracting patterns of clearing and forwarding (C&F) agents also exhibit some revealing peculiarities. For example, the introduction of a time-efficiency indicator with a weight of 30 percent in the national evaluation framework of C&F agents (Label Qualité des Commissionnaires Agréés en Douane) suggests that shippers are aware of the importance of time efficiency. However, few shippers include compelling time-efficiency terms into their contracts with C&F agents, especially dominant C&F agents who have a very strong supplier power. Those shippers who do include performance conditions in their C&F contracts formulate them in a way that leaves room for argument (for example, maximum clearance time on the condition that all documents are submitted correctly and in a timely manner by shippers). This is why the largest brokers maintain very high market shares despite poor time performance. Another key factor is that subsidiaries of international trade and industrial firms are often either financially linked with international forwarders or contractually linked to them at the regional or continental level, which does not encourage efficiency at the country level.

There are good reasons to believe that wider recognition of the national broker’s label would slowly increase the number of requirements placed on customs brokers, but that shippers would have to replace brokers with whom they have contracted for years. This seems improbable due to very strong patterns of repeat buying (loyalty of shippers).

Another major issue is the availability of cash and the strategies of shippers to reduce their financial exposure. Because of costly trade borrowing and limited import financing tools, shippers are often short of cash in their daily operations, and this is a major hindrance to the reduction of dwell times. The bulk of customs declaration lodging is done in the second or third week after container discharge, even though it takes no longer than three days, on average, to clear customs.
In the first step (the processing of payments), which takes 13 days on average today, processing could be shortened by facilitating the financing of customs dues, because finding the money to pay customs dues is a major reason for delaying this step. Savings in opportunity costs and financial charges associated with delayed clearance are probably underestimated because severe cash constraints and very high opportunity costs sometimes offset high demurrage charges after an extended stay in the terminal.

Some shippers facing extreme cash constraints have no choice but to abandon cargo in the port because they are unable to pay customs dues and clearance charges or can only pay them after part of the shipment has been sold.

**Lomé**

In Togo, the local market for consumer goods and food products is dominated by a few medium-size companies and strong informal operators who have captured significant market share over years in the context of a fragile administration and macroeconomic difficulties. Established companies use their own storage facilities in the city of Lomé adjacent to the port. All other operators take advantage of low storage prices to leave cargo in the port until final sale. Port warehousing areas have large capacity that has not yet been fully exploited, and this has delayed the development of off-dock storage. In addition, the trucking and freight-forwarding markets are scattered among a large number of small operators, especially in the important transit markets.

Storage practices are difficult to track in Lomé in the absence of comprehensive customs data. However, comprehensive port delay statistics suggest that delay is due in large part to the behavior of shippers (figure 4.1). For example, there are significant peaks in dwell time frequencies at two weeks, three weeks, and four weeks, although clearance formalities take only about seven days. The port authority in Lomé seems unable to track the payment of parking fees or to identify storage practices.

**Findings from the Firm Surveys**

The main objective of the analysis of firm surveys is to identify shippers’ demand and practices related to perceived and actual cargo dwell time and how they are linked to private sector market structure.
The statistical analysis of the results of firm surveys attempts to validate some of the theoretical assumptions presented in the previous section. The surveys were conducted in five Sub-Saharan African countries—Kenya, Nigeria, South Africa, Uganda, and Zambia—from May to July 2011. Each of the surveys includes about 100 observations (per country), yielding 506 validated records. Participants in the survey are shippers importing containerized cargo through the ports of Durban (for South African and Zambian importers), Mombasa (for Kenyan and Ugandan importers), and Lagos (for Nigerian importers). Both manufacturers and retailers in the most important sectors are represented in the survey.

Data Collection Problems Encountered during Fieldwork
Several problems were encountered while collecting data in the field. In many instances, the respondents were not able to answer all of the questions, mostly because they did not have the information (they had to check with other employees or the forwarding agents). For example, many respondents did not know clearance times in harbor or customs, as clearance procedures are generally handled by their C&F agents, who do not necessarily share the information with them. Many shippers were only concerned with the final on-site delivery dates. Some respondents did not understand the questions, even though pilot surveys had been conducted to eliminate this problem. These issues reveal the problem of information asymmetry between importers and their C&F agents, owing mainly to the lack professionalism and transparency of C&F agents, who
do not provide feedback about their work or exchange information about the clearance process with their shippers.

Another issue, particularly in Kenya, Nigeria, and Uganda, is that some of the potential respondents were suspicious about the survey and not willing to participate in studies of this nature. They considered the questionnaire to be seeking sensitive or private information.

However, several respondents, mostly in South Africa, felt that the interview was interesting and expressed appreciation that it was being conducted because they felt that something needed to be done to “improve the red tape of getting goods out of the harbor in time.”

This demonstrates two major problems that inhibit change: lack of information and low expectations.

**Dwell Time Statistics and Expectations**

The perception about what is “normal” cargo dwell time varies between countries and regions. Refas and Cantens (2011) present a detailed discussion regarding what is considered “normal” dwell time in Sub-Saharan Africa. According to them, it is around 11 days (close to the free time period) in Douala and in most ports in Sub-Saharan Africa. This is a particularity of the region, because the dwell time perceived as “normal” in most international ports in East Asia or Europe is around four days.

**Dwell Time as reported by shippers.** In the surveys, two variables were used to measure cargo dwell time: (a) the average dwell time measured in days and (b) the distribution of dwell time, by length of time: 0–5 days, 6–10 days, 11–20 days, 21–40 days, 41–70 days, and more than 70 days. The average cargo dwell time (measured in days) by country, weighted by the number of imported containers, is shown in figure 4.2. South Africa has the shortest dwell time, as expected, close to what is identified as “normal” in Europe or Asia. Nigeria has the longest. The average dwell time of the total five countries sample is around 8 days.

These figures should be viewed with caution, because they are not necessarily representative and are less reliable than customs data. Data collected in firm surveys should only be used as a complement to customs data on dwell time.

It is also interesting to analyze the distribution of dwell time by country (figure 4.3). In South Africa, 93 percent of imported containers have a dwell time between 0 and 5 days, which is expected, since the average is very low (3.93 days) compared to the other countries. In Kenya and Nigeria, 69 and 74 percent, respectively, of their imports need between
6 and 20 days to be cleared; this is consistent with the average dwell time experienced by Kenya (around nine) and Nigeria (around 14 days).

In Zambia, most of the imported containers (59 percent) have a dwell time between 0 and 5 days; hence average dwell time is almost the same in Zambia (7.64 days) as in Uganda (7.41 days), even though only 16 percent of containers in Uganda have average dwell time of 0 to 5 days, while 76 percent have average dwell time of 6 to 11 days.
Zambian importers benefit from the relatively good performance of Durban port, which shows that tackling performance issues in a port has a positive spillover effect on landlocked countries.

**Comparison with shippers’ perception of dwell time.** When importers’ perceptions of cargo dwell time are compared with actual dwell time in Sub-Saharan African countries, the latter is higher than expected in Kenya and Nigeria, which means that importers here are likely to want to reduce dwell time and might exert pressure to do so.

On the contrary, in South Africa, Uganda, and Zambia, the perception of normal cargo dwell time is higher than the estimated normal dwell time, meaning that there may not be strong pressure to lower it; importers might be satisfied with experiencing a shorter dwell time than expected. In both cases, average dwell time is lower in Durban than in the other ports studied, which may explain the relatively low expectations.

These differences between countries suggest that dwell time is also about perception and information (table 4.1). Shippers may not understand the significance of dwell time and may not have accurate information on it (dwell time statistics are often unknown and incorrect).

**Analysis by Importers’ Characteristics**

**Main activity.** The analysis of average dwell time with regard to the shippers’ main activity indicates that manufacturers perform better than traders overall (figure 4.4). Moreover, manufacturers have a significantly shorter average dwell time—one day shorter—than the other importers ($t(313.826) = 1.679; p = 0.047$). They are more efficient and should be the primary counterparts of customs or terminals in contractualization

### Table 4.1 Average Dwell Time and the Perception of Normal Dwell Time in Select African Countries, 2011

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Kenya</th>
<th>Nigeria</th>
<th>South Africa</th>
<th>Uganda</th>
<th>Zambia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual average cargo dwell time</td>
<td>Mombasa</td>
<td>Lagos</td>
<td>Durban</td>
<td>Mombasa</td>
<td>Durban</td>
</tr>
<tr>
<td>Perception of “normal” average cargo dwell time</td>
<td>8.71</td>
<td>14.11</td>
<td>3.93</td>
<td>7.41</td>
<td>7.64</td>
</tr>
<tr>
<td></td>
<td>7.7</td>
<td>11.2</td>
<td>6.5</td>
<td>8.7</td>
<td>14.1</td>
</tr>
</tbody>
</table>

**Source:** Authors based on firm surveys.
initiatives because they master their logistics (raw materials or intermediary products) and can reach top performance by implementing efficient processes.

Furthermore, small and medium retailers experience the longest dwell time. They have a significantly longer dwell time than the other shippers—around 10 days longer ($t(9.056) = 1.7991; p = 0.05$). This is not surprising: small retailers generally do not have their own warehouse and probably use the port as a storage facility; they may also experience a slower clearance process than larger shippers. This may be due to informal practices and possible “negotiations” with regard to lowering tariff duties and thus the cost of imports.

These findings are consistent with the assumption of the theoretical model, which posits that companies intentionally leave their cargo in ports since these are cheap storage units. The analysis by country illustrates that small and medium retailers are more likely to experience long dwell times in Nigeria, Zambia, Uganda, and, to a lesser extent, South Africa, which confirms our assumptions (figure 4.5).

The preponderance of trading is self-reinforcing: retailers have longer dwell times, and this makes port dwell time longer for everyone. This constitutes a barrier to assembling industries, which then paves the way for retailers to constitute a large share of port users.

**Volume of importations.** Contrary to the common belief that the volume of imports is an important determinant of cargo dwell time, in
Sub-Saharan Africa the volume of imports is not correlated with dwell time (figure 4.6). Hence, shippers that import medium volumes seem to have significantly longer dwell time—about one day longer—compared to shippers that import very low, low, and large volumes ($t(212.253) = 1.669; p = 0.048$). And shippers importing large volumes seem to have significantly shorter dwell time—approximately one day shorter—than all the other shippers ($t(268.041) = 2.218; p = 0.013$). More than the size of the company, the type of company and its business model are what matter the most.

**Frequency of deliveries.** An important relationship to test through data analysis is the one between dwell time and the annual frequency of deliveries. It seems that more frequent deliveries—more than 10 deliveries every year (figure 4.7)—result in about two days shorter dwell time ($t(273.202)= 3.562; p = 0.0002$). This reflects the dominant situation of importers in Sub-Saharan African countries, who have, on average, less than 10 deliveries every year and do not have real logistics strategies in place.

**Analysis by Market Structure**
Figures 4.8 and 4.9 present dwell time by the level of competition between shippers. In figure 4.8, the categories 0, 1, and 2–5 competitors are aggregated into “monopoly-oligopoly,” and the categories 6–20 and
Figure 4.6  Cargo Dwell Time, by Annual Volume of Imports, 2011

![Bar graph showing cargo dwell time by annual volume of imports.]

Source: Authors based on firm surveys.

Figure 4.7  Cargo Dwell Time, by Annual Frequency of Deliveries, 2011

![Bar graph showing cargo dwell time by annual frequency of deliveries.]

Source: Authors based on firm surveys.

Figure 4.8  Cargo Dwell Time, by Number of Competitors, 2011

![Bar graph showing cargo dwell time by number of competitors.]

Source: Authors based on firm surveys.
more than 20 competitors are aggregated into “competition.” Importers in monopoly-oligopoly situations experience a two-day shorter dwell time than importers in competitive situations ($t(223.564) = 2.694; p = 0.003$). In fact, rational importers in monopoly-oligopoly situations are likely to have shorter dwell time because they seek to minimize their logistics costs (long dwell time generally translates into higher logistics costs) in order to optimize their profits.

In all countries except South Africa, monopoly-oligopoly situations are likely to keep cargo dwell times lower (figure 4.10). However, shorter dwell time does not necessarily translate into lower prices, since the main objective of shippers is to maximize profits.

Only in South Africa does the high degree of competition play an important part in keeping dwell time shorter: since importers in a competitive situation cannot afford to reflect the costs of delays in their prices because they are afraid of losing customers, they protect the customers from price increases due to cost increases. These findings can be explained by the maturity of the South African economy.

**Analysis by C&F Agents’ Professionalism**

*Level of information provided by C&F agents about the clearance process.* Overall, when C&F agents provide accurate forecasts and real-time information about progress or delay in the clearance process well in advance (even if unexpected events might arise), dwell time is shorter (figure 4.11)—one day shorter when real-time information is provided ($t(184.615) = 2.242; p = 0.013$) and less than one day shorter
when clearance delays are well documented in advance, although this is not significant ($t(157.338) = 0.535; p = 0.296$). Shippers who master their logistics are the most efficient. The information appears to be the key to improve performance.

These findings hold for Kenya, South Africa, and, to a lesser extent, Uganda (figure 4.12).

**Main determinants in the selection of C&F agents.** When shippers select C&F agents based on their professionalism, cargo dwell time is likely to
be shorter than in the case of a selection based on the long term relationship with the agent (figure 4.13). Hence, when costs are the most important reason for selecting an agent, dwell time is shorter. However, the picture is not clear when looking at the data by country and may reflect a misunderstanding of the questions asked (figure 4.14).

**Analysis by Product Category**

The overall distribution of imports by category, shown in table 4.2, indicates that machinery and electrical products are the largest category (27 percent), followed by chemicals and allied industries (14 percent) and transportation (13 percent). Machinery and electrical is the largest category in Nigeria, South Africa, and Uganda and the smallest in Zambia. While the distribution of most product categories is rather balanced among countries, important differences are evident for transportation, which accounts for 30 percent of imports in Zambia, but only 5 percent in South Africa. The differences are also important for textiles, which account for only 0–4 percent of imports in all countries, except South Africa (16 percent).

This might explain a certain selection bias in favor of equipment, but also a higher level of professionalism (in South Africa compared to the other four countries) and therefore might depict the situation as better
than it is in reality. Moreover, the category of service products is small overall (2 percent) and nonexistent in Nigeria and Zambia.

Average dwell time varies significantly across categories and countries (table 4.3). For example, stone and glass products remain in port terminals for about 12 days. They are cleared more rapidly in South Africa...
(4.5 days) than in Zambia (14 days), which may explain differences in the degree of competition in Zambia and South Africa.

Moreover, while textiles take 6.5 days to clear on average, they take only 5 days in South Africa and 10 days in Uganda. These findings confirm

| Table 4.2 Imports in Select African Countries, by Product Category, 2011 |
|-----------------------------|------------|----------|-----------|-----------|----------|----------|
| % of all imports            | Total      | Kenya    | Nigeria   | South Africa | Uganda   | Zambia   |
| Chemicals and allied industries | 14        | 18       | 15        | 11         | 12       | 11       |
| Foodstuffs                  | 9          | 10       | 15        | 5          | 7        | 7        |
| Machinery and electrical    | 27         | 25       | 32        | 30         | 30       | 18       |
| Mineral products and metals | 9          | 12       | 17        | 9          | 4        | 5        |
| Miscellaneous               | 4          | 4        | 0         | 9          | 5        | 4        |
| Plastics and rubber         | 6          | 6        | 3         | 9          | 7        | 2        |
| Service                     | 2          | 4        | 0         | 2          | 1        | 0        |
| Stone and glass             | 7          | 2        | 7         | 4          | 10       | 16       |
| Textiles                    | 5          | 4        | 0         | 16         | 4        | 2        |
| Transportation              | 13         | 6        | 10        | 5          | 15       | 30       |
| Wood and wooden products    | 4          | 8        | 2         | 0          | 5        | 5        |

Source: Authors based on firm surveys.

| Table 4.3 Cargo Dwell Times in Select African Countries, by Type of Product, 2011 |
|--------------------------------|--------|----------|-----------|-----------|----------|----------|
| number of days                | Total  | Kenya    | Nigeria   | South Africa | Uganda   | Zambia   |
| Chemicals and allied industries | 9.94   | 10.44    | 9.33      | 8.83       | 8.90     | 12.33    |
| Foodstuffs                    | 7.65   | 5.89     | 7.67      | 5.00       | 9.33     | 11.00    |
| Machinery and electrical     | 9.03   | 7.68     | 9.32      | 8.35       | 10.56    | 8.80     |
| Mineral products and metals  | 7.94   | 7.18     | 8.10      | 5.40       | 7.00     | 15.33    |
| Miscellaneous                | 11.93  | 12.25    | —         | 11.80      | 10.75    | 14.00    |
| Plastics and rubber          | 8.89   | 6.60     | 9.50      | 3.60       | 14.83    | 10.00    |
| Service                      | 7.17   | 6.50     | —         | 14.00      | 3.00     | —        |
| Stone and glass              | 12.28  | 10.00    | 9.75      | 4.50       | 13.75    | 14.33    |
| Textiles                     | 6.53   | 6.50     | —         | 5.11       | 10.00    | 9.00     |
| Transportation               | 9.21   | 13.20    | 8.67      | 3.67       | 11.83    | 7.35     |
| Wood and wooden products     | 8.27   | 8.29     | 7.00      | —          | 7.25     | 10.00    |

Source: Authors based on firm surveys.
Note: — = Not available.
that the type of commodity is an important determinant of cargo dwell time.

Finally, table 4.4 summarizes the main assumptions of the theoretical model and the findings of the statistical analysis.

This exercise is, to our knowledge, the first of its type and does not answer all of the questions raised in this field. However, it demonstrates the crucial importance of studying private sector practices and incentives before designing any program aiming to reduce dwell time. The assumption that “importers are the victims of long container dwell time” is likely to be wrong in the case of many ports in Sub-Saharan Africa, which probably explains the multiple failures of many initiatives in this area. Only a couple of importers may be on the side of reform (for example, in Cameroon). This kind of study should be expanded to other countries, and some

<table>
<thead>
<tr>
<th>Theoretical assumptions</th>
<th>Survey findings</th>
</tr>
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<tbody>
<tr>
<td>Warehousing-derived terminalization: terminals are</td>
<td>Verified. Small and medium retailers are likely to use the port as a cheap storage facility.</td>
</tr>
<tr>
<td>cheap storage units for shippers (for example, port</td>
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<td>storage is a cheaper option until 22 days in</td>
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<tr>
<td>Douala).</td>
<td></td>
</tr>
<tr>
<td>Product characteristics and market structure are</td>
<td>Verified for market structure. Monopolies are time-efficient in Kenya, Nigeria, Uganda, and Zambia, but competition is time-efficient in South Africa. Hence, low dwell time is not necessarily reflected in lower prices in the case of monopolies-oligopolies (which might seek to maximize profits); however, it might keep prices low in competitive situations (South Africa). Verified for product category. Important differences are found in cargo dwell time among product categories.</td>
</tr>
<tr>
<td>the main determinants of dwell time.</td>
<td></td>
</tr>
<tr>
<td>Dwell time is also about perception and information.</td>
<td>Verified. When the dwell time perceived as “normal” is higher than the actual dwell time (Kenya, Nigeria), shippers are likely to exert pressure to shorten it; if the perceived dwell time is higher than the actual dwell time (South Africa, Uganda, Zambia), there might be no pressure to shorten it. Communicating reliable information about dwell time is key to avoid ill-adapted strategies and stimulate time performance of customs brokers.</td>
</tr>
<tr>
<td>In uncertain contexts, shippers build delay into their production schedule to plan for the worst.</td>
<td></td>
</tr>
<tr>
<td>Dwell time statistics are often unknown or incorrect.</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors based on firm surveys.
issues, such as the impact of market structure on pricing strategies, should be investigated further.

More analysis could be done with regard to the market structure of the private sector and the role of formal and informal behavior. However, such a study would undoubtedly encounter even greater reluctance on the part of respondents to answer questions that they view as confidential and even greater lack of understanding of the issues.

Notes

1. Appendix B presents a thorough description of the model used and theoretical behaviors.

2. Estimation based on average monthly storage costs for consumer goods, gleaned from local interviews. The currency is the franc Communauté Financière Africaine (FCFA).

3. The calculations are based on a net mass of 30 tons per TEU (20-foot equivalent unit) and a cargo value of US$18,735 per TEU for 2009 (Cameroon customs database).

4. Data do not capture Zambian importers using Dar es Salaam port. Therefore, no comparison is possible in this regard.

5. For descriptive statistics on firms' surveys, see appendix C.

6. In Kenya, pilot surveys were conducted in order to check whether the questions were understood by the interviewees and the length of the questionnaire.

7. This measures the proportion of containerized imports with a dwell time of 0–5 days, 6–10 days, 11–20 days, 21–40 days, 41–70 days, and more than 70 days.

8. All t-tests in this chapter are run on groups with unequal variances; thus Satterthwaite's approximation is computed instead of the usual degree of freedom.

9. This also holds when comparing average dwell time of each category of competitors with the next highest category: shippers that do not have competitors have a three-day shorter dwell time than those that have more than 1 competitor ($t(14.426) = 4.346; p = 0.0003$); shippers that face one competitor experience a three-day shorter dwell time than those that have more than two competitors ($t(10.568) = 2.735; p = 0.01$); and shippers with two to five competitors have a one-day shorter dwell time than shippers with more than five competitors ($t(150.772) = 1.749; p = 0.041$).

10. We use 11 categories based on the 15 standard categories (using two-digit Harmonized System codes). We aggregate some of the categories because
they are too small, but some still account for less than 5 percent of the total volume of imports. This might explain the problem of selection bias.

Reference
